

# Computer News 2018-19

micro LED TV, 5 nano meter chips

BRYAN B



# Computer News Summary 2018-19 microLED 5 nano meters

Bryan Bernstein

This book is for sale at <http://leanpub.com/ComputerSummarize>

This version was published on 2020-01-12



This is a [Leanpub](#) book. Leanpub empowers authors and publishers with the Lean Publishing process. [Lean Publishing](#) is the act of publishing an in-progress ebook using lightweight tools and many iterations to get reader feedback, pivot until you have the right book and build traction once you do.

© 2020 Bryan Bernstein

# **Contents**

Chapter One . . . . .	1
-----------------------	---

# Chapter One

## Computer News Summaries 2018 to 2019

### Table of Contents:

Quality  
Cheap  
Free Apps  
Battery, Solar  
Fashion  
Food, Farms  
Medical Tech  
Robots  
Tiny Houses  
Other  
References

### Summary:

\$400 #7 nano Qualcomm 865, 6.7" OLED.  
#5 nano March 2021, #3 nano thin 2023.  
\$10 billion factories Intel, TaiwanSMC, Samsung.  
\$1,000 microLED folding screens best quality, but not sold in phones yet.  
\$35 Raspberry Pi4 to \$65 Google Go phones TCL Alcatel 1B.  
Taiwan MediaTek MT6580 slow #28 nano meter, RiscV, Mips ISA-R6, ARM Cortex a55.  
Free TV app Kodi, compress AV1 HandBrake & Hybrid. Vulkan game language Nintendo Dolphin, CEmu (W.I.N.E. HangOver DXVK, XWayland on Android) Citra, Mupen64fz, RetroArch ROM.  
Solid state graphene battery 2021. Gallium Nitride electric cables. Solar perovskite LED red blue chore bots. Filter ocean saltwater for deserts.

### Quality:

#3 nano gate all around 3GAE Multi-Bridge-Channel FET stacked Samsung chip factory 2023.  
#3 nano chip \$750 million to design blueprint.  
#5 nano thin v-NWFET vertical nanowire FET chips 50% smaller.  
#5 nano ARM Cortex a77 fast 3 watt CPU chips for license 2021.  
#5 nano ARM Mali G77 GPU Vulkan 1.1 OpenGL ES 3.2, 16 cores for license.  
#6 nano CLN6FF, N6 Samsung & Taiwan TSMC chip factories summer 2020.  
#7 nano AMD Navi 2020 could be 8" touchscreen.  
\$15 Google Power Support Claw for Stadia joystick.  
\$25 per square meter Quantum Dot OLED 2021.  
\$40 Belkin Boost Charge Gallium Nitride.

\$43 Anker PowerPort+ Atom III Gallium Nitride Quick Charger 3.  
\$70 Samsung Galaxy S10 Plus 6.4" flexible OLED screen.  
\$87 6.4" OLED.  
\$90 Samsung SDC 7.3" foldable OLED 2022.  
\$130 TP-Link Archer AX1800 router Wi-Fi 6 (802.11ax) fall 2019.  
\$150 NVidia Shield TV Tegra X1+ obsolete #20 nano desktop. Competes with \$35 Raspberry Pi 4.  
\$150 JBL 300TWS wireless earphones, 4 hour battery.  
\$190 AMD Ryzen 5 3600G Zen version 2.0 #7 nano 2019.  
\$286 Nebra Anybeam laser pico-projector 720p TV.  
\$300+ Micron i300 1 TB microSD card.  
\$350 Laser Beam Pro C200 TV projector.  
\$350 #7 nano AMD Radeon RX 5700 desktop GPU, Contrast Adaptive Sharpening.  
\$375 Imagination IMG AXT-64-2048 GPU for fast phones, 2 TFLOPS, 64 Gpixels, 8 TOPS AI.  
PowerVR B-series Barrex August 2020, #5 nano C-series Caturix late 2021, #3 nano D-series Divano 2023.  
\$380 Oppo Realme X2 Pro #7 nano Qualcomm 855+ processor, 6.5" OLED.  
\$382 China Jianguo Smartisan Nut Pro 3, 6.4" OLED, #7 nano Qualcomm 855+.  
\$390 Lenovo Z5 Pro GT Qualcomm 855 #7 nano, 6.4" OLED.  
\$392 Xiaomi Mi 9, #7 nano Qualcomm 855, 6.4" OLED.  
\$400 Lexar Professional 633x SD card 1 TB memory.  
\$420 China ZTE Red Magic 3S, 6.6" OLED, Qualcomm 855+, 5,000 amp battery, ICE2.1 air & liquid cooled, black or silver.  
\$420 to manufacture Samsung Galaxy S10+, sells for \$1,000.  
\$420 Oppo Ace 6.5" OLED, #7 nano Qualcomm 855+, psychedelic purple or starry.  
\$450 Xiaomi Mi9 assembled by Foxconn, Yinghuada, BYD.  
\$470 Meizu 16 series pre-orders 2 million units.  
\$500 Chinese ZTE Nubia Z20, 6.4" + 5.1" OLED, Qualcomm 855+, 6 gigs RAM, 128 gigs memory UFS 3, 4,000 amp battery.  
\$500 Intel #10 nano laptop Core i3-8121U Cannon Lake chip.  
\$510 Taiwan Asus Rog Phone II #7 nano Qualcomm 855+, 6.6" OLED 1080p.  
\$535 China Vivo iQOO Pro 5G, Qualcomm 855+, 6.4" OLED, 8 gigs RAM, 128 gigs UFS 3 memory.  
\$615 China OnePlus 7T 6.5" OLED, Qualcomm 855+ #7 nano.  
\$685 OnePlus 7T Pro 6.7" OLED, #7 nano Qualcomm 855+.  
\$900 overpriced Google Pixel 3 XL, 6.3" Samsung OLED screen.  
\$1,300 China Royole fold OLED factory wants \$1 billion investment.  
\$1,600 Lenovo 15-inch OLED Yoga C730 Intel laptop.  
\$2,000 Lumi Industries mechanical volumetric display VVD.  
\$3,000 Intel Horseshoe Bend foldable 17" Tiger Lake #10 nano.  
\$8,000+ LG 65" Signature OLED TV R model 65R9 roll-able.  
\$10,000 Microsoft DNA memory prototype, with sequencer.  
\$10,000 Voxon Photonics VX1 hologram 3D TV screen.  
\$240,000 China Konka 118" 4K micro-LED.  
\$390,000 Sony 146" micro-LED Crystal-LED TV.

\$490,000 India Samsung The Wall MicroLED 146" TV 4K.

\$500,000 Micro-LED Samsung 34-foot Onyx movie theater.

\$1 million satellite dishes, routers, concrete for 4G LTE network of 500 people.

\$27 billion, more than 400 million OLED screens in 2018.

1 billion OLED phones sold.

170 million Micro-LED lightbulbs will be sold 2028, \$1.4 billion.

18 phone service co's use Qualcomm x50 5G antenna.

20 metals considered for #3 nano meter chips.

2019 codename Deimos #7 nano ARM Cortex a77 fast chip.

2020 Hercules fast game ARM a78 chip #5 nano.

2025 heated clothing mainstream.

2028 spintronic electronics more efficient.

2033 light-driven tiny photo-motors.

2035 self-cleaning clothing.

2036 stronger artificial molecules.

2039 every house self-sufficient.

2040 genetronics DNA computer.

2041 hologram projector phones.

2044 fusion electricity.

430 million phone OLED screens sold 2018. "Amorphyx quantum-tunneling OLED display back-planes." "Area-selective deposition chip production #5 nano or less 2021." "China BOE inkjet printed OLED screen prototype." "Developing evaporate cooling prototype, porous silicon membrane." "DNA assisted lithography (Dali) chip manufacture." "EUV chip factory machine costs \$187 million." "Ferroelectric materials decrease chip power consumption." "Foxconn considering 12-inch chip factory." "Intel sells around 250 million chips/year." "Korea's KAIST flexible vertical micro-LEDs (f-VLEDs)." "Micro-LED developer VueReal \$10.5 million invested." "MicroLED prototype by Jade Bird Display." "Micron to expand production #10 nano DRAM memory in Taiwan." "Microvision TV laser projector \$18 million common stock offering." "OLED materials Idemitsu Kosan subsidiary in Chengdu, China." "Samsung will jump into market if consumer needs roll-able TV." "Spain graphene with same band gap of silicon (1 eV)." "Taiwan Unique Materials \$2.3 million quantum dot factory." "Taiwan WiseChip Semiconductor flexible in-cell touch OLED." "UDC supplies phosphorescent OLED material to China Visionox." "You will hear more about #7 nano Navi in 2019," AMD Lisa Su.

Aixtron micro-LED collaboration agreement with PlayNitride.

AMD #7 nano Ryzen 3rd Gen Matisse Zen 2 with PCIe 4.0 desktops.

AMD Zen 3 Ryzen 4000 CPU, Taiwan TSMC #7 nano Plus EUV, 2020 desktop, 2021 iPad.

AMD #7 nano Ryzen Castle Peak desktops late 2019.

AMD #7 nano Taiwan TSMC 2020.

AMD Navi #7 nano GPU game chip, after October.

AMD Navi GPU chip late 2019.

AMD Zen 2 desktop chips #7 nano thin late 2019.

AMD, Intel & NVidia compete with Qualcomm game phones, 2021.

AMEC Micro-LED in MOCVD R&D production facility in Nanchang.

American chip factory equipment \$1.9 billion worldwide per month.  
Apple #5 nano thin chip, TSMC Taiwan factory, late 2020.  
ARM new 64-bit chips ARMv8.5 AArch64.  
aSi-OLED brighter contrast, faster response time.  
ASML chip factory equipment hired 2,500 people in Taiwan.  
ASML high numerical aperture EUV tools by 2030.  
ASML sold 30 units of extreme ultraviolet chip scanners 2019.  
AUO 12" microLED prototype.  
AUO prototype 8" Micro-LED, best quality with less electricity.  
Best iPad DRAM memory Samsung 12GB LPDDR4X #10 nano.  
British graphene Paragraf \$4 million invested.  
Cadence & Micron DDR5 RAM chip 2020 less than #18 nano.  
Cadence GDDR6 memory made by Samsung #7 nano 7LPP EUV.  
China BOE OLED factory 1 million flexible units/month.  
China folding OLED factories BOE, Visionox, Tianma, EDO.  
China Visionox 10.5" OLED folds in 3 places.  
China Fudan University Quasi-non-volatile RAM.  
China Hisense Micro-LED concept TV 143-inch Adonis MD.  
China Huawei researching DNA memory synthetic nucleobases.  
China Royole OLED factory 0.01 millimeter thin bending screens.  
China Sa'nan Optoelectronics microLED TV factory late 2019.  
China Sanan Opto R&D on III-V compound chips, GaAs, GaN & InP.  
China Skyworth OLED TV factory 1 million yearly units \$73 million.  
China TCL \$6.7 billion OLED TV factory 2021.  
China Tianma & Guangdong Juhua 4.9" OLED ink-jet printed.  
China Tsinghua carbon nanotube threads are centimeters long. Bundle them to make strong fiber.  
China vapor chamber & graphene film chip cooling system.  
China Visionox manufactured Xiaomi foldable OLED.  
China Visionox OLED factory \$6.3 billion 2021.  
China Vivo brand IQOO phones cost more than \$700.  
\$550 China ZTE Axon 10 Pro, #7 nano Qualcomm 855, 6.5-inch OLED.  
China chip factory #7 nano 2020, E.U.V. Ultra-Violet laser.  
Cisco acquired Luxtera fiber optic photonic chips for \$660 million.  
CMC Magnetics hologram optical disc 2024.  
COF (Chip On Film) package process for display driver chips.  
Coin-sized optical phased array TV projector & light bulb.  
Columbia University ion gated transistor does not use silicon.  
Corning Astra glass for IGZO.  
Corning glass sales \$2.7 billion second-quarter 2018.  
Cynora to develop blue TADF emitter OLED by end of 2018.  
Dell OLED 15-inch gaming notebooks XPS 15, Alienware m15, G15.  
DNA polymers 100,000 times more efficient than silicon memory.  
E Ink JustWrite black & white screen, maximum 3 feet.

Emitter (SE) PERC mono-Si have better energy conversion rates. Ruthenium could replace copper in chips.

England Plessey Semi microLED gallium-nitride on silicon.

EPFL researchers developed a chip based on excitons.

EUV chip factory mask yields currently 72% (28% defective rate).

Expensive desktop #7 nano AMD A.I. chip.

Flat surface moves up & down rapidly, projecting.”

Fraunhofer FEP & EMDE wearable OLED light integrated into textile.

Free chip blueprint charity RISC-V SiFive invested \$50 million.

Fuzhou, China B.O.E. \$6.75 billion flexible OLED factory.

GaN chips use 25% less electricity than silicon.

Good HDR TV's have 100% sRGB & 75% AdobeRGB.

Google Pixel brand 2 year warranty, free app updates.

Googles can recharge up to 27 watts USB-C PD (Power Delivery).

Haier Asu projector watch.

HBM2 memory standard, 24 gigabytes, 307 GB/second per stack.

HDMI 2.1 TV cable dynamic HDR10 & HDR10+.

HDMI TV cable 2.1 variable refresh rate (VRR).

Heliospectra Elixia LED lights & HelioCore app.

Holst Centre IGZO screen uses less electricity.

IBM area-selective deposition for #5 nano chip factories 2021.

Imec working on thinner alloys for etching chips.

Infineon 65 watt USB charger using Gallium Nitride (GaN).

Intel #10 nano meter laptops November 2019.

Intel #10 nano not common until volume manufacturing late 2019.

Intel #10 nano desktop Core i3 Comet Lake, summer 2020.

Intel 3DXP DIMM memory chips.

Intel 5G phone antenna laptops January 2020.

Intel Core i3 #10 nano 2020 is faster for videogames.

Intel Core m3-8114Y middle speed #10 nano laptop chip.

Intel expands \$5 billion #10 nano Israel factory 2020.

Intel Ireland #7 nano EUV chip factory \$8 billion, 2023.

Intel may not have good enough 5G antenna to sell Apple until 2022.

Intel Optane Memory M15 16 to 128 gigabytes PCIe 3x4.

Intel Pocket PC Microsoft prototype.

Intel quarter 2 2018 \$17 billion revenue.

Intel Tremont JacobsVille slow #10 nano Pentium Gold chips 2019.

Intel Willow Cove #10 nano chips 2020, Golden Cove 2021.

Intel working on Arctic Sound game GPU chip.

Ireland X-Celeprint 5" Micro-LED prototype.

Israel Metal-Oxide-Nitride-Oxide-Silicon (MONOS) optical chip.

Japan Denso invests \$280 million in JOLED factory.

Japan JOLED printed OLED TV factory 2020.

Japan JOLED factory \$228 million invested.  
Japan JOLED, Panasonic & Screen Finetech OLED printers.  
Japan OLED Idemitsu Kosan + Toray Industries OLED materials.  
Japan Rohm Semi SiC (silicon carbide) wafer factory \$535 million.  
Japan Sharp (Foxconn) Aquos phone with OLED screen.  
Japan Sharp commercial production flexible OLED for phones.  
Jun Zhan LED lighting with low thermal resistance.  
Karlsruhe Institute Tech smallest transistor chip #1 nano meter.  
Korea ETRI flexible OLED transparent graphene electrode.  
Korea MagnaChip to develop drivers for micro-LED signage displays.  
Korea OLEDON vertical-plane source deposition OLED technology.  
Korea Seoul Semiconductor Micro LED.  
Korean Lumens Inc. micro-LED for cars.  
Kyulux OLED TADF \$31 million invested.  
Laser pulses convert carbon nanofibers to diamond.  
LG “price of LED’s alone in 150” 4K micro-LED TV \$250,000.”  
LG demonstrated microLED TV.  
LG sold 15 million OLED to Oppo, Vivo, Xiaomi 2018.  
LG sold 3 million OLED TVs since 2013.  
LG to increase OLED TV production to 10 million units by 2021.  
LG to supply Sony phones with flexible plastic OLED.  
LG will supply Apple 2 million to 4 million OLED displays.  
LG working on rollable & foldable OLED phones.  
LG \$175 million for DuPont soluble OLED.  
Light Field Lab hologram projector \$7 million invested.  
Macronix memory factory 96-layer 3D NAND 2021.  
Made In Space Inc optical fibre ZBLAN, fluoride glass 10x efficient.  
Magnetic RAM agreement ARM, Spin Memory, Applied Materials.  
Maybe possible to fluoresce oxygen, nitrogen air as TV.  
Merck OLED quantum materials \$10 million invested.  
Micro-LED for cars SmartVIZ, Osram, Fraunhofer IISB, ASM Amicra 2022.  
Micron DRAM #1z nano-meter Taiwan factory volume production 2020.  
Micron memory factory UFS 3.0 2021.  
Mirage lab-grown diamond glass, for stronger screens 2019.  
N.C. State University field-effect chip crystal, hybrid perovskite.  
Nanosys quantum dots for OLED & MicroLED.  
New chip material wide-gap compounds such as GaN & SiC.  
Nichia Micro-LED screens 2022.  
Nokia partnered with Pixelworks for HDR screens.  
Nvidia #7 nano Ampere GPU, Samsung EUV factory 2020.  
Nvidia quarterly revenues \$3.12 billion.  
Oppo OnePlus \$1.4 billion/year selling OnePlus 6T/7 \$600 phones.  
Oppo OnePlus 50 employees in India.

Oppo Warp Charge 30 watts fast.

Optical logic gate chip prototype by Aalto U made from nanowires.

OSRAM green laser diode PLT3 520D (520 nm) for pico projectors. Energizer foldable Google phone with French Avenir Telecom.

Pellion Technologies lithium-metal battery.

Pixelworks Iris 5 display chip HDR10+, Day Light View.

Print circuits made of silver nanoparticles, with liquid metal alloy.

Proton battery carbon instead of lithium.

Purdue & University of Virginia thin film nano-electronics.

Qualcomm #7 nano thinnest X24 antenna 2019.

Qualcomm \$5.6 billion third quarter 2018, 205 million chips sold.

Qualcomm 5G antenna R&D, millimeter-wave testing in Taiwan.

Qualcomm 802.11ay 60-GHz Wi-Fi QCA64x8 & QCA64x1.

Qualcomm investing \$700 million Taiwan manufacturing engineers. Qualcomm expects \$5 billion revenues financial year 2018.

Qualcomm Quick Charge version 4+ 32 watt fast charging standard. Qualcomm licensed THX audio quality.

MPI (modified polyimide) antenna.

Rumor: Arcturus is name of AMD #7 nano game chip 2020.

Samsung & China San'an optoelectronics co-develop micro-LED.

Samsung & LG invested \$25 million Cynora OLED chemicals.

Samsung \$1,000+ 73" micro-LED TV Wall Luxury July.

Samsung \$6 billion another #7 nano E.U.V. chip factory 2020.

Samsung #16 nano DRAM memory 2020

Samsung 1 terabyte eUFS 2.1 memory. Samsung Exynos ARM Cortex a77 phones licensed AMD GPU RDNA 3 watt game #5 nano chip 2022.

Samsung 13" OLED laptop screen, \$50 more than bad quality LCD.

Samsung 2019 3D SiP (system-in-package).

Samsung 5G phone antenna Exynos Modem 5100 2019.

Samsung 8LPU (low power ultimate) #8 nano.

Samsung borderless OLED 2022.

Samsung fan-out panel-level packaging (FOPLP) for chips 2019.

Samsung HBM2E Flashbolt 16 gig DRAM for faster GPU game chips.

Samsung Infinity Flex Display OLED 7.3" folding.

Samsung manufactures 100,000 units per month of folding phones.

Samsung quantum dot (QD) QLED TV with QDoG (QD on Glass).

Samsung quantum dot-OLED TV factory 2020.

Samsung RAM LPDDR5 (low power) 2020, 20% reduced electricity.

Samsung second quarter 2018 sales \$52.2 billion.

Samsung investing \$110 billion in #1 nano chip factories by 2030.

Samsung sold 2 billion Galaxy phones since 2010.

Samsung SSD 96-layer 3D NAND, 4 bit per cell (QLC) flash memory.

Samsung unbreakable OLED screen stretches.

Sandia National Laboratories platinum-gold alloy wear-resistant.  
Schumacher Motorola aluminum lithium ion battery.  
Scynce LED lighting (red & blue) for greenhouses.  
Sharp ramps up IGZO & OLED screen manufacture.  
Silicon photonic fiber optic light cables on chips.  
Silicon-rich anode battery Sila Nanotechnologies.  
Single-atom transistor switches electrical current, in gel electrolyte.  
Sino-American Silicon N-type mono-Si solar 23% efficient.  
SK Hynix #1Y nano-meter DDR5 DRAM 2020.  
Smaller 40" micro-LED TV 1080p would be affordable.  
Sodium-Ion battery 2028.  
Solid Power battery \$20 million invested.  
Solomon Systech flexible/foldable OLED touch controller IC chip.  
Sony Crystal MicroLED TV 17 feet tall, 63 feet wide.  
South Korea LG stretchable OLED prototype.  
SPIL & TFME flip-chip packaging for AMD #7 nano CPU & GPU.  
Spintronic memory generates little heat, uses minuscule electricity.  
Sweden Dirac Bass for small music speakers.  
Sweden Rdot folding display competes with eInk.  
Swift Solar \$7 million invested in perovskites.  
Synthego Mad7 competitor to Crispr DNA editing.  
Synthetic boron arsenide crystal heat management for chips.  
Taiwan Auras Technology chip cooling modules for phones & iPads.  
Taiwan BenQ OLED polarizer filters sunlight glare.  
Taiwan Chunghwa Picture Tubes quantum-dot TV using printer.  
Taiwan EOSRL 60" Micro-LED TV.  
Taiwan Gallant Precision Machining Micro-LED factory equipment.  
Taiwan Innolux screen factory mLED unit active matrix micro LED.  
Taiwan Macronix working with IBM for phase-change memory 2022. Taiwan MediaTek working on #5 nano ARM chip 2021.  
Taiwan Ministry Science & Tech \$130 million for new chip factories.  
Taiwan Novatek, Himax, Chipbond, ChipMOS working on OLED.  
Taiwan NTHU TADF OLED emitter material high luminance.  
Taiwan Foxconn considers manufacturing microLED screens in Wisconsin.  
Taiwan ProLogium solid-state lithium ceramic battery factory.  
Taiwan screen driver IC chip Macroblock Micro-LED 2020.  
Taiwan TPK Holding factory silver nano wire OLED touch panels 2020.  
Taiwan National Chiao Tung University increased Micro-LED brightness 143% with ALD passivation layers.  
Taiwan TPK Holding nano silver wire-based folding touch panels 2020. Taiwan TSMC #5 nano chip factory volume production summer 2020.  
Taiwan TSMC factory #3 nano 2022, #2 nano 2024.  
Taiwan TSMC chip factory invests \$19 billion #3 nano 2023.

Taiwan TSMC makes 75% of Qualcomm power management chips.

Taiwan TSMC SiP packaging.

Thin & flat 2D “semiconductors like molybdenum disulfide bend.”

Toshiba 4th generation BGA SSD memory 96 layer 3D NAND.

Toshiba low-latency XL-Flash memory. SK Hynix 4D NAND memory.

Toyota, BMW Solid Power, Volkswagen QuantumScape solid state battery 2020.

TPK Holding sells silver nanowire touch solutions to LG.

TPK silver nanowire touchscreen.

Tungsten or ALD improves 3D NAND memory.

Twist Biosciences custom synthetic DNA on semiconductor chips.

U Colorado superconductor thin layer Rhenium (Re) between gold.

UC Berkeley atomically thinnest LED.

UC Davis polymer nanofibrous membrane use electrospin.

UDC progressing with OVJP TV deposition system.

Universal Display OLED partnered with Visionox (gvo).

Universal Display UDC says progress with blue PH-OLED.

University of Cambridge niobium tungsten oxide battery.

University of Colorado positively charged ion crystals.

University of Manchester graphene oxide saltwater filter.

University of Texas at Austin M.O.F. saltwater filter.

University of Washington thin-film perovskite solar.

UPS truck hybrid hydrogen fuel cell, lithium iron phosphate battery.

USB 3.2 cable 2020.

USB4 cable based on Intel Thunderbolt 3 type-C, after 2020.

USC copper phosphorescent OLED emitter.

VESA Display-HDR OLED TV standard.

VueReal \$8.5 million invested for small microLED factory in Canada.

WearTRBL E-Ink black & white TV shirt.

Wegmans stores Acuity Brands Peerless OLED Oleseence lights.

Western Digital 96-Layer 3D NAND UFS memory.

WiFi 6 (802.11ax).

Windmill generators made of superconducting magnets weigh less.

Xiaomi bought 65 million shares of TCL TV.

Xiaomi folding OLED may be named Mi Flex.

Xiaomi Mi 9 sold 1.5 million units.

Xiaomi prototype 100 watt fastest charger. Does it overheat?

Yale Quantum Circuits Inc.

Quality, not alphabetized:

\$450 Xiaomi Mi 9, 6.4" OLED, #7 nano Qualcomm 855, 103.8% NTSC wide color gamut, 600-nit bright outdoors, Corning Gorilla Glass 6.

\$2,000 Samsung Galaxy Fold 7.3" OLED Infinity Flex, #7 nano Qualcomm 855, 2 batteries total 4,380 mAh, interlocking gear hinge, shock-absorbent film, polarizer, Space Silver, Cosmos Black, Martian

Green, or Astro Blue, HDMI TV cable, AKG stereo speakers.

\$800 China Oppo OnePlus 5G phone antenna \$100 to \$200 extra,

#7 nano Qualcomm 855, summer.

\$1,100+ Samsung Galaxy S10 5G, 6.7 inch OLED Infinity-O, #7 nano Qualcomm 855, 4,500 mAh battery, 25 Watt charger USB-C Power Delivery 3, WiFi 6 802.11ax, 1,200 nits brightness, 16 million colors, 100% DCI-P3 color range HDR10+, 40% reduced blue light, dynamic tone mapping, vapor chamber cooling.

\$1,000 Samsung Galaxy S10+, 6.4" OLED, #7 nano Qualcomm 855. Oppo OnePlus 7 5G, #7 nano Qualcomm 855, summer.

South Korea SK Hynix building 4 DRAM DDR5 memory factories

\$107 billion, 2022.

\$1,000 China TCL Alcatel foldable 7.2" OLED, CSOT (China Star Optoelectronics Tech) factory, summer 2020. Dragon Hinge small gears, elongated OLED collapses down into bracelet.

\$2,600 Chinese Huawei Mate X folding 8" OLED (folds to 6.6", 5.4 mm thin), 4,500 mAh total 2 battery cells, 55 watt SuperCharge.

Evil Chinese Huawei #7 nano chip.

E Ink Advanced Color ePaper ACeP screen, 32,000 colors, microencapsulated cyan, magenta, yellow & white electronic ink, 2021. Touchscreen requires waveform controller 2023. Resolution 1600 x 2500 pixels, 150 ppi.

\$600 Xiaomi Mi Mix 3 5G, 6.4" OLED, #7 nano Qualcomm Snapdragon 855, ceramic aluminum frame, hybrid cooling system Rogers HeatSORB thermal material phase change effect, passive heat pipe

6 layers of graphite.

China TCL curved flexible 6.2" OLED, 430 nits brightness, 530 pixels per inch, 100,000 to 1 contrast, 100% NTSC colors, borderless glass.

\$900 South Korea LG V50 ThinQ 5G, 6.4 inch (3120×1440) OLED, HDR10, Gorilla Glass 5, #7 nano Qualcomm Snapdragon 855, maximum 2,000 gigabytes memory. LG owns OLED factories yet has delayed their folding V series iPad, instead offering Dual Screen

6.2 inch OLED attachment.

Samsung Fold uses colorless polyimide (CPI) film protective covers from Sumitomo Chemical.

\$1,050 Sony Xperia 1 6.5-inch (1644x3840) 4K OLED HDR Triluminos X-Reality, Corning Gorilla Glass 6, Qualcomm Snapdragon 855 #7 nano Adreno 640 GPU. Should have been around \$500.

\$450 Micron C200 1 terabyte microSD Express or SanDisk Extreme UHS-I memory.

\$450 China Vivo iQOO #7 nano Qualcomm 855, 6.4-inch OLED 1080p, dewdrop notch (91.7% screen-to-case ratio), 44 Watt Vivo Super FlashCharge, 4,000mAh battery, vapor cooler, Game Turbo mode. Competes with Oppo OnePlus7, Lenovo, Xiaomi, Meizu.

#2.5 nano-meters thin horizontal nano sheet chip, CPP 37, M2P 26,

5 tracks, SDB, density 323 MTx/mm<sup>2</sup>, Taiwan TSMC, Samsung, Intel factories after 2023.

50% of DRAM memory is core & peripheral part. Less electricity at

#7 nano FinFET, then #3 nano-sheet gate-all-around 2023. "Pillar capacitors provide more room for dielectric film. Thin film transistors with low leakage, stack DRAM capacitors over access transistor & logic."

Rumor: Samsung clamshell (folds vertically) early 2020. Samsung OLED that folds out 2020.

Intel #7 nano chip factory Arizona extreme ultraviolet lithography (EUVL) laser wavelength #13.5 nano for select layers in 2023.

20 layers require 20 EUVL scanners 100,000 wafer starts per month.

\$500+ Qualcomm Snapdragon 8cx laptop chip #7 nano summer 2019. Qualcomm Adreno 680 GPU with OpenGL Vulkan & Microsoft DirectX 12, fast Kryo 495 ARM Cortex A76 CPU, 10 megabyte L3 cache, USB 3.1, HDMI TV cable, UFS 3.0 memory, 16 gigabytes LPDDR4X RAM, QuickCharge 4+, fanless 7 watts.

LFPO (lithium ferrous phosphorous oxide) battery for uninterrupted power supply.

Rumor: \$130 AMD #7 nano RX 3060 desktop game GPU chip, 75 watts late 2019.

Intel #10 nano generation 11 GPU HDR game chip for laptops late 2019. Intel slow Pentium Silver 2019 Tremont #10 nano, 2021 Gracemont chip faster single-threaded & better vector performance, 2023 Intel Next Mont #7 nano with new GPU.

\$637 Samsung 7.3" OLED folding phone cost to manufacture. Screen \$220, #7 nano Qualcomm 855 chip \$70.

#7 nano chip factory market (TaiwanSMC, Samsung, Intel) will be \$10 billion for 2019.

#7 nano AMD Navi GPU game chip in Xbox Scarlett (Anaconda Lockhart) prototype for 2020.

EUV laser masks for smaller than #7 nano chip factories made of nickel or cobalt absorptive materials. Qualcomm 855 #7 nano ARM Cortex A76 chip has larger out-of-order window, better prefetch, bigger buffers.

IBM partnered with Samsung Foundry to manufacture Power10 #7-nanometer EUV desktops 2021.

Qualcomm Adreno 640 GPU game #7 nano chip. Has integrated micro-controller for power management, good OpenGL Vulkan 1.1 driver app, 50% more arithmetic logic units (ALU), physically-based rendered games (Unity Engine, Unreal, Messiah, NeoX), 10-bit true HDR video, zzHDR 3-exposure Quad Color Filter Array (QCFA), hardware-accelerated H. 265 & VP9 TV decoder, HDR playback codec of HDR10+, HDR10, HLG & Dolby Vision.

Intel working on magneto-electric multi-ferroics spin-orbit MESO chips that use less electricity. Year 2075 Pico-engineering (trillionth of a meter) \$20+ billion chip factories. Year 2100 Femto-engineering (1,000th of a trillionth of a subatomic meter). #1 femto-meter chip much smaller than current #7 nano-meters.

Micro LED 30-by-50 micron made by Taiwan PlayNitride & China Sanan Optoelectronics for Samsung TV 2020.

\$700 #7 nano AMD Radeon VII Vega desktop GPU game chip. I am waiting for slower \$500 AMD iPad #7 nano 2020.

Samsung #3 nano GAAFET (Gate-All-Around MBCFET Multi-Bridge-Channel) chip factory 2021 with Samsung EUV mask inspection tool.

Solar MBB shingled array (each cell is equally divided into pieces with overlapped borders to reduce occupied space). TOPCon (tunnel oxide passivated contact), N-type, Multi-Busbar (MBB), Selective FDK SMD solid-state small battery, cathode material lithium cobalt pyrophosphate (Li<sub>2</sub>CoP<sub>2</sub>O<sub>7</sub>).

Meizu 16s, Meizu 16s Plus, Meizu 16G will have Qualcomm 855

#7 nano this summer.

Vivo Apex 2019 Qualcomm 855 #7 nano, no cables, only wireless charging, thin borders around screen.

\$700 AMD Radeon VII #7 nano desktop game chip has \$300 16 gigabyte HBM 2 memory.

\$250 AMD Navi model 20 videogame laptop chip #7 nano, HBM2 or GDDR6 memory, early 2021. China Yangtze Memory Technology (YMTC) 128-layer 3D NAND flash memory 2020.

Efun Technology cadmium selenide (CdSe)-free quantum dot enhancement film (QDEF) screen products.

China Huawei silicon lithium-ion, Nitrogen-doped carbon materials, pyridine-type nitrogen, graphite-type nitrogen, pyrrole-type nitrogen. IBM electrified graphene deposits smaller than #7 nano meter chips 97% accuracy.

Flat diamond chips from Kanazawa University, National Institute of Advanced Industrial Science & Technology.

Diamond finFET chip from HRL Laboratories (Boeing & General Motors). Diamond chips tolerate high electricity & heat.

Intel delayed Extreme Ultraviolet Lithography (EUV) chip factory until 2021 #7 nano meters.

GlobalFoundries chip factory will stop at #12 nano meters. #7 nano available from Intel, Samsung & Taiwan TSMC. AMD outsources #7 nano chip (Zen 2 & Navi) production to TSMC factory 2020. Samsung 75" MicroLED TV in 2019 made of 30-micron x 50-micron MicroLED chips produced by PlayNitide. LG likely to purchase microLED chips from Taiwan & China Epistar & HC SemiTek. Made in Space & FOMS (Fiber Optic Manufacturing in Space) want to make optical fibre at International Space Station \$1 million/kilo.

\$1,100 Apple iPhone XS Max #7 nano TSMC factory ARM chip, 6.5" OLED from Samsung. Apple iPhone XS Max costs \$400 to manufacture. \$80 6.5-inch OLED screen, \$72 ARM Cortex A76 chip #7 nano. Chinese Oppo OnePlus 7 similar \$600.

Samsung Galaxy S10+ #7 nano, copper heat pipe is wider & thicker than last year, copper strands, liquid wick to transfer heat.

VeriSilicon #7 nano RISC-V chip manufactured by TSMC late 2019. RISC-V C.H.I.P.S. Alliance of free blueprints includes Google, SiFive, Western Digital, Esperanto Technologies.

Rumor: \$1,000 Xiaomi Mi Flex folding OLED, Qualcomm 855 #7 nano, January 2020.

\$475 Xiaomi Black Shark 2, Qualcomm Snapdragon 855 #7 nano, 6.4" OLED, liquid cooling, 4,000mAh battery, 27W fast charger, Shadow Black, Frozen Silver, or Mirage Blue, 44 milisecond touch latency, stereo speakers, optional GamePad 3.0 joystick.

ARM Cortex a76 chips 64 bit version 8.3 blueprints add new float-to-int instruction with faster handling of JavaScript errors & out-of-range values.

Zeno Semiconductor licenses #7 nano memory chip 2019 single-transistor SRAM Zeno-1 has bi-stable bipolar transistor built-in, includes N-well buried under floating P-well on top of P substrate. Taiwan MediaTek Helio M70 5G baseband phone antenna summer. 5G Google phones with #7 nano ARM MediaTek chips early 2020.

AMD fast desktop EPYC CPU chiplets #7 nano Taiwan TSMC factory, I/O chip #14 nano, Radeon Instinct MI50 GPU.

AMD #7 nano Rome desktop chip PCIe 4.0, Intel won't have that cable until mid-2020.

Taiwan TSMC chip factory rented to Apple September 2019. #7 nano meter EUV, advanced packaging integrated fan-out (InFo).

ARM #7 nano Ares & Zeus chips 2019 to 2020,

#5 nano Poseidon 2021. ARM Neoverse chips for appliances.

South Korea LG 13-inch foldable OLED display for Lenovo or Dell tablet late 2019.

Taiwan MediaTek #7 nano ASIC chip, 56G PAM4 SerDes by 2019.

AMD 5 watt #7 nano Ryzen mobile game chip? “We could do it, but we wouldn’t necessarily design a product just for that market.” “We always look at ARM, if it makes sense down the road to introduce another ARM standard product, we’ll consider that.”

ARM chips use less electricity than Intel or AMD. “Elastic diamonds in bioimaging, biosensor, nanomechanical resonators, memory, optomechanical & foldable displays.”

ARM Cortex A76 fastest phone chip #7 nano. “Mali G76 graphics & HDTV Mali V76 video chips.”

Sweden Glo micro-LED 1.5-inch on LTPS backplane, 4,000 nits brightness.

OLED top 5 equipment vendors Canon 13%, Applied Materials 9.6%, Tokyo Electron, Nikon, SFA Engineering.

Application-Specific Instruction Set Processor (ASIP) chips use less electricity because they only run 1 app with hardware acceleration.

Samsung evaporation (FMM) OLED for small displays, ink-jet OLED deposition for medium-sized TV, & micro-LED.

OLED petrochemical films are too blue, scratch, de-laminate so better films, adhesives, & coatings, micro-LED created.

Rumor: Apple September 2019 iPhones with Samsung Y-OCTA (Youm On-Cell Touch AM-OLED) screens.

Advanced Micro-Fabrication Equipment (AMEC) #5 nano plasma etching tool.

Free miniaturization book “Engines of Creation The Coming Era of Nano-technology” by K Eric Drexler 1986. [http://e-drexler.com/d/06/00/EOC/EOC\\_Table\\_of\\_Contents.html](http://e-drexler.com/d/06/00/EOC/EOC_Table_of_Contents.html)

#1 nano meter chip factory acronyms:

3DAP 3-D Atom Probe AES Auger Electron Spectroscopy AFM Atomic Force Microscopy ALE Atomic Layer Epitaxy AP Atomically Precise APFN Atomically Precise Functional Nanosystem APM Atomically Precise Manufacturing APPN Atomically Precise Productive Nanosystem APSA Atomically Precise Self Assembly APT Atomically Precise Technology CAD Computer Aided Design CASSCF Complete Active Space Self-Consistent Field CBS Complete Basis Set CC Coupled Cluster CI Configuration Interaction CNDO Complete Neglect of Differential Overlap Cryo-EM Cryo-Electron Tomography DCP Disc Centrifuge Photosedimentation DLS Dynamic Laser Light Scattering ESEM Environmental Scanning Electron Microscopy FIB Focused Ion Beam FRAP Fluorescence Return After Photobleaching FRET Fluorescence Resonant Energy Transfer FTIR Fourier Transform Infrared Spectroscopy GVB Generalized Valence Bond HRTEM High Resolution Transmission Electron Microscopy INDO Intermediate Neglect of Differential Overlap LED Light Emitting Diode MCSCF Multi-Configuration Self-Consistent Field MEMS Micro Electro Mechanical System MINDO Modified Intermediate Neglect of Differential Overlap MMCN Modular Molecular Composite Nanosystem MP Moeller-Plesset Perturbation Theory MRCI Multi-Reference Configuration Interaction MWNT Multi-Walled Carbon Nanotube NC-AFM Non-Contact Atomic Force Microscopy NMR Nuclear Magnetic Resonance NOPV Nanostructured Organic Photovoltaic OLED

Organic Light Emitting Device PALS Phase Analysis Light Scattering PCS Photon Correlation Spectroscopy PEM Proton Exchange Membrane; Polymer Electrolyte Membrane PIXE Proton Induced X-ray Emission PN Productive Nanosystem; Obsolete form replaced by APPN PPP Pariser-Parr-Pople PV PhotovoltaicQMC Quantum Monte Carlo RS Raman Spectroscopy SAM Scanning Auger Microscopy SAMMS Self-assembled Monolayers on Mesoporous Supports SANS Small Angle Neutron Scattering SAXS Small Angle X-ray Scatte SEM Scanning Electron Microscopy SHEM Scanning Helium Ion Microscope SNOM Scanning Near-Field Optical Microscopy SPM Scanning Probe Microscopy SSL Solid-State Lighting SSNMR Solid State Nuclear Magnetic Resonance STM Scanning Tunneling Microscopy, SWNT Single-Walled Carbon Nanotube TEM Transmission Electron Microscopy TOF-SIMS Time of Flight Secondary Ion Mass Spectrometry UV-vis Ultraviolet-Visible Spectroscopy XAFS X-ray Absorption Fine Structure XPS X-ray Photoelectron Spectroscopy XRD X-ray Diffraction.

#1 nano APM would provide: Atomically precise synthesis of electrically conventional transistors, but with atomically precise positioning of impurity atoms. Carbon nano-tube chips, or planar graphene, molecular tunnel diode with negative differential resistance.

0.25 nano-meter spot size Helium Beam Lithography chip factory tool by Zeiss.

Current inefficient blue light emission lowers efficiency of white OLED screens. Molecular engineer better electron transport properties with saturated linkers. Combine molecular building blocks with monodisperse noble metal nano-particles.

Fluorescent OLED & micro-LED TV via plasmonic effects, assemble bulk structure with molecular precision for

100% efficient conversion of electricity to light.

Solar nano structured organic photovoltaic (NOPV), thin film silicon, CIGS.

Rohinni micro-LED joint venture with China BOE placing 50 die-per-second (dps) 10 micron accuracy at 99.9% yield.

Toshiba UFS 3.0 memory 96 layers 3D TLC NAND,

1.2 volts for VCCQ, 2020.

British Oxford Instruments Plasma Technology plasma etch deposition factory equipment sold several PlasmaPro 100 to Taiwan ITRI micro-LED.

Sino-American Silicon Products N-type TOPCon

(tunnel oxide passivated contact) solar.

Rohinni joint-venture with Magna Electronics to develop flexible micro-LED lighting for cars.

Queen's University Human Media Lab prototype touchscreen MagicScroll that bends.

Lextar micro-LED chips - RGB chips & color conversion - with the requirement of mass transfer processes.

China Sanan Optoelectronics micro-LED epitaxial wafer & chip factory first-quarter 2019. "Semiconductor Energy Laboratory OLED CAAC-IGZO (C-Axis aligned crystalline In-Ga-Zn-O) backplane." Stanford & Georgia Institute of Technology nickel-hydrogen battery with bifunctional nickel-molybdenum-cobalt electrocatalyst as hydrogen anode \$83 per kilowatt-hour.

Japan Nitride Semiconductors micro-LED μUV-LED+RGB phosphor displays \$3 million invested.

Coherent laser Micro-LED tools. Laser Lift-Off equipment (LLO to separate micro-LED from sapphire wafer), Laser Induced Forward Transfer (LIFT to move micro-LED to substrate),

Excimer Laser Annealing (ELA, to fabricate LTPS backplanes).

British GaN-on-Si MicroLED Plessey Semiconductor collaboration with EV Group wafer bonding & lithography equipment for Quanta-Ray TV direct emission micro-LED.

Pixelligent invested \$7.6 million, working with Kateeva materials for OLED inkjet printing.

Samsung is looking into enhancing Micro-LED arrays with quantum dot coating to convert blue LEDs to white light. “MIT battery uses temperature swings between day & night. Thermal resonator, hybrid materials produce both high heat conduction & capacity. Copper or nickel foam at core coated with graphene to boost conductivity, infused with phase-changing material (octadecane).”

Micro-LED Gallium-Nitride TV. Aledia (French CEA), Intel invested \$37 million. “Current efficiency of gallium-nitride LED is 70%.

OLED 5% efficient. Gallium-Nitride grown as thin layer atop wafer of sapphire or silicon.” “Hemt-LED, like light emitting transistor, lets you switch light emission on & off, control brightness with voltage signals.

Micro-LED from gallium nitride, High-Electron Mobility Transistor.”

Stanford liquid metal flow battery stores electricity at lower price. Metal mix of sodium & potassium serves as negative side. “Sub-electrode micro-lens array can increase light output in OLED by a factor of 3.”

PlayNitride \$17 million Micro-LED factory in Taiwan. Best quality & battery time 6 inch Micro-LED screen costs \$300 in 2021. I would pay the premium over \$50 OLED screens.

China Jinneng Clean Energy Tech N-type HIT (heterojunction intrinsic thin layer) silicon solar cell energy conversion rate 23%.

Color changing clothing not from embedded LED. Fiber strands wrapped around thin piece of metal. Electrical wire modulates, changes temperature. Pigment threads react.

Micro-LED TV \$500 million factory “17 55-inch micro LED panels per minute. Lower cost than LCD factory.”

Samsung gave sample of folding 7.2” OLED screen to Apple & Google Pixel, could be 10 million units per year.

Rochester Institute of Technology vertically integrated nano-wire gallium nitride (GaN) field-effect transistors (FET) indium gallium nitride (InGaN) microLED TV.

Merck has OLED quantum dot materials for ETL (electron transport layer), EMC (emissive material layer), HTL (hole transport layer), HIL (hole injection layer) & is working on MicroLED screens.

British GaN-on-Si MicroLED TV Plessey Semiconductor partnered with Quantum Dots Nanoco.

Samsung microLED TV 75” The Wall, best quality.

Intel prototype Lakeview/Lakefield #10 nano iPad, 5 inch motherboard with stacked memory. Intel Ice Lake system on a #10 nano chip, Sunny Cove Core i3, generation 11 Intel GPU graphics. Asus, Acer, Dell, HP, Lenovo thin laptops Project Athena Christmas.

Israel InZivan raised \$2.5 million for microLED inspection equipment, nano-scale optics, near-field microscopy.

Lextar Electronics micro LED chips below 20 micrometers in diameter, RGB micro LED & color conversion micro LED chip.

British GaN-on-Si MicroLED TV developer Plessey Semiconductor partnership with Taiwan Jasper Display Corp silicon backplane.

Samsung will begin pilot production QD-OLED screens 2019. Challenges are efficient blue OLED light emitter &

quantum-dot color converter (QDCC).

ALLOS 200 mm GaN-on-Silicon epiwafer on Veeco Propel MOCVD reactor for microLED screens. Merck & Visionox factory strategic partnership to accelerate OLED material development. "Year 2020 OLED strong demand for more factories. OLED new markets of tablets, laptops & car stereo screens."

Korea "Advanced Display Research Center created 1,024 pixel blue-light-emitting microLED on blue-laser-annealed (BLA)

low-temperature polysilicon thin-film transistor backplane." "Rdot Swedish company developing low-cost energy-efficient electrochromic display."

France 3D GaN microLED Aledia uses Veeco Instruments Propel GaN metal-organic chemical vapor deposition (MOCVD).

\$800 quantum dot OLED 55" TV, \$450 in 2022 by reducing factory masks.

Molecular Glasses \$225,000 invested non-crystallizable TADF host material OLED.

\$1,200 refurbished Walmart OLED 55" TV, compared to \$3,000+ LG 65" rollable OLED.

Small amounts of cesium & rubidium salt improve lead-halide perovskite solar.

MIT diamond chips much faster than silicon, nano-meter sized pins elastically stretched by 9%.

ITRI aluminum battery, graphite cathode, aluminum anode, incombustible ion electrolyte.

RMIT University metal field emission air channel transistor (ACT)

#1 nanometer flexible chips 2030.

2 in-plane symmetric metal electrodes (source & drain) separated by 35 nanometer air gap (electrons travel through air), bottom metal gate. Manufactured by laying down tungsten, gold, or platinum emitter & collector on any dielectric surface substrate glass, plastic, or elastomer.

Solar metals more flexible than silicon are cadmium telluride, copper indium gallium selenium & perovskite.

South Korea Ulsan National Institute of Science Technology perovskite LED (PeLED) that folds.

Japan Meiko Electronics & Taiwan Zhen Ding Technology expanding SLP production.

University of Cambridge, Chinese Academy of Sciences, University of Sheffield, University of Oxford, Nanjing Tech University efficiency record 20% for LED perovskite.

China solar Guangdong Aiko Solar Energy Technology to commercialize CCz (continuous Czochralski) process of growing mono-Si ingots.

U of Strasbourg, U of Lyon, Nazarbayev University boosting efficiency of organic solar cells by fluorine atoms in polymer.

National Science Foundation (NSF) & Semiconductor Research Corp (SRC) investing \$12 million to develop DNA read-only memory (ROM), nucleic acid memory (NAM) & neural networks based on yeast cells.

UCLA thin-film solar copper, indium, gallium & selenide (CIGS) with perovskite 22.4% electrical efficiency.

China solar poly-Si wafer factory GCL-Poly Energy, Suzhou GCL Solar Technology 18% efficient perovskite, 1m x 2m modules, \$0.15/Watt, 0.3 micron thin, 2020. "Researchers predict in 2021 we might see fast commercial quantum computers."

Brown University & U of Nebraska Lincoln titanium for lead-free, inorganic perovskite solar panels. Taiwan lab energy photonics & photo-electrochemistry, National Cheng Kung University "Perovskite crystal in Calcium Titanate (Catio3) mineral allows solar 1,000 times thinner than silicon."

“China manufacturers BOE, China Star Optoelectronics, Tianma, Hehui Optoelectronics, Kunshan Guoxian, Rouyu Technology mass production 4 million OLED units.”

“Zhijing Nanotech Quantum Dot backlight (QD-BLU)  
perovskite quantum-dot film (PQDF)”

Solar “Perovskite efficiently converts blue & green light, while silicon better at red & infrared light.”  
Micron Technology \$3 billion memory factory 2030 in Virginia. Kyulux OLED red, green & blue  
HF/TADF light emitters mid-2019. “Japan chemical Nagase \$4.6 million in Hyperfluorescence TADF  
OLED Kyulux.”

“Taiwan Taiflex Scientific flexible copper clad laminates (FCCL) expects flexible PCB (FPCB) chip  
market to continue growing.” “Thermal activation sensitized fluorescence, TASF, a type of TADF  
OLED emitter material developed at China Tsinghua University. Visionox TASF prototype.”

#5 nano chips 2021 “Photoresist volume per feature not enough to ensure low shot-noise effects,  
photon & chemical. Unless highly absorptive materials to maximize image contrast & exposure  
dose.”

#3 nano thin 2023 “Hyper-NA anamorphic requires multi-patterning lithography, alternative resist.  
EUV laser metrology challenge of how to collect, characterize, predict random failures.”

Metal on metals, dielectric on dielectrics, deposit inorganic film using self-aligned process. Immerse  
prepatterned substrate in special material & add atomic layer deposition chamber using self-  
assembled monolayers (SAM).

EUV ultra violet for #5 nano chip factories, big challenge is sensitivity, stochastics, & resolution.  
Hope for metal oxide resists, regular silsesquioxanes, cobalt interconnects.

ASML Twinscan NXT:2000i DUV (Deep Ultra Violet)

#5 nano meter chip factory equipment.

Taiwan TSMC chip factory mass production #5 nano thin summer 2020. #5 nano meter (CLN5FF,  
N5) process uses extreme

Ultra Violet light on 14 layers.

Rumor: iPhone 5G 2020 with Apple ARM Cortex a76 #5 nano chip & Intel 8161 5G modem antenna  
#10 nano. “High-harmonic generation for photolithography decades away.” High-harmonic would  
replace EUV laser in #3 nano chip factories.

Samsung prototype Quantum Dot OLED TV.” Blue OLED light converted to white light using  
quantum-dots combined with color filters (QDCF) to add red & green colors.”

“Sure industry can make #3 nano meter thin nanosheet chips in 2022. But it requires \$1.5 billion each  
design.”

Japan JOLED screen factory \$420 million invested to mass produce OLED displays using printers.  
Gudeng Precision Industrial obtained ASML validation for extreme ultraviolet (EUV) pods, joining  
rival chip factory equipment Entegris. China Tongwei Solar will manufacture N-type HIT (hetero-  
junction with intrinsic thin layer) solar late 2018.

European Union Sunrise improve solar by atmosphere’s carbon dioxide, oxygen, nitrogen, artificial  
photosynthesis or catalysts.

Microbial biophotovoltaic (BPV) battery generates electricity from photosynthetic metabolism of  
cyanobacteria & microalgae.

China Silk Road Fund & Taiwan TPK investing \$500 million in Japan JDI OLED factory. “New  
materials indium gallium arsenide, graphene, quantum well, TFET, silicon photonics.”

China Star Optoelectronics Technology (COST) 6G flexible OLED factory monthly 45,000 units, Visonox 30,000 units.

\$510 China ZTE Nubia  $\alpha$  Alpha watch, curved 4" OLED Visionox, waterproof heat-resistant polyimide, obsolete Qualcomm Snapdragon Wear 2100 #28 nano.

Samsung OLED factory makes the most screens, LG 25 million units per year, China BOE 20 million, Visionox 15 million units.

Taiwan AUO in-folding flexible OLED factory, Lenovo/Motorola is possible customer.

France, Germany, Italy, Britain \$2 billion invested in Bosch, Infineon, STMicroelectronics, Osram, Carl Zeiss, GlobalFoundries, Murata chips 2024.

Israel gave Intel \$185 million grant in return for \$5 billion chip factory #10 nano expansion.

Intel Cryogenic Wafer Prober tests quantum qubits on 300mm wafers at a few degrees kelvin.

University of Cambridge & Jilin University 100% IQE radical OLED emission screen.

\$1,500 HP Spectre 15 x360 Intel & NVidia #14 nano laptop,

5 pounds. OLED wide viewing angle, 100% DCI-P3 color gamut. Should have been \$500 8" OLED touchscreen, 1 pound, #12 nano AMD Ryzen 3 3200U Vega chip.

China buying folding OLED parts from Taiwan screen driver chip Novatek Microelectronics, COF back-end service providers ChipMOS & ChipBond, COF substrate supplier JMC Electronics.

\$30 Anker Atom PD1, 30 watt USB Type-C Power Delivery, wall charger made of Gallium Nitride.

\$30 Powerport Atom PD 1 electric charger 27 watt USB-C PD, Gallium Nitride (GaN).

Sweden Chalmers University double doping process increases efficiency of polymer OLED emitters.

Sanan compound semiconductor Gallium Arsenide, with Taiwan Acter & Nova clean rooms.

Applied Materials integrated materials solution for cobalt chips, Endura platform keeps wafers in vacuum.

Cornell, Kyoto University, Novel Crystal Technology beta gallium oxide, vertical-trench Schottky barrier diode.

Aalto University all-optical logic chip gates using nanowires indium phosphide & aluminum gallium arsenide.

MIT chip made from gallium arsenide, gallium nitride, lithium fluoride to replace silicon.

French STMicroelectronics, German Infineon & Texas Instruments power chips use silicon carbide (SiC) & gallium nitride (GaN).

Texas Instruments, Infineon, Rohm GaN FET (gallium nitride field-effect transistors). T.I. GaN 600-V power stages support laptop chargers up to 10 kW. GaN FET, driver protection features at 50m $\Omega$  or 70m $\Omega$  capable of fast 1 MHz switching frequencies, slew rates up to 100 V/ns.

Qualcomm Adreno 640 GPU game chip compatible with OpenGL ES 3.2, Vulkan 1.1, OpenCL 2 Google games. Free Linux Qualcomm graphics driver app Freedreno Gallium3D Mesa does not yet support Vulkan.

\$400 Wisky EeWrite 10" E-ink Mobius black & white, Taiwan MediaTek Helio X20 #20 nano.

\$130 Samsung Galaxy Buds wireless headphones, weigh 5.5 grams each, 6 hour 55 mAh battery.

Trump supports 6G phone antennas. 5th generation antenna currently \$100, 5G Qualcomm X55 #7 nano 2020. 6G after 2030 "Waveguide over copper at millimeter frequencies (30 GHz to 1 THz)."

Western Digital 96-layer 3D iNAND MC EU511 memory Universal Flash Storage (UFS) 3.0.

A.R.M. licenses #7 nano Neoverse N1 System Development Platform server desktop.

École polytechnique fédérale de Lausanne, MIT, Ioffe Institute testing III-V material nanowires.  
Apple co-founder Steve Wozniak, “Apple are not leaders in areas such as collapsible phones, which makes me worry because I really want a foldable phone.”

China Tianma to manufacture CLEARink color e-paper display TFT modules.

Transition metal dichalcogenides (TMD) tungsten selenide (WSe<sub>2</sub>) & molybdenum disulfide (MoS<sub>2</sub>) more efficient than silicon.

PCB (printed circuit boards) for folding iPads: flexible boards, rigid-flex boards, HDI (high density interconnect), SLP (substrate-like PCB).

Apple may purchase memory chips from Chinese Yangtze memory 2020 instead of Toshiba, Western Digital, SK Hynix & Samsung.

Australian CSIRO Water Filter “graphene film Graphair with microscopic nano-channels. Water passes, but stops pollutants.”

OLED 440 million screens 2017.” Ink printing for OLED panel manufacturing begins 2019 with 2 million & 9.2 million OLED 2022.”

#2.5 nano meters 2027. #1.5 nano thinnest 2030.

Corning bendable Gorilla Glass 0.1 millimeters thick, 5 millimeter radius.

MIT, University of Colorado thermal atomic level etching 3-D chip #2.5 nanometers.

Intel Foveros 3D chip-stacking combines fast Core i3 with slow Pentium Silver. Intel #10 nano Sunny Cove CPU chip has parallelism, increased cache, 5 wide allocations, 10 execution ports.

NIST-Purdue University atomically thin sheets of resistance-based memory.

Chinese Academy of Sciences Liaoning hit copper with electrically charged argon gas to resist high temperatures, oxidisation & erosion.

Taiwan chip packaging ASE Technology has orders from Qualcomm & Nvidia, Powertech assembles MediaTek fan-out panel level package (FOPLP), TSMC factory CoWoS or InFoWLP packaging for Apple.

Google prototype laptop codenamed Dragonegg with Intel Ice Lake #10 nano chip 2020.

Event Driven MEMS sensors consume no power while standing by from UT Dallas, Northeastern University.

Thin film piezoelectric resonators monolithic acoustic waveguides for RF filtering in 5G antennas by Purdue, Texas Instruments.

Corning glass chip carriers used by SCH Electronics Shanghai for temporary bonding silicon thinning & fan-out packaging.

Rhodium & Iridium better for chips than copper.

Tohoku University 128 megabyte-density STT-MRAM (spin-transfer torque magnetoresistive random access memory), fast write speed 14 nano-seconds.

French STMicroelectronics & SERMA nano-sheet FET based on silicon-on-insulator (SOI) wafers, replacement metal gate.

Merck deposition, patterning, spin-on dielectric materials for stacked 3D NAND memory.

\$200 Heatworks Duo Carafe 130 degrees instantly with

Ohmic Array. Water as electrical conductor between graphite electrodes, summer 2019.

University of Massachusetts Amherst & Brookhaven National Laboratory memristor memory

crossbar arrays #2 nano.

China Hisense 4K Smart TriChroma Laser TV 100L7T has red, green, blue lasers.

\$6 million to license E-ink black & white folding touchscreen, make 100,000 units. Color e-paper CLEARink invested in by Lenovo.

Space Tango ST-42 autonomous factory satellites in 2025 for silicon carbide, carbon nano-tubes, pharmaceuticals, cloned organs.

LB Lusem, YOFC FIBBR 4-in-1, or Silicon Line Active Fiber Optical HDMI 2.1 TV cable.

Italy ISOF CNF organic n-type FET transistors, CVD graphene sheets, OLED backplane, thin-films of PDIF-CN2 (perylene diimide).

2 x 2 mm Fraunhofer FEP Institute OLED-on-silicon phosphorescence oxygen sensor.

China CSoT OLED factory, IGZO backplanes & inkjet printing deposition 2021.

Xiaomi phones have microcrystal zirconium oxide ceramic case & Samsung may also in 2019.

Stanford, University of California Davis to manage chip overheating by routing heat away with thermal transistor, layer molybdenum disulfide crystal made of sheets of atoms #10 nano meters thin.

Magnets made from composite tape with ceramic superconducting layer: gadolinium–barium–copper oxide (GdBaCuO) on steel ribbon made by Theva in Germany, cryo-coolers from SHI Cryogenics UK chill the superconductor to  $-240^{\circ}\text{C}$ .

E Ink Holdings black & white eBook screen production capacity fully used in Taiwan, considering USA E-Ink factory to produce 7.5-inch electronic store shelf labels 2019. 3rd-quarter revenue \$128 million.

NanoSolix 45% efficient solar made of aluminum, copper, glass, nickel, carbon nanotubes manufactured in \$4 million TV factory.

England UltraWeld to improve airtight bonding in OLED lighting with photonic-based processes. “With the popularity of mobile, electrical power optimization is mantra of the day. Demand for thinner, lightweight mobile devices boosting new wafer-level packaging schemes, \$30 billion 2020. Eliminating the need for wire bonds & bond pads. Bump/Pillar, Fan-In, Fan-Out, Through Silicon Via TSV.”

Samsung water carbon cooling system reduces chances of overheating. Big copper thermal spreader along with carbon fiber interface for better heat transfer.

OLED direct-patterning technology, eMagin achieved maximum brightness 7,500 nits.

China Sun Yat-sen University water desalination tellurium (Te) nanoparticles, plasmonic & all-dielectric properties exposed to light.

Samsung OLED display best brightness (710 nits), native color gamut (113% DCI-P3 & 142% sRGB Rec. 709) lowest screen reflectance (4.4%) & highest contrast in ambient light.

Samsung self-regenerating oleophobic (oil repelling) coating for flexible or foldable screens.

Taiwan Asus Active Aerodynamic System (AAS) opens vent on bottom of laptop. Improves airflow by 22% with 5 heat pipes,

4 copper heatsinks. Self-cleaning fans with 83 blades.

Sila Nanotech \$70 million invested to boost lithium-ion battery 40% & Silicon Valley factory—2 million phones or 10 million watches. “We have a factory working with us to get #12 nano meter

ReRAM memory mass production."

Vacuum pumps, pressure gauges & vacuum valves in 2017 were \$2.5 billion for use in chip factories. Japan Osaka University, University of Tokyo, Kyoto University, Waseda University logic gene nanochip. Actuator, sensors, DNA components. Enzyme, RNA polymerase (RNAP) & multiple target-gene substrates, integrated reprogrammable logic gates.

Imec & Soitec sequential 3D front-end chip manufacture integration process. Stacks two chip device layers on 300mm wafer connected using interconnects. Top layer must be processed at low temperatures below 525°C.

Bismuth (element 83) hard pink metal crystal. Bismuth electrons crowd into valley, creating ferro-electricity valleytronics.

Supercapacitors accumulate electrical charge on surface.

2 metal plates, positive & negative charge. Samsung capacitor battery for remote controls.

University of Glasgow graphene supercapacitor, layers of flexible, 3D porous foam formed from graphene & silver.

Lithium-Oxygen battery cathode made of nickel oxide & supported by stainless steel mesh, molten salt electrolyte.

Apple may sell low-temperature polycrystalline oxide (LTPO) backplane screens.

Stack of 3 thin horizontal nano-wire chip, #2 nano meter nano-slabs by 2025.

China Everdisplay (EDO) & BOE manufactured 1.7 million OLED screens first half of 2018. AU Optronics & Tianma 0.7 million panels (0.4% market share). Truly OLED factory 400,000 screens.

Taiwan government increasing cooperation with Israel research & development of AI & advanced chip materials.

Korea Ulsan National Institute Science Technology nano-membrane out of silver nanowires, flexible music speaker.

Japan JOLED screen factory working on \$500+ TV screen 20 to 30" OLED for videogames.

China Yangtze Memory Technologies (YMTC) Xtacking architecture for 3D NAND flash memory. NAND chips with 2 wafers: wafer containing flash memory cells, charge trap architecture, another wafer features CMOS logic chip.

China trialing more efficient solar PERC (passivated emitter rear cell) TOPcon (tunnel oxide passivated contact), N-type TOPcon & HIT (heterojunction with intrinsic thin layer).

China Yangtze Memory Technologies (YMTC) memory factory volume production 64-layer 3D NAND flash late 2019.

U of Maryland, U of Nebraska-Lincoln, U.S. Army Research Lab redox molecules transport electrons. Biological memory chip (without silicon) compatible with biological & electronic equipment. Bio-hybrid circuits for electronic device that interprets molecular information, computes, actuates cells to signal & destroy bacteria.

Taiwan Powertech Technology (PTI) factory fan-out panel-level packaging (FOPLP) \$1.6 billion, 50,000 sheets or 150,000 units

12-inch wafers monthly 2021.

Integrated solar flow battery devices with round-trip efficiency greater 20% can be commercialized. Intel divided chip factories into Technology Development, Manufacturing Operations, & Supply Chain.

South Korea government \$468 million OLED R&D factory, evaporation systems, flexible OLED

encapsulation.

Samsung #7 nano 2019 EUV chip factory partners with Ansys, ARM, Cadence, Mentor, SEMCO, Synopsys & VeriSilicon to provide Foundation Advanced blueprints, advanced packaging, & services.

Taiwan Advanced Semiconductor Engineering (ASE) fan-out panel-level packaging (FOPLP) chips. Large fraction of cell energy budget for translating RNA into amino acid proteins. Thermodynamic electrical efficiency of biology better than current artificial computers.

Custom OLED factory rental tool fee \$3 million, minimum order 300,000 screens.

Samsung embedded magnetic random access memory (eMRAM) #28-nano fully depleted silicon-on-insulator (FD-SOI) 28FDS.

Toshiba hard drives use two-dimensional magnetic recording (TDMR) & shingled magnetic recording (SMR). Then microwave assisted magnetic recording (MAMR) & heat-assisted magnetic recording (HAMR).

China BOE factory “integrates touch layer inside flexible OLED display (on touch).”

China TCL blue OLED emitter, red & green Quantum Dot emitters, ink-jet printed, H-QLED factory. Taiwan/Singapore AUO 4.5 generation Active Matrix OLED AFPD factory late 2019. Lenovo might buy these folding screens.

University of Houston awarded \$589,000 by National Science Foundation CAREER for “efficient long-lasting blue OLED emitter, near-infrared emitter compounds & photocatalysts, organic synthesis light-induced electron transfer.”

World’s first foldable \$1,300 China Rouyu Technology FlexPai 7.8” OLED flexible plastic screen, Qualcomm bendy integrated chips & 100 micro nano structured thin film materials. “Local chip clock gating at flop or module level using deep sequential analysis” to reduce electricity.

Micron memory factory Taiwan #1x nano meter, #1y nano 2019, #1z nano 2020.

Move functions from app into hardware. Single function accelerator chips use less electricity.

SK Hynix 96-layer CTF (charge trap flash) 4D NAND TLC (triple-level cell) array 3D CTF memory with PUC (peri under cell).

Samsung, Nepes, ASE/Deca 2020, Taiwan Powertech 2020, JCET/STATS & Unimicron 2021 panel-level fan-out chip factories.

OLED laminated closer to top glass to be thinner, angular color shift improved, 400 nits brightness, gamma close to target 2.20.

Synaptics flexible chip-on-film (COF) ClearView display driver, ClearPad touch controller, smaller bottom screen bezel.

China Onyx Youngy Boox 10.7” color E Ink display. Good battery time, E Ink screen stays still compared to others changing 30 times (frames) per second.

Intel #10 nano chips 2019 support S0ix low-power states during idle time, which are sub-states of ACPI S0 that increase power-savings.

Atomera, Mears Silicon Technology (MST) buries atom-thin layers of oxygen below silicon’s surface. U of Illinois at Chicago & Argonne National Laboratory new lithium-air battery still functioned after 750 charge/discharge cycles. Diamond Diode chips. Advent Diamond, Arizona State University

awarded National Science Foundation Small Business Innovation Research grant \$225,000 R&D on single-crystal diamond diodes capable of operating at high temperature & power.

Cellulose TV Screen “Institute of Materials Science of Barcelona (ICMAB-CSIC) 2D photonics crystals of cellulose derivative, hydroxypropyl cellulose (HPC), with submicron features by periodically nanostructuring a film of material using soft lithography, roll-to-roll compatible.” “Quasi-1D zirconium telluride nanoribbons high current density – 100 MA/cm<sup>2</sup> University of California Riverside & University of Georgia.”

CUNY Advanced Science Research Center & Hunter College microfluidics. Manipulation of fluid molecular level, exposes bio-chip to chemicals. Then photochemistry shines light through pyramid apertures. As light reacts with molecules, it adheres to the chip.”

OLED display driver chips from MagnaChip, Silicon Works, Raydium Semiconductor, SinoWealth Electronic, GigaDisplay Semiconductor, GalaxyCore, Yunyinggu & Chipone Technology.

MIT; UC Berkeley; U of Colorado Boulder; SUNY Polytechnic Institute add thin layer of polycrystalline silicon on top of chip.

US Department of Energy \$15 million for solid-state light LED.

U of Maryland water zinc battery rechargeable & safe. “Nanoresonator coating, 1,000s tiny glass beads, deposited on solar cells. Coating enhances sunlight absorption.” “AIN wafers HexaTech 2-inch aluminum nitride (AlN) substrate line for laser diodes, power semiconductors, ultraviolet LED.” “China Fudan University -70 degree battery.” Conductive ethyl acetate as the electrolyte & 2 organic compounds as the electrode i.e. PTPAn cathode, PNTCDA anode.”

British A.R.M. chip “display processor unit (DPU) ARM Mali-D51. 30% more power-efficient, supports 8 full layers of scene complexity. ARM outdoor display technology, Assertive Display 5, high dynamic range (HDR) TV. A.R.M. Mali-V52 video TV chip. 4K video at 60 FPS in silicon area 38% smaller.”

Samsung new memory chips TSV design & thermal control. Added more thermal bumps between HBM2 for heat dissipation & protective layer at bottom of stack to improve physical strength.

Samsung 12 metal magnesium-aluminum alloy.

V-Technology “next-generation OLED deposition technology fine hybrid mask (FHM) factory.”

Stanford Wearable Electronics Initiative (eWEAR) “foldable, stretchable touchscreens, electronic clothing, skin-like patches for medical applications.”

University at Buffalo triboelectric nano-generator. Consists of 2 thin layers of gold, with poly-dimethylsiloxane (PDMS silicon polymer).

Samsung saves space thanks to printed circuit board (PCB) Substrate Like PCB (SLP). “Samsung Y-OCTA OLED, integrates touchscreen layer in encapsulation layer. Y-OCTA thinner, better optics & 30% cheaper.”

Thinner laptop cases carbon fiber by Dell, HP & Lenovo business laptops. “Fiberglass lower cost than aluminum alloy.” “Georgia Institute of Technology nanostructured gate dielectric organic semiconductors for thin-film transistors.”

Technical University of Berlin “Battery chemistries lithium-air, aluminium-sulphur, magnesium-ion.”

UNIST, “Reduce battery size through electrodes with high areal & volume capacity. Paper-like folded electrode continuous layered films. Folds at film edges are paths for free electrons.”

Columbia U flexible battery, lithium cobaltate cathodes & graphite anodes. Insulator layer, copper

& aluminum current collector.

“FD-SOI (fully depleted silicon on insulator) factories offer lower power consumption, low as 15 mw or less in deep sleep. 17 times less than regular ARM Cortex a55 chip.”

“Cadenza super-cell battery case composite ceramic. Outside is overcharge disconnector, fuse that shuts down electrical output. Inside the box, cylindrical battery cells protected by aluminum sheet, in another ceramic composite that prevents transfer of heat. New York Power Authority bought \$1 million large Cadenza battery.”

Canyon effect dissipates chip heat. Fan case concave shape increases air flow. “Saudi Arabia Quantum Solutions, quantum dots (QD) for optoelectronics: LCD displays, LED, solar.” “Aluminum 24% of iPhone’s mass (1 ounce), iron 14%. Various rare earth elements, titanium, cobalt & nickel.” “Only way to offer bezel-free screen is to wrap flexible OLED connectors in the back (no chin), expensive & difficult.” “Conamix in New York raised several million dollars to develop cobalt-free lithium-ion battery.”

Intel Verizon CDMA phone antenna competes with Qualcomm in Apple iPhone.

“AMD Chiplets not made from individually packaged chips attached to printed circuit board. Bare integrated circuits are interconnected on large slice of silicon.”

Made in Space 3-D printing. “Archinaut heavy equipment factory, even full satellites, in orbit.”

“Cooler Master chip thermal compound with 11 Watt/mK conductivity, MasterGel Maker, nano-diamonds at good viscosity.”

Waterproof fabric MIT shorter-chain polymer & different coating process, initiated chemical vapor deposition (iCVD).

“Human brain 20 watts electricity, compared to 100,000 watt super computer. Might a computer someday have NPU neural processor unit—cloned brain plugged into it?”

Japan Semiconductor Energy Laboratory improved lifetime of OLED red phosphorescent emitter 5.4 times longer. “RMIT University prototype rechargeable proton battery combining hydrogen fuel cells & electrical power.” “LG to use Substrate-like printed circuit board (SLP) for smaller phone chips next year.”

Biological computers. Algae are like solar panels. “Artificial photosynthesis. If we can figure out how sea slug maintains isolated plastids to fix carbon without plant nucleus, then we can harness isolated plastids for eternity as green machines to create bioproducts or energy.”

Time of how long it takes to manufacture game chip. “Bill Of Materials release, Engineer Validation test 1-2 weeks, Design Validation 2 weeks, working sample 1-2 weeks, Electromagnetic Interference Test less than week, Production Validation Test 2-3 weeks, PVT Sorting PPBIOS final BIOS a few days, Ramp & MP Mass production shipping a few days.”

#1 nano meter thinnest chips. “1 million units per year if Canadian Quantum Silicon gets \$20 million. He assembles tiny circuits, atom by atom, on conventional silicon.”

“Japan Meidensha to deposit barrier films for bendable OLED displays & electronics. Low temperatures (30 C).” “China double-sided solar panels generate power from light that hits underside. 10% boosted output on white roof.”

French Glowee Bio-luminescent Marine Organisms Lighting encoded genes in symbiotic algae bacteria, does not require electricity.

“Tune diamond like a guitar string. Quantum memory system where micron-wide diamond crystal strings house impurities.”

“IGNIS screen driver chip enhances OLED compensation using individual pixel sensing.” “Universitat Autònoma de Barcelona & TU-Dresden ultra-stable film formation improves OLED efficiency 15%.”

Merck invested \$3.25 million Taiwan “develop CVD/ALD materials for thin-film process & conductive paste for IC chip packaging.”

Stanford “Field-effect transistors Hafnium & Zirconium diselenides (HfSe<sub>2</sub> ZrSe<sub>2</sub>)”

Bendable solar “Material PNTz4T. Coated on both sides with 1-micron layers of Parylene barrier to oxygen & water. Laminated between 2 acrylic elastics, 500 microns.”

India solar panel companies want to sell 1st world “high-efficiency solar PERC (Passivated Emitter Rear Cells).”

Japan Toshiba memory factory bought by Apple, Bain, Dell, Seagate, Kingston, & South Korean SK Hynix \$18 billion.

\$100 Nvidia Jetson Nano desktop, #20 nano-meters slow ARM, Nvidia Maxwell GPU game chip, OpenGL 4.5, 5 watts, 4 gigabytes RAM, free Google TV or Linux4Tegra Ubuntu apps.

Intel #10 nano Icelake GPU has coarse pixel shading, tile-based rendering, Adaptive-Sync, early 2020.

Caltech DNA salt water computer “DNA logic gates attach to DNA origami seed, encode 6-bit input.”

“US NIST silicon-doped GaN nanowire, magnesium-doped GaN aluminum shell, p-i-n structure.”

Artificial photosynthesis cell, “Photo-synthesized ATP consumed for transcription, synthesis of bacteriorhodopsin or constituent proteins.”

E Ink black & white medical 3” to 42” screens with Advantech, Avalue, Cypress, iMedtac.

Taiwan TSMC #5 nano CLN5FF chip factory late 2020. Design rule manual, process design kits (PDK), SPICE (simulation program integrated circuit emphasis), EDA (electronic design automation) from Ansys, Cadence, Mentor Graphics, Synopsys, standard cell libraries & memory compilers.

Taiwan TSMC factory SoIC packaging integrates #7 nano logic chip, memory, 2020.

Intel #10 nano Elkhart Lake Icelake Gen11 Graphics GPU, Pentium CPU, 7” tablet, March or fall 2020.

Oppo Reno, Qualcomm 855 #7 nano, copper tube liquid cooling heatsink.

\$1,000 Qualcomm #7 nano Snapdragon 855 Hardware Development Kit desktop. “Secret Way Your AirPods Are Made.

Southern California facility revealed Apple GROWING earbuds like plants.” [www.funnyordie.com/2019/4/1/1828764](http://www.funnyordie.com/2019/4/1/1828764) airpods-secret-facility-sound-gardener-earbuds “US Semiconductor Industry Association called on government to raise federal funding for chip material research from \$1.5 billion to \$5 billion.”

\$600 OnePlus7 “OLED mask DC dimming + dither uses Qualcomm Display Engine layer mixer to reduce eyestrain.”

\$1,300 China Dasung Paperlike Pro 2019, 13” E-ink Carta black & white touchscreen monitor with frontlight & HDMI TV cable.

Swiss ETH Zurich “CRISPR (biological) central processing unit to program complex logic computation in human cells” Proceedings of National Academy of Sciences.

In 2021, Samsung, Micron, Elpida, SK Hynix, Nanya factories DRAM DDR5 memory (or LP5X, GDDR7) #16 nano, quadruple patterning, EUV, multi-stack 3D structure. Competes with ReRAM, MRAM.

Taiwan ProLogium solid-state LCB oxide car battery factory 2021. “Chemical types of solid-state electrolyte: sulfide, oxide, cyanide, halide, solid polymer, thin-film compound.”

\$1,500 China laser TV projectors Changhong, JmGo, Xgimi, Hisense, TCL, Konka, Haier, Jiangsu Inovel Display, Costar Group, Casirisvision.

Korea MagnaChip working on #28 nano driver chip for Micro-LED TV.

#3 nano high numerical aperture EUV laser chip factory 2023, competes with multi-beam direct-write, nano-imprint lithography, directed self-assembly, self-aligned techniques.

\$430 Lenovo Z6 Pro, #7 nano Qualcomm 855, 6.4" OLED, DCI-P3 color gamut, DC Dimming, HDR 10, red or green.

\$475 Meizu 16s M1971, #7 nano Qualcomm 855, 6.2" OLED, carbon black, pearl white, phantom blue.

\$350 Kingrow K1 5" E Ink Carta HD black & white display 720p, #16 nano Taiwan MediaTek Helio P23 ARM a53, front LED light.

\$55 Anker PowerPort Atom PD2 wall charger, Gallium Nitride, 60 watt USB-C Power Delivery.

\$430 China ZTE Nubia Red Magic 3, #7 nano Qualcomm 855, cooling fan, 6.6" OLED HDR, 90 Hertz display refresh rate, DC dimming, 6 gigs LPDDR4 RAM, 64 gigs UFS 2.1, 5,000 mAh battery, 30 watt Quick Charge 4 USB-C PD, IP55 dust water resistant, front stereo speakers, optional joystick attachment, black, red, camouflage, or blue.

China Sanan & Gedian Development Zone Hubei \$1.75 billion micro-LED factory.

Intel #10 nano laptops January 2020, #7 nano 2022, #7++ EUV 2024.

Intel #10+ nano Tiger Lake iPad, 15 watts, Xe GT2 GPU, 2020.

\$2,500 Lenovo ThinkPad X1 Fold 13" LG OLED, #10 nano Intel, summer 2020.

\$44 RAVPower 61 Watt PD 3 GaN wall charger.

\$670 China Oppo OnePlus 7 Pro, 6.7" OLED 90hz, #7 nano Qualcomm 855, 10-layer liquid cooling, 128 gigs UFS 3 fast memory, Dolby Atmos stereo speakers, optional HDMI TV cable, nebula blue, mirror grey, almond, Verizon or GSM 4G LTE, 20 watt Quick Charge USB 3.1 Type-C 5V 3A Power Delivery.

HP overpriced Omen X laptop has Thermal Grizzly Conductonaut cooler.

ARM Mali D77 display chip #7 nano.

Macroblock "glass substrates for micro LED phones."

#7 nano (TSMC factory) AMD Radeon RX 5700 Navi desktop GPU, PCIe4 GDDR6 memory.

\$200 AMD #7 nano 3rd generation Ryzen 5 3600 Zen2 desktop CPU chip, 65 watts, AM4 MSI MPG X570 Gaming Plus motherboard.

\$362 Xiaomi Redmi K20 Pro #7 nano Qualcomm 855, 6.4" OLED, 4,000 amp battery, USB-C 27 watt fast charge,

red, blue, black or carbon fiber.

Intel #10 nano Core i5-1035 G1 Y-series Ice Lake laptops, 9 watts, Intel Graphics Engine 64 execution unit GPU, OpenGL 4.5, DirectX 12, OpenCL 2.2, HDR10, hardware accelerated TV compression encode 4K60 10-bit 4:4:4 HEVC, 8K30 10-bit 4:2:0 HEVC (worse than AV1).

Intel Optane Memory M15 64 gigs M.2 80mm PCIe 3x4 NVMe, 5.5 watts.

Taiwan MediaTek #7 nano (TSMC) ARM Cortex A77, Mali G77 GPU, 5G antenna, March 2020.

Intel Gemini ionic cooler prototype.

\$50 10,000 amp battery upgrade for Xiaomi Mi9, adds 3.4 mm thickness, China Taobao.

Taiwan perovskite quantum dot micro-LED.

ClearInk 2.0 Color 10" E-Paper, Lenovo.

Amphion Semiconductor AV1 video decoder hardware.

China BOE factory 55" printed OLED, 12" roll-able touchscreen.

E-Ink EIH invested less than \$5 million Plastic Logic.

LG micro-LED TV, 50 micron pixel pitch.

PCI Express 6.0 cable 2021.

China Vivo 120 watt fast charges 4,000 amp battery 13 minutes. Micro-LED 15 million units, 1% of screen market 2026.

US govt gave \$1.1 million Penn State OLEDWorks low refractive index organic materials.

SFI Advanced Materials, Bioengineering Research Center, Nokia Bell Labs, Trinity College Dublin battery formula.

E Ink 32 inch black & white folding screen.

JB Display microLED 2 million nits bright, 2.5µm pitch.

Embedded GC-eDRAM.

China ShineOn IconiView & South Korea Lumens 140" Micro-LED TV, flip-chip-on-module, 2,000 nits bright.

DNA, sugar, amino acid memory chip Brown University. "Japan JSR, Showa Denko, Shin-Etsu Chemical 70% supply of polyimide OLED, photoresists, high-purity hydrogen fluoride LSI, DRAM, NAND."

Synopsys Yield Explorer analyzes product layouts, #7 nano Samsung chip factory data.

#7 nano NVidia game GPU 2020.

Qualcomm SnapDragon Wear 429 #12 nano watch chip 2020.

Foldable iPads should 16:9 widescreen micro-LED 15".

OLED single layer TADF, CzDBA, diboron Max Planck Institute Polymer Research.

PlayNitride micro-LED \$50 million invested.

RiTDisplay or China CSoT 1.25" to 3" micro-LED 2020.

\$650 Samsung Galaxy Tab S6 10.5" OLED HDR10+, Qualcom 855 #7 nano, 7000 amp battery.

\$1,100 Samsung Galaxy Note 10 Plus 6.8" OLED 1,300 nits bright, 3040×1440 resolution Sub-Pixel Rendering, #7 nano Qualcom 855, UFS 3 memory, DeX USB-C HDMI TV cable, 0.35mm vapor chamber. Should be 855+ \$700.

Intel #10 nano Ice Lake Core i5 1030G4 CPU, 9 watts for laptops, Intel Iris Plus GPU. AMD Navi 23 highend #7 nano 2020 will compete with #7 NVidia & #10 Intel Xe GPU.

Samsung graphene battery 2021.

China Sanan may invest \$1.7 billion GaN & GaAs microLED factory. China Jilin OE \$85 million OLED R&D.

15" OLED screens 5 to 20 watts.

China Huami Amazfit X 2" curved OLED, 220 amp battery, summer 2020. Good only if Google apps, micro-LED better.

Taiwan TPK bendable OLED silver nanowire touch sensor.

\$100 JBL Link Music speaker, ocean blue, sienna brown, straw yellow, green, black, grey.

\$860 Onyx Boox Max3 13" black & white EInk, medium speed Qualcom, Google apps, HDMI TV input. Should be \$500.

China Realme XT (Qualcom) 730G #8 nano, OLED.

\$810 China Vivo NEX 3 5G, 6.9" OLED 1080p HDR10 blue light filter, Schott's Xensation Up curved glass, #7 nano Qualcom 855+.

Inverse Lithography Technology on at least 1 chip layer 2022.

University of West England mushroom computer “network micro-wires, transistors, capacitors, memristors” 2022.

Xiaomi Mi 9 Pro 5G #7 nano Qualcom SnapDragon 855+ XL VC liquid cooling 5 graphite layers + thermal conductivity copper foil gel.

Taiwan Innolux fan-out panel-level packaging (FOPLP) TV factory 2022.

HZO IPX8 waterproof coating via outsourcers Foxconn & Netronix \$70 million invested.

Intel & Japan Toshiba PLC (Penta-Level Cell) 5 bits per NAND flash memory 2020.

Organic solar cells at low temperature roll-to-roll deposition.

Chalmers & Slovenia National Institute of Chemistry aluminum battery, carbon molecule anthraquinone.

Taiwan University microLED GaN thin film wafers without mass transfer step.

Google Eric Schmidt believes biology is next computer frontier.

Microsoft Surface Duo folding phone early 2021.

Samsung 12-layer 3D-TSV packages 12 DRAM through 60,000 TSV holes.

Samsung investing \$2.5 billion Quantum Dot LED & other new TV factories 2025.

Synopsys #5 nano 5LPE Samsung factory Fusion Design Platform, QuickStart Implementation Kit.

Optical infrared keyboards are the fastest.

\$180 Google Pixel Buds earphones, voice commands including Translate app, spring 2020.

Micro-mirror piezoelectric film actuation pivots at larger angle for projectors.

Motech N-type TOPCon (tunnel oxide passivated contact) solar energy conversion rate 23%.

Argonne National Laboratory neuromorphic chip modeled off bug brains, tungsten aluminum oxide.

Tokyo Electron OLED printer Elius 500 Pro.

Chips&Media Wave510A licensed for AV1 TV player chips, entropy decoding, inverse scan, inverse transform/quantization, motion compensation, loop filtering.

South Korea SK Hynix #1z nano meters 16 gig DDR4, LPDDR5, HBM3 RAM.

Austin Electric aluminum-air battery.

\$150 Ring Stick Up cam with solar.

Samsung Exynos 990 #7 nano ARM Cortex a76, Mali G77 GPU.

PCA Phosphor Converted Amber LED street lights convert blue light to yellow.

NY GlobalFoundries & Singapore Nanyang Technological University \$88 million for resistive ReRAM 2021.

Sanan Optoelectronics 6-inch microLED wafers 10 x 20 microns.

Sony, Intel, NTT photonics research.

Sweden KTH Royal Institute of Technology solar nanocrystal microlens film captures infrared light.

ARM version 9 Matterhorn Cortex a79 chips 2022.

Sila Nanotechnologies silicon battery anode \$45 million invested.

Intel Stratix 10 GX 10M FPGA made of 2, 150 watt chips connected by EMIB.

USB-C chips Taiwan Alcor Micro, ASMedia, Etron, Genesys Logic, Global Mixed-mode, Leadtrend, On-Bright Electronics, Richtek, Weltrend Semiconductor.

AMD Zen 2 CPU Ryzen 4000 laptops #7 nano summer 2020, faster Zen 3 2021.

\$400 NVidia Jetson Xavier NX module, #12 nano Volta CUDA & Tensor Cores, NVDLA Carmel ARM 64-bit CPU, 2x 4K encode h265 TV, 15 watts.

Berkeley AquaPIM flow battery membrane.

China Marvell ThunderX4 #5 nano ARM fast Google desktop, 4 128-bit NEON SIMD, 2022.

Xiaomi OLED TV March 2020.

Sharp NHK 30" rollable direct emission OLED IGZO.

Taiwan III-V compound semiconductors makers Intelligent Epitaxy, Transcom, Global Communication Semiconductors. Stevens Institute of Tech common button mushroom, cyanobacteria, electrodes made of graphene nanoribbons turns it into lightbulb.

Solar panel from spinach leaf protein & blackberry extract.

Electrically conductive protein nanowires Geobacter Sulfurreducens. "Epoxies & solders weren't designed to flex."

Rumor: NVidia RTX 3080 Ampere GPU #7 nano summer 2020.

Rambus #7 nano PCIe 5.0 controller & PHY.

Jetcool micro-convective cooler fluid.

Taiwan Forcecon heat pipe, thermal ground plane 0.2 mm.

Intel Ponte Vecchio (Old Bridge) Xe GPU #7 nano 2021.

Intel hopes to sell up to 200 million Xe LP low power GPU game #10 nano chips.

One Netbook One-GX 7" laptop, #10 nano Intel Tiger Lake, 1.5 pounds summer 2020.

Intel partnered with Taiwan MediaTek for 5G laptop antenna M.2 module 2021.

Taiwan MediaTek Dimensity 1000 5G #7 nano ARM a77, Mali g77, 4K 60fps AV1 hardware accelerated TV playback, March 2020.

E-Ink sells 10 million black & white screens per year to PocketBook, Kobo, Tolino, Bookeen, China Onyx, DJ.com, Zhangyue.

Wacom Print-Color E-Ink summer 2020.

Gallium Nitride phone power amp twice as expensive but more efficient from Cree, Qorvo, Sumitomo.

Japan Display microLED prototype.

Japan Idemitsu Kosan Toray Industries OLED, efficient TADF emitter & red fluorescent material.

#3 nano high-NA EUV lithography laser 2023 "Inorganic resist best performance (#11 nano half-pitch resolution) low LER, 67 mJ/cm<sup>2</sup> dose. Resists still a work in progress."

Qualcomm 865 #7 nano ARM Cortex a77 5G, March from Xiaomi, Samsung, HTC, OnePlus, LG, Nubia, China ZTE, Blackshark, Coolpad, IQOO, Meizu, RedMagic, Smartisan, TCL. Desktop Forward Rendering lighting effects, Adreno Updateable GPU Drivers app store, HDR Game Color Plus, Snapdragon Game Performance Engine.

Qualcomm 765G #7 nano (Samsung EUV factory) 5G antenna, made by 10,000 engineers.

USA Department of Energy \$1 million grant to replace OLED ITO with silver micro-grid.

Qualcomm 8c #7 nano medium speed ARM laptops.

Taiwan RiTDisplay microLED watch 2020.

ASE backend services packaging Qualcomm laptops.

Qualcomm 865 #7 nano module certified by Verizon.

Taiwan Macronix 96-layer 3D NAND flash 2021.

Rumor: China Redmi K30 Pro #7 nano Qualcomm 865 March 2020.

China BOE Pixey microLED TV 2021.

Epistar & China Leyard Optoelectronic micro LED 2021.

Aukey Omnia PA-B2 61 watt PD Gallium Nitride wall charger.  
AMD Ryzen 5 4600H #7 nano 45 watt laptop chip.  
Alienware Concept UFO 8" Intel.  
Hisense Color Filter Array E Ink Carta phone.

**Cheap:**

\$0.01 plastic or paper printed sensors food packaging, clothing.  
\$0.10 American slow chip 2028 said \$5 Raspberry Pi creator.  
\$0.10 MEMS sensors, such as motion gyroscopes.  
\$0.10 per 1 gigabyte memory on AliBaba.  
\$0.62 per unit China solar mono-Si wafer.  
\$1 HPL Bioraytron B35 UV-C LED light water filter.  
\$1.50 India AJIT #45 nano 32 bit slow chip, SPARC V8, Institute of Technology Bombay & Powai Labs.  
\$2 Japan Furukawa Electric, Taiwan Lemtech stainless steel-based vapor chamber cooler.  
\$2 TB test Wyss Institute for Biologically Inspired Engineering, Broad Institute, Women's Hospital.  
\$3 China battery 5,000 milliamps, minimum order 1,000 units.  
\$4 Colorii CH1 USB Type C to HDMI TV cable.  
\$5 slow desktop Sipeed MAIX Bit, Kendryte K210 64-bit RISC-V chip.  
\$5 Tzumi PocketJuice Solo 4,000 amp battery Best Buy.  
\$5 Xiaomi waterproof phone case.  
\$5 Arduboy Mini 1" black & white OLED slow videogame.  
\$6 LG Phoenix 3 at Target.  
\$6 Monoprice Essentials Certified Premium HDMI TV cable.  
\$6 Xiaomi Mi Car Charger Basic Qualcomm Quick Charge 3.0.  
\$6/month Amazon Prime for Medicaid recipients.  
\$7 Hammer Technology small battery power bank 3,000 mAh.  
\$7 Xiaomi XiaoAi Bluetooth speaker with 480 mAh battery.  
\$8.50/month India Reliance Jio GigaFiber internet & TV service.  
\$9 second generation Chromecast desktop with bad apps Walmart. \$10 Chinese black & white slow phone Taiwan MediaTek MT6250.  
\$10 Asus Rog Tv500bg joystick.  
\$10 Amazon Net10 Alcatel Pop Star 2 4G LTE obsolete phone.  
\$10 Ikea Trådfri smart plug.  
\$10 Versa Power Clean Stick vacuum.  
\$10 Xiaomi Google Quick Charger 3.0, 36 watts.  
\$10 Xiaomi Mijia Mosquito Repellent.  
\$10 Pretty Good Cheap Power Supply Unit PGCPSU.  
\$11 2nd-generation Google TV Chromecast at Target.  
\$11 Xiaomi 10 watt Universal Fast Charge wireless charger.  
\$12 Meizu Mobile Power 3 10,000 amp battery.  
\$12 music watch DZ09 AliExpress.com  
€12 Avenir Telecom Energizer Energy E12 limited telephone, music player, microSD.

\$13 CNPGD Amazon.

\$14 X96 Mini Google desktop, Chinese Amlogic S905W slow ARM Cortex a5 Aliexpress.com

\$15 Amazon Fire 7" 2015 Google refurbished.

\$15 Amazon Fire TV Game Controller.

\$15 Amazon Fire TV Stick desktop at Daily Steals.

\$15 Anker Eufy Genie Alexa voice command speaker at Micro Center. \$15 HNW 018 Zapper Mosquito Killer Lamp.

\$15 mosquito traps with canola oil.

\$15 Xiaomi Mi Qi Wireless 20 watt charger built-in fan & heatsink.

\$15 Xiaomi Redmi AirDots wireless headphone, 4 hour battery.

\$15 Xiaomi USB-C headphones.

\$15 sneakers, \$0.50 ship from China.

\$16 Amazon Fire 7" iPad refurbished.

\$16 Xiaomi fire extinguishing bottle.

\$16 Xiaomi Mijia Water Filter Jug.

\$18 Xiaomi Power Bank battery 10,000 mAh.

\$18 Chinese Mecool M8S Plus W Google desktop.

\$19 Meizu EP52 Lite Sports bluetooth headset.

\$20 Amazon Fire TV Game Controller.

\$20 Chinese Qi wireless battery recharger for Apple iPhone X.

\$20 Corsair CX500 500 Watts desktop power supply, Newegg.

\$20 Chinese A95X MiniQ Google desktop.

\$20 Oppo O-Fresh wired (USB-C or 3.5mm) headphones, graphene diaphragm.

\$20 Wyze Cam V2.

\$20 Crioxen Indoor Plug-in Bug Zapper, UV Light.

\$21 Amazon Fire HD 6 refurbished Woot.com

\$22 AliBaba Zhkubdl MP3 music player watch.

\$22 India Airtel 4G Google phone, obsolete 480p 4".

\$22 Nokia 110 flip phone, FM radio, optional \$10 32 gig music microSD.

\$23 6" Samsung OLED screen.

\$23 5.8" 2880x1440 OLED flexible curved full-display.

\$23 X88 Mini Google desktop, Chinese RK3318.

\$25 Xiaomi Redmi AC2100 RM2100 wifi AC router.

\$25 China PineTime touchscreen watch, slow Nordic nRF52832, ZephyrOS.

\$25 China electric USB heated vest jacket N9B4.

\$25 8 gigs DRAM.

\$25 EVGA 400 N1 electric power supply for desktops.

\$25 IPRee waterproof solar battery.

\$25 Xiaomi wireless AirDots earbuds Bluetooth 5.0.

\$27 Xiaomi Mijia Mosquito Repellent.

\$28 notch 5.9" 2438x1125 OLED by China BOE factory.

\$28 Onn 7" GooglePad, Walmart.

\$29 Xiaomi Mijia Induction Cooker Youth Edition.

\$30 4 gigabytes memory RAM DDR4.  
\$30 Alcatel Verso Google phone, bad 480p screen.  
\$30 Amazon Fire 7 tablet or \$20 Fire TV stick at Staples & Best Buy. \$30 Amazon Fire 7 tablet Target.  
\$30 Barnes & Noble Nook Tablet 7.  
\$30 EnergyFlux Enduro hand warmer 7,800 mAh battery.  
\$30 Xiaomi Mi Power Bank 3, 45 watts USB-C 20,000 mAh battery.  
\$30 Xiaomi Smart Trash Can.  
\$32 Xiaomi Sneakers 2.0.  
\$33 Taiwan KingWear GT88 music mp3 watch.  
\$35 Amazon Fire TV ARM Cortex a53 sold 30 million desktops.  
\$35 Amazon Fire TV Stick 4K, Target, new Alexa remote.  
\$35 India Lava Z50 Google Go phone. Low quality 480p screen.  
\$35 Raspberry Pi 3B+ obsolete #40 nano.  
\$35 Samsung Galaxy Ace S5830 AliExpress.com  
\$35 Tenker Q5 480p LED projector.  
\$37 China EL W45 Taiwan Mediatek MT6580M, 4.5" IPS 480p.  
\$35 8 gigs DRAM.  
\$37 Chinese TV-Box X96 Max AMLogic S905X2 Aliexpress.com  
\$38 Banana Pi BPI-M4 desktop, Taiwan Realtek RTD1395 ARM a53.  
\$38 slow China Craig 7" Google, 1 hour obsolete battery Walmart.  
\$40 Coolpad Google Go Illumina phone, Qualcomm slow #28 nano.  
\$40 Oukitel C10 phone AliExpress.com  
\$40 KXD W50 Google phone AliExpress.com. \$40 to \$75 Radxa Rock Pi X Intel Atom x5-Z8300 slow #14 nano desktop.  
\$40 Corsair CX450 450 watt electric power supply for desktops.  
\$40 Xiaomi Mini Neck Massager.  
\$40/month no contract Verizon Visible for Google & iPhone CDMA.  
\$40 Tracfone Chinese ZTE Zfice C 4G LTE 5" Android Prepaid.  
\$42 India I-Smart is-59 obsolete (does not have Google Go apps).  
\$42 Xiaomi Mi powerbank 3 20,000 amps.  
\$43 Lenovo Air Wireless bluetooth headset.  
\$43 Lenovo Thinkplus lipstick 65 Watt charger.  
\$47 Xiaomi Shuawadi wireless handheld vacuum.  
\$50 AMD Athlon 3000G CPU, Radeon Vega 3 GPU, #12 nano 35 watts.  
\$50 Barnes & Noble Nook 7" Google. Competes \$30 Amazon Fire 7".  
\$50 China Alcatel Tetra #28 nano Taiwan Mediatek MT6739WM, 480p bad screen.  
\$50 Blackview A20 Google Go phone.  
\$50 Chinese H96 Max with AMlogic S905X2 #12 nano desktop.  
\$50 HomTom S12 phone.  
\$50 India Nokia 1 Google Go phone. Bad 480p screen.  
\$50 Lenovo Tab E7, 7" IPS, Taiwan MediaTek MT6187D, Google Go.  
\$50 water turbine <https://hackaday.com/2019/12/20/open-source-50-water-turbine-from-repurposed-parts/>

\$50 LiBa Bug Zapper & Electric Indoor Insect Killer.  
\$50 Rajintek Pallas Compact CPU cooler fan for desktops.  
\$50 slow AllCall S1.  
\$50 India Flipkart MarQ TurboStream Android TV desktop Chinese AMLogic worse than Raspberry Pi 4.  
\$50 Walmart RCA TV projector.  
\$50 Wechip V8 Max Chinese AMlogic S905X2 chip desktop Alibaba.  
\$50 Imagination IMG AXE-1-16 GPU for cheap phones, OpenGL Vulkan, 1 PPC, 16 GFLOPS, 1 Gpixels.  
\$50/month T-Mobile 4G LTE internet for rural areas.  
\$54 Lake I Home Cloud TV Box Taiwan Realtek RTD1295 slow.  
\$55 China Mecool M8S Plus DVB-T/T2/C Europe TV antenna desktop.  
\$56 China G12S Amlogic S905X2 slow Google TV box for Kodi app.  
\$56 TV 32-inch, \$90 Chinese TV 43-inch.  
\$58 Xiaomi Smart Camera, IP65 dust & waterproof.  
\$58 JBL Flip 3 speaker.  
\$58 Xiaomi Mi Home air pollution detector.  
\$60 Ulefone Note 7, #28 nano Taiwan MediaTek MT6580.  
\$60 Acer C720 Chromebook Intel Celeron Google laptop.  
\$60 Open Book Feather 4.2" E-Ink.  
\$60 AmazonBasics Microwave with voice commands.  
\$60 Blu Vivo Google Go slow #28 nano Taiwan MediaTek phone.  
\$60 Bluboo D6 slow phone.  
\$60 Cubot J3 Google Go phone.  
\$60 Goal Zero Nomad 5 solar 5 watts.  
\$60 JBL Flip 4 speaker Target.  
\$60 Wear24 Google Wear Watch 1" OLED.  
\$60 Xiaomi Mi AirDots Pro wireless headphones.  
\$60 Lenovo Tab M7 #28 nano Taiwan MediaTek MT8321 obsolete 32-bit ARM Cortex A7.  
\$64 Walmart Onn Android Tablet, 8" IPS 720p, 2 gigs RAM.  
\$65 China 43" TV, \$100 55", \$165 65".  
\$66 TCL Alcatel 1B Google Go.  
\$67 ASRock H370M Pro4 Intel desktop motherboard.  
\$68 Xiaomi microwave by Guangdong Kitchen Technology.  
\$70 Blackview A60 Pro, #12 nano Taiwan MediaTek Helio A22, 4,000 amp battery.  
\$70 India Xiaomi Redmi Go 16 gig version, optional 128 gig microSD.  
\$70 Choetech 24 Watt foldable solar charger.  
\$72 China Mecool KM9 AMlogic S905X2 desktop, Mali-G31 MP2 GPU.  
\$75 Xiaomi Redmi obsolete 6A, Taiwan MediaTek Helio A22 #12 nano slow.  
\$75 Dell Chromebook, obsolete Intel Celeron laptop.  
\$77 Xiaomi Le Fan back massage cushion.  
\$78 India iTel A22 Google Go phone. Other phones in India \$30.  
\$80 China Oppo Realme C2 sold in India, Indonesia, Malaysia, Pakistan, Vietnam, Egypt.

\$80 Anker Nebula Prizm 2500 Lux LED Home Projector 480p.  
\$80 waterproof Blackview BV4000 phone, obsolete chip.  
\$80 Xiaomi Mi Reader EInk Carta black & white, Google, Chinese chip.  
\$80 Dell 3120 Google Chromebook refurbished laptop #22 nano Intel N2840.  
\$85 Xiaomi Redmi 7A #12 nano, India.  
\$87 Lenovo-Motorola phones assembled in India by Flex, exported to Latin America.  
\$88 Nebula Prizm by Anker TV Projector LED 100 ANSI Lumen 480p.  
\$90 Samsung Galaxy A2 Core #14 nano, South Africa.  
\$90 Alcatel 1 Google Go phone. Should be less than \$60.  
\$90 China LeEco LeTV Le2 X526, Qualcomm 652 #28 nano.  
\$90 Motherboard AMD AM4 ASRock AB350 Gaming K4.  
\$90 Xiaomi Redmi 5A, slow Qualcomm 425, 720p IPS screen.  
\$92 Xiaomi Redmi 8A, 6.2" IPS, #12 nano Qualcom 439, 5,000 amp battery, India Flipkart, red, black, or blue.  
\$95 China Vivibright F10 720p TV HDMI projector GearBest.com  
\$97 Realme C1 slow Qualcomm 450 #14 nano.  
\$100 China Hisense 40" TV.  
\$100 Javoda E500 LCD projector 50" 720p TV, 150 lumens BangGood.com  
\$100 CleanseBot disinfecting UV-C light.  
\$100 Chinese ZTE A7 Prime.  
\$100 Intel #14 nano Pentium Gold G5620 can play some games.  
\$100 JBL Tunew120TWS wireless headphones 4 hour battery.  
\$100 LeEco LeTV Le 2 X526 Snapdragon 652 #28 nano.  
\$100 Nigeria Chinese Umidigi A1 Pro phone.  
\$100 or less rice cookers Tatung, Tiger Corp, Panasonic, Zojirushi.  
\$100 Samsung Galaxy J4 Core Google Go phone, 6" 720p LCD.  
\$100 Walmart Samsung Chromebook 3 slow laptop.  
<\$100 AMD 35 Watt Ryzen 3 2200GE desktop chip.  
<\$100 AMD Ryzen 3 2200GE #14 nano 35 Watt game desktop chip.  
<\$100 Brazil Google Go phones from Positivo, Multilaser & Alcatel.  
<\$100 HomTom C1 C2 Lite Google Go Taiwan MediaTek #28 nano.  
<\$100 AMD Ryzen 3 2300X CPU 65 watt #12 nano slow desktop.  
\$105 Chinese HomTom H1 Google slow phone for India.  
\$105 Xiaomi Redmi 7, Qualcomm 632 #14 nano slow ARM a53.  
\$106 Oppo O-Free wireless bluetooth headphones.  
\$107 Indonesia Google Go phone Asus Zenfone Live L1.  
\$110 AllCall W1 Google music watch, 1.4" OLED.  
\$110 EVOO laptop #14 nano Intel Celeron N3350, Walmart.  
\$110 Smartisan air purifier.  
\$112 Xiaomi Redmi 8, #12 nano Qualcom 439, optional 512 gigs microSD.  
\$115 Nokia 2.1 Google Go slow phone.  
\$115 Xiaomi Amazfit Verge OLED watch.  
\$117 India Vietnamese Mobiistar XQ Dual, Qualcomm 450 #14 nano.

\$120 Nokia 2.3, 6.2" IPS, #12 nano Taiwan MediaTek Helio A22, optional 512 gig microSD, 4,000 amp battery.

\$120 Moto E6 Play, Brazil & Mexico.

\$120 Gigabyte B450 Aorus Pro WiFi AMD motherboard.

\$120 Xiaomi dehumidifier, silver ion antibacterial filter.

\$120 Xiaomi Redmi A1 washing machine.

\$123 Samsung Galaxy J2 (2018) 5"OLED 480p slow Qualcomm India.

\$125 India Realme 5i Qualcom 665 #11 nano, optional 256 gig microSD.

\$130 Samsung Galaxy M10s 6.4" OLED, Samsung Exynos 7884B #14 nano Mali-G71 GPU.

\$130 Rwanda Mara X Google Go, 5.7" Gorilla Glass, 3,500 amp battery. Competes with \$37 Chinese.  
<https://youtu.be/z-IIo1-soQQ>

\$130 Frigidaire 5,000 BTU air conditioner Walmart, \$800 in 1968.

\$130 HP ProBook 11EE G2 Intel Core i3 laptop.

\$130 Asus E203MA laptop, slow Intel Celeron N4000 #14 nano, Best Buy.

\$134 X31 desktop Intel Core i3-7100U, no memory AliExpress.com

\$134 Xiaomi Mi TV 32-inches Indonesia.

\$136 Xiaomi Drying Machine.

\$138 Chinese Alcatel 3T 8 inch Google Go tablet. Should be \$30.

\$140 China Redmi Note 8, #11 nano Qualcom 665, 4 gigs RAM, 64 gigs memory.

\$140 Tablo Dual Lite TV recorder.

\$150 Mi Mini PC, 5" 720p, slow Intel, Microsoft apps.

\$150 AMD RX 5500M laptop GPU #12 nano.

\$150 Moto Z Droid, fast Qualcomm Snapdragon 820 #14 nano.

\$150 Xiaomi Redmi Y2 India, Qualcomm 625 #14 nano slow.

\$150+ China Oppo Realme phones exclusive to Amazon India.

\$150 Amazon Fire HD 10" Dolby Atmos stereo speakers, optional 512 gigs microSD, USB-C charger, plum, twilight blue, black, or white.

\$150 slow car engine China Tuo La Ji.

\$155 Xiaomi Redmi S2 Qualcomm 625 #14 nano slow.

\$158 Lenovo Z6 Lite Youth Edition, #10 nano Qualcomm 710, IPS screen.

\$160 Intel #14 nano Pentium Gold 6405U slow desktop.

\$168 China Vivo Y71 #14 nano Qualcomm 450 India.

\$170 Xiaomi Mi Pad 4, 8" 0.75-pound, Qualcomm 660 #14 nano.

\$175 ODroid-H2 desktop slow Intel Celeron J4105 #14 nano.

\$175 China 360 N7 Lite, Qualcomm 660 #14 nano, 4,000mAh battery.

\$180 Xiaomi Mi A3, #11 nano Qualcom 665, 6" OLED 720p.

\$180 Samsung Galaxy A20, 6.4" OLED, Samsung Exynos 7884 #14 nano.

\$180 NVidia GTX 1650 #12 nano desktop game chip April.

\$180 Nvidia GTX 1650 #12 nano desktop game chip.

\$183 Chatreey S1-A320 desktop, AMD Athlon 200GE #14 nano, RAM memory not included.

[www.aliexpress.com/item/4000072044221.html](http://www.aliexpress.com/item/4000072044221.html)

\$185 Xiaomi Mi Google Watch, 1.75" OLED, 570 amp battery, #28 nano Qualcom SnapDragon Wear 3100, 8 gigs memory.

\$188 Mexico Xiaomi Redmi Note 5A overpriced #28 nano meters.  
\$190 Lenovo 100e laptop. Slow #14 nano Intel Celeron N3350 Apollo.  
\$190 Xiaomi Mi TV 4S 32-inch.  
\$193 Xiaomi Mijia handheld wireless vacuum.  
\$200 AMD desktop #14 nano Atari VCS 2020 with joystick.  
\$200 Element 55-inch 4K television Target.  
\$200 NVidia Shield Google TV Pro desktop ARM #20 nano obsolete chip (\$150 version limited to 32 bit apps). NVidia Shield Tablet not updated since 2014. NVidia should make #7 nano ARM Cortex a77 iPad next year, but is focused on high-end desktops & robot cars.  
\$200 Intel slow Gemini Pentium Silver J5005, 6 watts, #14 nano.  
\$200 NVidia GeForce GTX 1650 Super GPU #12 nano, Asus, Colorful, EVGA, Gainward, Galaxy, Gigabyte, Innovision 3D, MSI, Palit, PNY, Zotac, A.I. Enhanced Image Sharpening, ReShade Freestyle “customize 650 games post-processing filters into oil painting, watercolor, or retro 1980s environment.”  
\$204 Xiaomi Mi 8 Youth Edition 6.25” IPS, Qualcomm 660 #14 nano.  
\$205 Xiaomi Yunmi Smart Washing Machine.  
\$213 India Oppo A5 with slow #14 nano Qualcomm 450 chip.  
\$215 Oppo Reno Z 6.4” OLED, #10 nano Qualcom 710, Adreno 616, ocean green & black.  
\$218 Xiaomi Mi 6X Qualcomm 660 #14 nano.  
\$220 Realme X 6.5” OLED, #10 nano Qualcomm 710.  
\$220 MII Intel #14 nano Pentium J4205 desktop, 10 watts.  
\$220 Walmart Chinese Hisense HIS49H6E 49-inch 4K HDR TV.  
\$223 Essential Phone Qualcomm 835 #10 nano, low quality screen.  
\$225 Xiaomi Mi 9 SE, 6” OLED, #10 nano Qualcom 712, Adreno 616 GPU, 18 watt Quick Charge 4+, blue, violet, or gray.  
\$230 Oppo K3, #10 nano Qualcomm 710, 6.5” OLED.  
\$230 China Vivo Z3, Qualcomm 710 #10 nano, 6.3” OLED.  
\$230 Oppo K1 6.4” OLED, Qualcomm 660 #14 nano.  
\$233 Meizu X8, #10 nano Qualcomm 710.  
\$237 Xiaomi Poco F1 #10 nano Qualcomm 845 in India.  
\$240 ECS LIVA Q2 Intel Pentium Silver N5000 #14 nano desktop.  
\$240 Xiaomi Zhimi Air Purifier.  
\$242 Xiaomi LTK electric heater.  
\$250 Beelink X55 Intel Pentium Silver Gemini #14 nano desktop.  
\$250 HP 14-dk0731ms laptop #14 nano AMD Ryzen 3 3200U, 8 gigs RAM at Microsoft Store.  
\$250 LG V30 6” 1440p P-OLED, Qualcomm 835 #10 nano on eBay.  
\$250 HP 14z laptop, AMD Ryzen 3 3200U #14 nano.  
\$262 Smartisan Nut Pro 2S 6-inch OLED, Qualcomm 710 #10 nano.  
\$267 UDOO X86 II Ultra desktop #14 nano Intel Pentium N3710 Intel HD Graphics 405, 6 watts.  
\$277 Minisforum U500 desktop #14 nano Intel Core i3-5005U GearBest.com  
\$280 Acer Aspire 3 AMD Ryzen 3 slow laptop #14 nano.  
\$280 Lenovo 14e Chromebook laptop, 6 watt AMD A4-9120C #28 nano.  
\$280 Xiaomi Mi 8 SE 5.75” OLED Qualcomm 710 #10 nano.

\$280 AMD Radeon RX 5600 XT desktop GPU #7 nano.  
\$280 Vnogn medium speed #14 nano Intel Core i5-8250U, memory not included.  
<https://m.aliexpress.com/item/33053685915.html>  
\$290 Xiaomi Redmi K20 #8 nano Qualcomm 730, 6.4" OLED.  
\$293 XCY Mini Pc Linux Thin Client Micro Desktop, #14 nano Intel Core i7 6500U, 8 gigs RAM.  
\$300 Heatworks Tetra small dishwasher.  
\$300 Lenovo ThinkPad E495 14" laptop #14 nano AMD Zen 3 3200U.  
\$306 Meizu 16X 6" OLED, #10 nano Qualcomm 710.  
\$325 Sapphire FS-FP5V motherboard AMD Ryzen Embedded V1000.  
\$330 Lenovo IdeaPad Flex 14 laptop, AMD Ryzen 3 2200U #14 nano, NewEgg.  
\$332 Mann 8S waterproof Qualcomm Snapdragon 653 #28 nano.  
\$342 China OnePlus 6T Qualcomm 845 #10 nano, 6.4" OLED.  
\$342 OnePlus 6T #10 nano, SouQ store UAE, Egypt, Saudi Arabia, Kuwait.  
\$360 Oppo R15x 6.4" OLED, Qualcomm 660 #14 nano. Should \$200.  
\$360 Xiaomi Mi8 #10 nano Qualcomm sold 6 million in 4 months.  
\$363 Microsoft Surface Go Intel Pentium Gold 4415Y #14 nano.  
\$365 Xiaomi Mijia smart washing & drying machine.  
\$377 China Meizu 16s Pro, #7 nano Qualcom 855+, 6.2" OLED. Screen should be larger.  
\$380 Xiaomi Mi TV 4S 50-inch with HDR.  
\$400 Vivo V15 Pro 6.4" OLED, Qualcomm Snapdragon 675 #11 nano.  
\$400+ Intel Frost Canyon #14 nano NUC desktop, 25 watts.  
\$400+ Zotac ZBOX MI574, #14 nano Intel Core i7-9700 65 watts fast desktop.  
\$412 Samsung Galaxy A70s 6.7" OLED, #11 nano Qualcom 675, Prism Crush Red, Black, or White.  
\$430 China Oloey #14 nano Intel i7-8750H desktop.  
\$470 China Meizu 16 Plus 6.5" OLED, Qualcomm 845 #10 nano.  
\$480 China Vivo X27, 6.4-inch OLED, Qualcomm 710 #10 nano.  
\$500 Qualcom 7c #8 nano slow ARM laptops.  
\$530 China Oppo Reno3 Pro #7 nano Qualcom 765G, 6.5" OLED, blue, sunrise, black, white.  
\$600 Acer Swift 3 SF314-42 #7 nano AMD Ryzen 4700U 15 watt laptop.  
\$630 Walmart RCA 70" 4K Smart LED TV RNSMU7036.  
\$740 Xiaomi RedmiBook 13 #14 nano Intel i7-10510U, NVidia MX250, 8 gigs RAM.  
\$800 Samsung Galaxy A80, 6.7" OLED, Qualcomm 730 #8 nano. Should be \$400.  
\$3 million Global Cooling Prize to find better air conditioner.  
\$2.5 billion China JD Logistics 7 fulfillment, 400 warehouses.  
\$11 billion Taiwan RAM factory Winbond #20 nano.  
1.8 billion phones & 75 million laptop ultramobiles will be sold 2020.  
1 trillion very slow chips sold in 2018.  
16,000 Google phone brands/products.  
20 million Raspberry Pi's sold.  
345 million smartphones sold 1st quarter 2018.  
35 million ARM chip wafers compared to 1.6 million Intel & AMD.  
3rd world corn 10x more quantity with affordable nitrogen fertilizer.  
60 quasi-mono-Si solar cells panel has power output 310 watts.

7 million videogame laptops sold per year, average \$700 each.

8-inch wafer factory capacity supply to have shortage through 2020. 8Bitdo Joystick Zero 2 smaller than average. “Alibaba invests another \$1.3 billion into offline retail stores.” “Chile man buys \$400 phone with 127 pounds of avocados.” “China LEAGOO Care official service support center in Nigeria.” “Thailand, Vietnam, Malaysia & Cambodia potential manufacturing.” “TV 4K HDR playback on Qualcomm Snapdragon 710 #10 nano.”

“AMD 35 watt desktop game chip Athlon 200GE & Pro 200GE.”

“IDC predicts 1.65 billion smartphones sold in 2022.”

“Taiwan UMC chip factory to invest \$1.25 billion in China.” “Sony closed Beijing smartphone plant, transferred to Thailand.”

Africa only sold 10 million Google phones quarter 1 2018.

Alibaba invested Daraz Pakistan & Bangladesh.

Alibaba sales \$12.2 billion quarter 1 2018.

AliBaba ships most products to China in 4 days.

Alibaba wants 2 billion consumers & 10 million sellers 2036.

Amazon invested in prefabricated housing Plant Prefab.

Amazon quarterly revenue \$52.9 billion.

AMD 12 watt #14 nano Great Horned Owl V1000 chip.

AMD B450 desktop motherboards MSI, ASRock, ASUS, Gigabyte.

AMD E9170 game chip #14 nano, 35 watts.

AMD laptop market share 5%.

AMD Picasso #12 nano laptop chips 300U & 3200U.

AMD RX 550X desktop game chip, 5% faster than 2017.

AMD Ryzen 5 2600H #14 nano laptop AMD Vega game chip 45 watts. AMD second quarter 2018 \$1.76 billion revenue.

AMD third quarter 2018 revenue \$1.65 billion, gross margin 40%.

AMD V1202B (12 watts) comparable to Ryzen 3 2200U #14 nano.

AMD around 30% desktop market share.

Apple online store 10% military veteran discount.

Apple outsources iPhone assembly to asian Foxconn & Pegatron. Australia banned untrustworthy Chinese Huawei & ZTE.

Australia Mirreco hemp 3D printed houses.

Avocado tree \$100/year profit, \$0.10 each fruit.

Brazil Google Stations free wifi.

C16 Biosciences lab palm oil, grown in bioreactors, 20% cheaper.

Canada hemp concrete NForce-Fiber for China Olympics.

Charity chip SiFive U54-MC Coreplex #28 nano, slow as ARM A55.

China \$300 million invested Coolpad.

China \$8.45 to assemble each iPhone.

China 4 million game laptops sold 2018, \$750+ now, \$500 next year.

China CEC-Panda LCD Tech manufactures IGZO efficient screens.

China chip factories will be fourth most miniaturized by 2028.

China ChangXin Memory \$2.5 billion invested #17 nano DRAM factory 2021.

China govt Tsinghua Yangtze Memory & UNIC factory.  
China Innotron #17 nano RAM factory 2021.  
China JD.com store wants Germany office & to sell in Europe.  
China Lenovo 34-year old company, first laptop 1996.  
China manufactures 10 million OLED screens/year.  
China Oppo 400,000 points of sale in 30 countries.  
China Oppo OnePlus TV in 2019 with voice commands.  
China Oppo phones sold in England, Poland, Turkey.  
China Realme sells Google phones in India retail stores.  
China Shenzhen MTC invests in LED lights.  
China SMIC #14 nano chip factory, working on #7 nano.  
China solar Longi Green Energy to manufacture using solar 2022.  
China solar mono-Si LONGi Green Energy \$0.63 per wafer.  
China store JD.com 315 million customers, Alibaba 600 million.  
China Tongwei Solar annual capacity for PERC solar cells 9 GWp.  
China Tsinghua to buy 3D NAND memory from Intel until 2019.  
China ZTE Nubia Red Magic videogame computer brand.  
China Elephone store in Morocco.  
China Huami Huangshan No. 1 wearable RISC-V slow chip.  
China Huawei \$2 metal heat spreader.  
China JD.com Central store Thailand.  
China Leagoo Poland phone store.  
China Lenovo #1 in India laptop sales.  
China OnePlus phones store in Paris.  
China Realme selling phones in Pakistan.  
Colorful, Inc. memory RAM.  
Computer prices in India vary from day to day, including Apple.  
Corning car glass factory in China.  
Dollar General opening 900 stores in 2018.  
Elebao slow desktop GK3, 10 watt #14 nano Intel Pentium J5005.  
Europe 30% of phones are Chinese.  
FitTech China market share 50% LED probers, 80% for LED sorters.  
Free blueprints SiFive E20 & E21 RISC-V chip for slow wearables.  
French GreenWaves Technologies RISC-V chip for slow appliances.  
Global sales of flat-panel TV's 107 million units in first half 2018.  
Google supports lowRISC & Linux Foundation C.H.I.P.S. Alliance free chip blueprint.  
Google \$550 million invested China store JD.com  
Google sold 55 million \$30 Chromecast TV limited boxes since 2013.  
Google sold at least 10 million \$40 Go phones.  
Google licensing Chinese Amlogic TV desktops to companies.  
GPD 3rd generation Win & Pocket small Intel laptops 2020.  
Hematene chips made from cheap, plentiful iron ore.  
HomTom Noida, India \$30 million assembly factory.

Humax Vision Google TV projector.  
India \$120 Mosquito Away phone LG K7i “ultrasonic sound waves.”  
India 800 million people online 2022.  
India Cashify \$12 million invested used smartphone business.  
India every \$25 AliBaba Google Go phone 4G antenna 2020.  
India FabCI will contribute to chip design.  
India FlipKart.com sells 50% of phones. Xiaomi, Lenovo, Samsung.  
India FlipKart.com store \$3 billion invested by Google.  
India Motorola 1,000 small retail stores.  
India solar factories may buy used equipment from China & Taiwan.  
Indonesia Samsung sold 2.3 million phones first quarter 2018. Indonesia top 5 Xiaomi, Oppo, Vivo, Samsung, Smartfren.  
Indonesia top 5 phones Samsung, Xiaomi, Oppo, Vivo, & Advan. Innolux 1.4” round flexible OLED display.  
Innolux considering TV factory in India.  
Intel 15 watt #14 nano Whiskey Lake-U Core i3-8145U.  
Intel 9th generation Core i3 Coffee Lake-S Refresh #14 nano chips.  
Intel 9th generation Core i3 H-series obsolete #14 nano laptops.  
Intel 9th generation fast chip #14 nano Core i5-9600K.  
Intel 9th generation Pentium Gold 5420 #14 nano middle speed chip.  
Intel Amber Lake-Y Core m3-8100Y #14 nano 5 watt laptop chip.  
Intel Compute Module desktop 15 watt Pentium 5405U #14 nano.  
Intel Crimson Canyon NUC8I3CYSM2 with AMD Radeon 500 desktop.  
Intel Low Power Display Tech, Sharp & Innolux 1 watt LCD screens.  
Intel partially outsourced #14 nano chips to Taiwan TSMC factory. Intel Pentium Gold G4560, G4600, G4620, 4415Y slow chips.  
Investment in chip companies \$10 million minimum.  
Kenya M-Pesa payment service for AliExpress.com  
Korean LG quit China phone market.  
Korean LG working on Kromax & Epik A.R.M. chips.  
Lenovo Tab M10 Qualcomm 450 #14 nano slow chip, 10” low quality. Liquidity Services Liquidation.com 3 million customers.  
LIVA One SF110-A320 AMD Ryzen desktops.  
Machinon Raspberry Pi Home Automation System.  
Magnachip flexible OLED display driver #28 nanometers.  
Memory chip factory Nanya \$660 million more #20 nano capacity.  
Mexican nitrogen-fixing corn reduces need for fertilizer.  
Mexico TIC charity cell phone network \$2/month.  
Micro-Star International (MSI) sold 1.2 million gaming laptops 2018. MIPS chip acquired by A.I. hardware Wave Computing.  
MIPS CPU chip sold to Chinese Tallwood Venture Capital \$65 million.  
Moolah Mobile free phone service with ads.  
Netflix true story Malawi windmills “Boy Who Harnessed the Wind.”

Nokia HMD another \$100 million invested.  
Nokia HMD sold 70 million phones in 2 years.  
North Carolina State University electro-hydrodynamic chip printer.  
NVidia GeForce MX230 laptop game chip #14 nano, Samsung factory.  
NVidia MX150 1D12 laptop game chip #14 nano, 10 watts.  
NXP I.MX 8M Mini A.R.M. Cortex A53 chip #14 nano LPC FinFET.  
NY Times, “2 acres hemp stems & lime can build a house.”  
One Mix 2 laptop 7 inch, Intel Core M3 #14 nano.  
OpenCL API. ARM Cortex a76 #28 nano costs less than \$75.  
Oppo \$550 OnePlus 6T online store ships to 40 countries.  
Organic chip interposer \$2 compared to \$30 silicon interposer.  
Osh’s Affordable Pharmaceuticals public benefit corporation.  
Police, fire, EMS workers discount \$15 off Verizon unlimited.  
PolyGlu water filter.  
Qualcomm “make chips from \$100 to \$1.”  
Qualcomm #10 nano Snapdragon 710.  
Qualcomm #8 nano (made in Samsung factory) Snapdragon 730 chip.  
Qualcomm 635 chip #14 nano. Qualcomm 670 #10 nano.  
Qualcomm 636 slow chip #14 nano.  
Qualcomm 665 #11 nano, Vulkan 1.1, OpenGL ES 3.2.  
Qualcomm 730G #8 nano (probably Samsung factory) Adreno 618 GPU, Vulkan 1.1.  
Qualcomm Quick Charge 4+ newer cable standard.  
Qualcomm Mobile 215 chip slow Google Go ARM Cortex a53 phones.  
Qualcomm Snapdragon 429 & 439 chips for Google Go 3rd world.  
Qualcomm Snapdragon 730, #8 nano LPP Samsung factory chip. Qualcomm Snapdragon Wear 3100  
#28 nano obsolete G watch chip.  
Qualcomm will cap pricing of specific patent licensing deals.  
Raspberry Pi version 4 #28 nano or less 2020.  
Refrigerator plastic crystals of pressurized neopentylglycol (NPG).  
RISC-V SiFive Freedom u540, #28 nano chip.  
Rumor: \$150 Qualcomm 6150 #11 nano chip 2019.  
Rumor: \$400 mid-range Google Pixel #10 nano Qualcomm 710.  
Rumor: \$500 AMD Kahlee Google Chromebook Raven Ridge laptop.  
Rumor: Amazon Alexa wireless headphones.  
Samsung assembles phones in Bangladesh with Fair Electronics.  
Samsung planning more affordable midrange options India.  
Samsung sold 15 million Google phones in Europe quarter 1 2018.  
Samsung sold 2 million units Galaxy A10, A30, A50 over 40 days in India 2019.  
Samsung store Argentina.  
Samsung targeting sales \$10 billion in India.  
Samsung vs. China in India \$65 Google Go to \$200 phones.  
Samsung will outsource to Wintech for Chinese phones.  
Samsung, Oppo, Vivo & Xiaomi \$0.50 heat pipes.

Samsung.com 10% discount to college students & teachers.

Should have been #7 nano thin.

SiFive RISC-V free chip blueprint \$65 million invested by Qualcomm, Intel, Samsung.

South Africa low-end phones from Mobicel, Mint, Nokia, Transion.

South China Normal University reflective electrowetting TV.

Sriperumbudur, India Xiaomi Flex assembly factory.

Taiwan Acer 10 stores Indonesia.

Taiwan Acer revenue for 2018 \$7.8 billion.

Taiwan ASRock Phantom Gaming branded AMD Radeon GPU.

Taiwan Asus AMD gaming laptops named Ares.

Taiwan Asus Arez brand AMD game chips.

Taiwan Asus goal 2 million gaming laptops (average \$800) 2018.

Taiwan Asus outsourcing laptops to Pegatron & Quanta.

Taiwan Asus ships over 10 million motherboards per year.

Taiwan AU Optronics SunBravo SunForte solar modules.

Taiwan Banana Pi BPI-W2 Realtek RTD1296 desktop.

Taiwan Foxconn invested in EpiLED.

Taiwan Foxconn outsourcing revenue \$44.4 billion 3rd quarter 2018.

Taiwan MediaTek \$7.73 billion revenue 2018.

Taiwan MediaTek P40 chip, Mali G72 GPU, #12 nano.

Taiwan PowerChip factory \$10 billion #14 nano 2020.

Taiwan Powerchip to construct 2 12-inch wafer factories \$9 billion.

Taiwan Semi Manufacture Company TSMC \$32 billion/year revenue.

Taiwan UMC chip factory bought Mie Fujitsu Semi \$500 million.

Tesla may make \$25,000 cars in 2021.

Thailand Apex International 10-layer PCB board factory.

Toyota, Panasonic partner on 5 battery factories in Japan & China.

Turkey dictator endorsed Venus, Vestel Google phones.

U of Maryland wood water desalination interfacial evaporation.

Verizon discount for military members & their families.

Volkswagen to make 50 million \$22,000 electric cars.

Walmart has 60,000 suppliers for 142,000 products.

Walmart 150 warehouses for 11,500 stores via 6,000 trucks.

Winbond #25 nano meter DRAM memory factory.

Xiaomi & India Reliance Jio may sell phones & TV retail.

Xiaomi 150 Europe stores.

Xiaomi 500 Mi Stores India & few thousand stores by 2020.

Xiaomi invested \$0.5 billion in India division.

Xiaomi Mi 8 sold 1 million units in 18 days.

Xiaomi Mi Store in Hungary, Italy, Philippines, Vietnam.

Xiaomi Realme 20,000 retail outlets across 150 India cities.

Xiaomi Redmi phones maximum \$375.

Xiaomi sold in 83 countries.

Xiaomi working on less than \$75 printer.

XTPL 100 nm Nano-metric Printer makes slow chips & TV screens.

Yoycart.com China store 700 million products.

Cheap, not alphabetized:

\$15 (competes \$7 2G phones) KaiOS HTML5 black & white sold 85 million phones, Ooredoo in North Africa & Middle East, Orange Africa.

Qualcomm QCA6390 #14 nano, Wi-Fi 6 Bluetooth 5.1 antenna.

EOMA68 charity RISC-V iPad 64-bit chip. Competes with

\$10 ARM Cortex a55. Lower power consumption from compressed instructions, 25% code reduction.

Free apps & hardware blueprints reduce cost of designing low-end computer to \$6 million.

China Hua Hong Semiconductor building #14 nano chip factory & then #5 nano after 2021.

\$40 HomTom C13 Google Go phone, 5" IPS 480p screen, #28 nano Taiwan MediaTek MT6580M

<https://m.es.aliexpress.com/item/33001713409.html>

\$65 Xiaomi Redmi Google Go phone, Qualcomm #28 nano, competes in Africa, India, Malaysia with Chinese iTel, Tecno, Infinix, Philippines Lazada.com. Same as Verizon Nokia 2V.

\$20 Chinese phones Benin, Botswana, Cameroon, Congo, Ghana, Guinea, Guinea Bissau, Ivory Coast, Liberia, Nigeria, Rwanda, South Africa, Sudan, South Sudan, Swaziland, Uganda, Zambia.

Slow KaiOS app made by China Mobile, Unisoc, MTN.

Worse than \$25 Alibaba Google phones ARM Cortex a55 #28 nano Taiwan MediaTek chip.

\$100 Lenovo IdeaPad 130s-11GM 14" laptop, 3.2 pounds,

slow Intel Celeron N4000 #14 nano.

\$112 + \$12 electric cable ODroid-H2 Intel slow desktop.

Intel Celeron J4105 Gemini Lake 10 watt, 2 slots for DDR4 RAM, Intel UHD Graphics 600 #14 nano.

Competes with \$55 AMD

Athlon 200GE AM4 socket #14 nano desktop.

\$90 Gigabyte GB-BXBT-2807 (rev. 1.0) mini-PC barebone desktop

#22 nano obsolete Intel Celeron N2807.

\$120 Gigabyte BRIX GB-BLCE-4105-BW mini barebone (memory not included) Intel Celeron J4105 #14 nano desktop.

AMD wafer supply contract with NY GlobalFoundries factory until 2021 for #12 nano obsolete chips.

\$100 slow #12 nano AMD Zen 5 appropriate for 100 watt desktops. AMD rented Taiwan TSMC factory #7 nano iPad, 7 watts, 2020. Taiwan Vanguard International Semi bought GlobalFoundries factory 3E in Singapore \$235 million.

\$300 ACEPC CK2 desktop Intel Core i5-7200U #14 nano, Intel HD Graphics 620 GPU, 15 watts.

\$550 14 inch HP ProBook 445 G6 laptop AMD Ryzen 3 2200U

#14 nano, 0.7" thick, 45 Watt-hour battery, 65 watt USB-C charger, stereo speakers, HDMI 1.4b TV cable, 4.5 pounds. I am waiting for 2020 Intel Lakefield 10" MicroLED #10 nano iPad or #7 nano AMD APU (CPU + GPU), less than 1 pound, 7 watts.

Emdoor EM-NP/NS13AP-H 13" laptop, 0.75" thick, AMD #12 nano Ryzen 3-3200U.

Taiwan PCB Zhen Ding Technology \$15 million India SMT

(Surface Mount Tech) factory.

#10 nano Qualcomm Snapdragon 712, ARM Cortex a75 medium speed, QuickCharge 4+, Qualcomm

Adreno 616 GPU game chip, OpenGL ES 3.2 Vulkan.

\$200 Chinese Moto G7 Play, Qualcomm Snapdragon 632 slow ARM Cortex a53 #14 nano chip for Brazil & Mexico. Should have been \$150 & OLED screen instead.

\$400 Samsung Galaxy Tab S5e 10.5" OLED WQXGA (1600p), Qualcomm Snapdragon 670 #10 nano, Adreno 615 GPU OpenGL Vulkan game chip, 5.5 mm thin, 14 ounce metal case, 7,000 amp battery, Dolby Atmos speaker.

Banana Pi BPI-M4 slow desktop, Taiwan Realtek RTD1395 ARM Cortex a53 chip. ARM Mali G52 GPU game chip driver has hardware accelerated video decoding in Kodi TV app, Ubuntu 19.04, 4K/UltraHD H.265 60 frames per second. Mali Linux uses framebuffer, not X11; Wayland graphics driver app in a few months.

\$220 Inforce 6560 Qualcomm Snapdragon 660 #14 nano, Adreno 512 GPU, Google desktop. Should be \$100 to compete with AMD & Intel.

\$100 Nokia 1 Plus, Taiwan MediaTek MT6739 slow ARM Cortex-A53 CPU chip #28 nano, bad PowerVR IMG GE8100 GPU, 5.5" IPS 480p screen, black, blue, or red, Android 9 Pie Google Go apps.

\$400 Lenovo IdeaPad S340, AMD Ryzen 7 3700U CPU & Radeon RX Vega 10 #12 nano (NY GlobalFoundries factory), 14" IPS 1080p touchscreen.

\$450 Lenovo IdeaPad C340 laptop, AMD Ryzen 5 3500U CPU & AMD Radeon RX Vega #12 nano or Nvidia GeForce MX250 1D13 GPU game chip, 15 watts, 14" 3-sided narrow bezel screen, abyss blue, platinum grey or onyx black.

\$730 Lenovo IdeaPad S540, AMD Ryzen 7 3700U & Radeon RX Vega 10 #12 nano or Nvidia GeForce GTX 1050 GPU, 14" display bezels 25% smaller, Rapid Charge, dual action fans, abyss blue, copper, or mineral grey.

\$400 Samsung Galaxy A50 & A30, 6.4-inch OLED Infinity-U, #10 nano Samsung Exynos 9610 ARM Cortex a73 chip, Mali-G72 MP3 GPU Bifrost architecture with MSAA (Multi-Sample Anti-Aliasing), ASTC (Adaptive Scalable Texture Compression), AFPC (Arm Frame Buffer Compression). OpenGL ES 3.2 & Vulkan 1.1 only work on newer

#7 nano Mali G76 GPU game chip.

\$210 India Samsung Galaxy M30, 6.4 inch OLED Infinity-U, #14 nano Samsung Exynos 7904 ARM Cortex A73 medium speed, Mali-G71 GPU, Widevine L1 certified for Netflix.

\$100+ Dutch NXP i.MX 8MQuad slow #28 nano ARM Cortex-A53 desktop EMB-2238. Vivante GC7000LVX GPU game chip with OpenGL ES 3.1, OpenGL 3, Vulkan, OpenCL 1.2, H.265 HDR 4K TV hardware acceleration on Linux & Google.

Should be \$20 ARM Cortex a55.

\$100 Lenovo Ideapad 130S laptop, slow Intel Celeron N4000

#14 nano, 2.8 pounds.

Free Libre RISC-V M-Class Vulkan GPU game chip hardware accelerator blueprints, 25 FPS, 720p, 2.5 watts, Rust Kazan programming language.

Rumor: \$75 Amazon entry level Kindle E-Ink Carta HD black & white screen, Voyage 2 E-Ink Carta HD, crippled apps.

NY/China Globalfoundries #12 nano-meter FD-SOI (12FDX) chip factories.

\$55 (1,000 units minimum) CompuLab UCM-iMX8M-Mini desktop slow chip Dutch NXP i.MX8M Mini #14 nano Arm Cortex-A53, GC NanoUltra 3D GPU, GC320 2D GPU, 1080p60 H.265 TV

playback,  
motherboard not included.

\$10 (minimum order 10,000 units) French STMicro STM32MP157 slow obsolete ARM Cortex-A7 chip, Vivante 3D GPU OpenGL ES 2 (should have been GLES 3.2). \$70 STM32MP157C-DK1 desktop. \$8 Chinese WZ99 Bluetooth Magnetic Earphones built-in music player. <https://m.geekbuying.com/item/WZ99-Bluetooth-Magnetic-Earphones-Red-413671.html>

\$250 Beelink J45 miniPC Intel Pentium J4205 #14 nano desktop, Intel HD 505 obsolete GPU, fan, 8 gigabytes LPDDR4 RAM,

China Gearbest.com or GeekBuying.com

\$280 Nvidia GTX 1660 Ti #12 nano desktop game chip from Colorful, EVGA, Gainward, Galaxy, Gigabyte, Innovision 3D, Micro-Star International, Palit, PNY, Zotac. 120 watts is too much electricity.

TV projectors battery powered Texas Instruments DLP470TP,  
laser autofocus or LED light, less than 1,500 lumens brightness.

French 96boards CE Avenger96 STMicro STM32MP157, obsolete ARM Cortex-A7, Vivante GPU OpenGL ES 2.0, compatible with free Ubuntu Linaro Linux mainline apps.

iPad screens have “4 million tiny light (red, green, blue) pixels, each 45  $\mu$ m micrometers wide, thinner than hair.”

\$165 Minix Neo Z83-4 8CXB-C8B02-220 obsolete Intel desktop, large heatsink & thermal pad, free Ubuntu charity apps.

Dutch NXP i.MX 8M Nano #14 nano slow ARM Cortex A53, Vivante GPU OpenGL ES 3.1, OpenCL 1.2, Vulkan, early 2020.

\$100 BeagleBone-AI Texas Instruments AM5729 obsolete ARM Cortex-A15 desktop, bad PowerVR SGX544 3D GPU, Vivante GC320 Core 2D graphics accelerator. TI C66x digital signal processor (DSP), embedded vision engine (EVE) Texas Instruments Deep Learning

\$470 China Maiben Wheat 5, 15" IPS laptop, Intel Kaby Lake #14 nano Pentium 4415U, Intel HD 610 GPU, NVidia Geforce 940MX GPU, Banggood.com Should be \$300 & weigh less.

\$150 Google Coral desktop, Dutch NXP i.MX 8M Arm Cortex-A53, Vivante GC7000 Lite 3D GPU, Machine Learning accelerator Google Edge TPU coprocessor, heatsink, fan. Should be \$35.

\$22 to \$70 (1,000-unit quantity) Texas Instruments Sitara AM6548 #28 nano slow ARM Cortex A53 chip late 2019.

\$20 Aerb Backlit Mini Wireless Keyboard 2018 D8 Pro with touchpad mouse, rechargeable battery for Google TV.

\$300 HP 15 Laptop 15" AMD Ryzen 5 2500U, AMD Radeon Vega 8 #14 nano 15-db0069wm Walmart.  
\$58 China B320-IPC Thin-ITX DC AMD desktop motherboard.

<https://m.intl.taobao.com/detail/detail.html?id=583127994911>

\$190 China AMD Athlon 200GE HTPC #14 nano desktop. <https://m.intl.taobao.com/detail/detail.html?id=583119660>  
Chinese

designs for gaming laptops “white label PC” produced by ODM (original design manufacturers) Compal & Clevo, sold by retailers such as CyberPowerPC or iBuyPower.

\$5 Chinese Sannysis USB Mini MP3 music player Amazon. Costs less \$1 to make.

Taiwan ITRI (Industrial Technology Research Institute) 0.25 micron printed plastic slow chip factory.

\$435 GPD Pocket 2 Intel Celeron 3965Y slow chip, 6,800 mAh battery, 1.1 pound, 7 inch touchscreen.

\$7.25 LED light bulbs equivalent to 60 Watts from LEDvance, Philips, Muller Licht.

\$55 AMD Athlon 220GE #14 nano desktop chip, 35 watts,

AMD Vega 3 GPU.

\$35 Team IoT Atomic Pi, Intel Atom x5-Z8350 obsolete 15 watt desktop.

\$17 second generation Google TV Chromecast crippled desktop & Google Home Mini voice command speaker at Walmart.

\$120 Qualcomm Snapdragon 820 #14 nano ARM Cortex a72 desktop sold by Charbax April 2019. Competes with \$50 Chinese chips same speed but larger obsolete #28 nano.

\$25 Google Android TV desktops sold more than 20 million units, 100 pay TV service operators, channels in Europe & Asia.

South Korea TeleChips TCC899x (Lion) ARM Cortex-A53 slow desktop chip. Should be ARM a55.

\$7 Indonesia WizPhone WP006 Qualcomm 205 MSM8905 #28 nano slow chip, limited KaiOS apps, Assistant voice commands,

not a touchscreen.

Intel Islay Canyon NUC desktop, 15 watt Whiskey Lake-U CPU with AMD Radeon 540X game GPU chip early 2019.

\$29 folding bluetooth Jelly Comb keyboard with rechargeable touchpad Amazon.

\$50 8BitDo SN30 pro+ joystick has USB-C cable & motion controls (Nintendo Wii) but is too large.

\$105 Chinese Huawei Y5 Lite Google Go phone, Taiwan MediaTek #28 nano ARM Cortex a53 in Philippines & Pakistan. Should be less than \$50.

#12 nano AMD Athlon 300U, 15 Watts laptop chip used by Acer, Asus, Dell, HP, Lenovo, Samsung.

\$300 Acer Chromebook 315 or HP Chromebook 14, obsolete #28 nano AMD A4-9120C, 6 watt laptops.

\$21 China KM8 P TV-Box, slow Chinese AMLogic S912 ARM Cortex a53 Mali T820MP3 GPU with infrared remote control.

<https://m.aliexpress.com/item/32950584751.html>

HomTom P1 projector phone Texas Instruments DLP LED pico resolution 720p pixels, OSRAM illumination brightness 150 lumens, 5,500 mAh battery, liquid cooling.

\$120 ASRock DeskMini A300 AMD Raven Ridge #14 nano, AM4 socket maximum 65 watts, 3" thick desktop motherboard A300M-STX, no memory, CPU cooler 46 mm z-height sold separately.

\$200 Silicon Dust HDHomeRun Scribe Duo with 1 TB hard drive, \$150 HDHomeRun Servio 2 TB networked TV recorder (ATSC antenna channels 2 to 13). Requires \$35/year service on Apple & Google, more expensive than Raspberry Pi Kodi no monthly fees.

\$55 Texas Instruments projector TV Digital Micro-mirror Device (DMD) DLP Pico reflective polarization agnostic aluminum.

5.4  $\mu$ meter DLP3010 chipset (DMD + DLPC3435 display controller + DLPA2000 PMIC/LED driver) power consumption 350 milli-watts. Portable projector

reference design TI DLP2010, 5.3mm thick, 480p, 20 lumens per watt. Optical modules manufactured by Asia Optical, Butterfly Technology (Shenzhen), Colorative-Optics, Coretronic, Digital Optics, iView, OnGine, Sekonix, Shenzhen Anhua Optoelectronics, SolidPro Technology, YoungOptics.

\$150 Xiaomi Redmi Note 7, Qualcomm Snapdragon "optimized" 660 #14 nano, 4,000mAh battery graphite negative anode, medium speed for videogames, DSM dynamic gain control 0.64cc sound cavity

AAC micro-speaker.

\$16 Raspberry Pi case with 3.5" bad quality display. <https://sea-m.banggood.com/35-inch-TFT-LCD-Touch-Screen-Protective-Case-Touch-Pen-Kit-For-Raspberry-Pi-3B3B2B-p-1391232.html>

\$380 Dell Inspiron 15 5000 (5575) laptop, AMD Ryzen 5 2500U

#14 nano Radeon Vega8 game chip, i5575-A410BLU-PUS Walmart. ECS SF110-A320 AMD 35 watt desktop.

Texas Instruments TAS2562 smart speaker amp class H boost uses less electricity than analog.

\$30,000 Boise State 4 gas variable pressure CVD graphene chip factory, "Atmospheric & low pressure growths, up to 1,100°C."

\$350 Acer Chromebook Spin 311 R721T Google touchscreen laptop with AMD A4-9120C obsolete #28 nano.

\$3 to \$9 Brandless dog treats, supplement chews, non-toxic toys, hemp collars, pet cleanup waste bags with TDPA.

Intel said expensive, fast desktops are their top priority. My priority billions \$25 slow chip ARM Cortex a55, #28 nano or thinner, 3 watts.

Less than \$100 Nokia 1 Plus April. Taiwan MediaTek MT6739 ARM a53 #28 nano, bad PowerVR GE8100 graphics driver app (does not have Vulkan). 1 gigabyte RAM, 5" 480p screen, Android 9 Pie (Google Go Edition).

\$112 Samsung Galaxy M10 Exynos 7870 ARM a53 #14 nano,

Mali-T830 MP1 GPU with bad graphics driver app, India.

Nvidia, Intel, Texas Instruments, Lam Research, TE Connectivity blame lower sales on China.

\$25 Raspberry Pi 3 Model A+ slow TV Kodi app desktop. #45 nano Broadcom BCM28370B0 ARM Cortex-A53 chip, 0.5 gig RAM. Competes \$5 to \$10 Chinese ARM Cortex a55 #28 nano desktops.

\$0.01 British PlasticArmPit flexible plastic sensor for body odor, amorphous oxide thin-film slow ARM chip FlexIC.

Samsung Exynos 9820 ARM Cortex a76 customized CPU, Mali-G76 GPU chip #8 nano.

\$230 Fire TV Recast TV recorder, voice commands "Alexa open Channel Guide. Alexa tune to NBC. Alexa rewind or fast forward."

\$12 20-inch by 20-inch box fan + \$15 20-inch by 20-inch by 1-inch furnace HEPA air filter.

Italic online women's fashion store \$300 handbags, \$100 prescription eyewear direct from manufacturers.

AMD Polaris 30 GPU game chip made by NY GlobalFoundries 12LP #12 nano factory & Samsung 11LPP #11 nano.

\$38 TV-Stick X96S Chinese AMlogic S905Y2 #12 nano ARM Cortex-A53, Mali-G31 GPU AliBaba.

\$30 Amazon Fire Google TV Stick 4K, Taiwan MediaTek

#12 nano at Target.

\$40 Walmart Straight Talk LG Rebel 4, 5" 720p IPS display, slow Qualcomm Snapdragon #28 nano, Google Android 8 Oreo, battery 2,500 mAh (should be 4,000 amps).

\$40 HomTom HT16 5-inch 720p IPS display, Taiwan MediaTek MT6580 #28 nano chip, 3,000 mAh battery.

\$143 Intel Celeron slow desktop Beelink S2 Mini PC Intel Gemini Lake N4100, 64 gigabytes flash memory, Windows 10 app, SATA 2.5" hard drive compatible maximum 2,000 gigabytes, #14 nano. <https://m.aliexpress.com/item/32890319062.html>

\$45 HomTom S12 with 5-inch screen, Taiwan MT6580 slow #28 nano chip, 2,750 mAh battery (should

be 4,000 mAh).

\$88 KKTICK H1 Google watch. <https://m.aliexpress.com/item/32850928449.html>

\$148 X34 fanless aluminum mini-PC desktop Intel Core i3-7100U medium speed chip #14 nano, wifi not included AliExpress.com

Google's Anandan, "basic smartphones \$60, black & white \$12 India." 1 gigabyte of Internet service \$0.15.

Chinese AMLogic S905X2 chip is not #12 nano. Only its CPU is #12 nano. The rest is #28 nano obsolete.

Less than \$300 Qualcomm Snapdragon 670 #10 nano fast chip (ARM Cortex a75) with OpenGL Vulkan.

Taiwan chip factory United Microelectronics Corporation (UMC) & Avalanche Technology STT-MRAM

(spin transfer torque magnetic RAM) at #28 nano.

Compal Electronics most popular laptop outsourcer thanks to increased orders from Dell & Acer. Foxconn offered bonus of \$295 to Chinese assembly line-workers to assure enough workers for September 2018 iPhone shipments.

\$450 HP Pavilion 15-CW0088NR 15" laptop, AMD Ryzen 5 2500U AMD Radeon Vega 8 Graphics game chip #14 nano.

\$100 Best Buy Samsung 12" Google Chromebook laptop, Intel Celeron obsolete.

\$582 Xiaomi Notebook 15 inch, Intel i5 #14 nano, Nvidia MX110, dual fan & dual air outlet 2+2 heat pipe.

\$70 Walmart Lenovo Tab E7 Google Go 7" slow #28 nano Taiwan MediaTek chip. Competes with \$30 Amazon Fire 7" Google.

Less than \$100 Samsung Google Go Galaxy J2 Core, #14 nano slow Samsung Exynos a53 chip, low quality screen for India & Malaysia. Oppo R17 Pro 6.4" OLED, Qualcomm 710 chip #10 nano, 2 batteries total 3,700 mAh.

\$65 Chinese NanoPi M4 desktop, untrustworthy Chinese Rockchip RK3399 ARM Cortex A72 chip, Mali-T864 obsolete game chip with bad software. With better American apps & software driver it could play Nintendo Dolphin Wii games. OpenGL ES 3.0 supported but not yet compatible with OpenGL Vulkan language.

\$250 Xiaomi Pocophone F1 #10 nano, Chile, Colombia, Mexico, Uruguay, Bangladesh, Hong Kong, India, Indonesia, Kazakhstan, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Vietnam, Albania, Austria, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, England, Estonia, Finland, France, Greece, Hungary, Italy, Latvia, Lithuania, Luxembourg, Netherlands, Norway, Poland, Portugal, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, Bahrain, Egypt, Iraq, Israel, Jordan, Kenya, Kuwait, Lebanon, Morocco, Oman, Qatar, Saudi Arabia, South Africa, United Arab Emirates.

\$400 China TopJoy Falcon 8 inch touchscreen IPS display, Intel Pentium Silver 5000 #14 nano laptop. Minix Neo G50C-4 mini PC desktop with Intel Pentium Silver J5005 #14 nano chip.

\$10 basic phone, \$75 Google Go Chinese Transssion.

Ethiopia Syinix TV assembly, Caricare service centers, accessories brand Oraimo Africa. Competes with \$80 Chinese ZTE Temp Go, Xiaomi & TCL. Transssion/iTel/Tecno expanded to Southeast Asia,

Latin America, Middle East & India.

\$130 Dell Inspiron 11 3000 slow AMD E2-9000e CPU with Radeon R2 graphics GPU chip #28 nano meters obsolete laptop.

\$100 SiliconDust HDHomeRun Prime can watch cable TV on Google Android TV such as \$140 NVidia Shield.

Macquarie inc. said it's time for Amazon to make Google phones with Alexa voice commands.

In China, Oppo/Vivo (same company) sold 73.6 million phones first half 2018. Xiaomi sold 26.7 million phones.

\$262 Samsung Galaxy On8 for India. #14 nano Qualcomm 450 slow chip, 3,500 mAh battery, 6-inch Super OLED Infinity display.

Should have been \$150.

India RISC-V Shakti (Holy Mother) slow chip with free app charity Linux or Google. #22 nano meter prototype at Intel factory.

\$73 Chinese Itel P32 Google Go phone for Africa. 5.5 inch low quality screen, 4,000 mAh battery, slow Taiwan MediaTek chip.

\$650 Samsung 10" OLED Galaxy Tab S4 with obsolete fast Qualcomm SnapDragon 835 chip, 4 speakers tuned by AKG & Dolby Atmos, optional HDMI TV cable. China sells slower Alldocube X Tablet with same OLED screen \$270.

\$250 India Samsung Galaxy On8 #14 nano slow Qualcomm 450 chip, OLED screen. Should be \$150.

\$625 AMD & Zhongshan Subor game desktop chip for China. 4 AMD Zen CPU chips at 3 GHz speed with 24 compute units Vega GPU

#14 nano. \$60 million invested.

\$110 Asus ZenFone Google Go phone 5.5-inch 720p low quality LCD screen, slow Qualcomm 425 #28 nano chip, 3,000 mAh battery. Foxconn Electronics to scale down its LCD screen factory in Wisconsin to 6th generation. Obsolete compared to newer 10th generation TV factories.

\$530 Intel Crimson Canyon NUC desktop with #10 nano Cannon Lake CPU (15 watt Intel Core i3-8121U) + AMD game chip.

\$62 Samsung Exynos ODroid-XU4 obsolete slow TV (Kodi app) desktop #28 nano & \$7 electric cable. Samsung chip thinner than \$35 Raspberry Pi 3B+. Slower than #28 nano HPm high performance mobile ARM Cortex A72 Qualcomm 653, Adreno 509 GPU game chip, better at OpenGL Vulkan compared to bad Mali graphics driver.

Qualcomm, Samsung, Broadcom, NVidia, Texas Instruments, NXP, Marvell, Taiwan MediaTek should sell \$50 Google TV desktops #28 nano ARM Cortex A76.

Compete with \$50 Chinese (\$45 NanoPi Neo4 Rockchip RK3399 ARM Cortex-A72).

#28 nano obsolete (year 2010) chip factories are common, already manufacture \$30 Google Go 3rd world phones.

\$350 Nokia 7.1 Qualcomm #14 nano ARM Cortex A73 fast, bad screen. Should be \$200 to compete with Xiaomi.

\$262 Intel i5-9600K 9th generation #14 nano Coffee Lake Refresh fast desktop chip. Solder TIM improves thermal transfer efficiency between heatspreader & chip. Intel #10 nano meter IceLake 2019. HomTom P1 projector TV phone with OSRAM illumination, Texas Instruments D.L.P. pico projector with HDTV resolution 720p, brightness 150 lumens.

\$0.60 Target low-cost private-label brand Smartly 70 cleaning products, toiletries, soap. Taiwan United Microelectronics (UMC) chip factory September revenue \$382 million.

\$80 Xiaomi Red Rice Redmi 5A, 5" 720p LCD screen, Qualcomm Snapdragon 425 #28 nano ARM Cortex a53 slow chip. 10 million units sold, India's best-selling smartphone.

\$35 Google Chromecast third-generation Netflix TV desktop. Slow Marvell ARM chip, limited software features.

\$60 Walmart Xiaomi Mi Box S Google TV desktop slow Chinese AMLogic #28 nano ARM Cortex-A53 chip with Mali-450 graphics & voice commands. Should be less than \$35.

\$55 AMD Athlon 200GE desktop chip 35 watts, #14 nano, Zen CPU + Vega GPU graphics. Requires \$50 AM4 A320 motherboard.

PC peripheral maker Thermaltake alliance with retail channel distributor Synnex Tech gaming markets of Thailand & Indonesia.

\$44 billion chips exported from U.S. each year, 80 obsolete wafer fabrication factories (fabs) across 19 states.

\$510 Asus 13.3 inch laptop with slim bezels, 8th-generation Intel Core i3-8130U #14 nano, Nvidia GeForce MX150 graphics chip.

Trump said, "Apple prices may increase because of massive Tariffs we may be imposing on China - but there is an easy solution where there would be ZERO tax, indeed a tax incentive. Make your products in the United States instead of China. Start building new plants now."

\$0.10 Elon Musk Boring Company Eco Bricks, free when used for affordable housing projects. Dutch desktop NXP i. MX8M Variscite DART-MX8M-Mini #14 nano meters ARM Cortex A53 slow chip, Vivante GC7000Lite GPU. NXP chips have better software than China.

\$1 (in bulk) \$3 (1 unit) Chinese obsolete #55 nano, slow desktop Allwinner A13 chip ARM Cortex A8, Mali 400 GPU.

\$13 (100 unit order) Olimex Chinese Allwinner A13 desktop.  
[www.olimex.com/Products/SOM/A13/A13-SOM-256/](http://www.olimex.com/Products/SOM/A13/A13-SOM-256/)

\$671 Xiaomi Notebook Youth Edition 15-inch Intel Core i5 processor #14 nano, NVidia MX110 game graphics chip, dual-fan cooling, air outlets with 2+2 heat pipe.

Taiwan Foxconn Electronics & TPV Technology are the biggest TV ODM outsourcing factories with orders from Sharp, Sony & Vizio.

\$230 Amazon Fire TV Recast records antenna TV channels 2 to 13 to iPad, 500 gigabytes memory, no monthly fee. China sells less than \$100 TV recorder desktops.

By introducing new OLED substrate materials, printing layers, new encapsulation process, & light extraction films, cost can be reduced to \$1 per 100 lumens of light.

Chinese V.I.A. Zhaoxin Displays Microsoft x86-compatible KaiXian KX-6000 #14 nano desktop 2019. Intel is better at #10 nano.

Dutch NXP MRFX 65 Volt LDMOS RF power chip, laterally diffused metal oxide semiconductor (LDMOS) silicon for laser generation, plasma processing, magnetic-resonance imaging.

Pan International Foxconn electronic manufacturing service (EMS) factories in China, Thailand, Malaysia.

\$193 India Chinese Oppo Realme 2 Pro Qualcomm Snapdragon 660 fast #14 nano.

Compal outsourcing considered Philippines but already has assembly factories in Vietnam. Intel \$1 billion increase of obsolete #14 nano chip factories Oregon, Arizona, Ireland, Israel. iBASE motherboard desktop MI988F-1202 AMD Ryzen V1202B DC Vega game chip #14 nano. Free charity RISC-V chip blueprints reduce cost of producing prototypes. \$10+ million to make custom ARM chip. RISC-V chip companies can be \$1 million including all intellectual property, SerDes, DDR RAM controllers.

\$170 India Samsung Galaxy J6 5.6" OLED, #14 nano Samsung ARM Cortex a53 Exynos slow chip. \$50 Amazon Fire TV Stick 4K desktop supports HDR standards (HDR10, HDR10+, Dolby Vision) & Dolby Atmos audio. Obsolete PowerVR IMG GE8300 graphics GPU chip. Taiwan MediaTek MT8695 #12 nano ARM Cortex a35 slow CPU app chip. Works with free Kodi TV app & 1990's Nintendo RetroArch app videogames.

Texas Instruments AM654 Keystone III ARM Cortex-A53 slow chip, PowerVR SG544 (obsolete year 2013 with bad graphics driver app).

I would buy T.I. A55 chip for \$50 Google TV Kodi BeagleBoard 2020. Global TV LCD market 218 million units 2019.

China Transsion & India Reliance LYF rank 9th & 10th in 2019, shipments each exceeding 35 million Google phones.

\$110 AMD Athlon 200GE #14 nano desktop slow chip & Gigabyte A320M-S2H motherboard, not including memory & power supply.

\$350 Algeria Condor Allure X 6.4-inch OLED, Taiwan MediaTek P70 #12 nano from TSMC factory, ARM Mali G72-MP3 graphics (bad game driver app).

Samsung expects 45 million Galaxy S10 units per year in 130 countries (out of 205 total countries).

Bolivia Jalasoft Accione slow phone with Jolla Sailfish apps (Linux & Google Android).

\$215 Kodlix GN41 desktop, Intel Gemini Lake Celeron N4100 #14 nano, Intel UHD Graphics 600 GPU, 6 watts, free Ubuntu apps.

Brazil Qualcomm Snapdragon System in Package (SiP) #14 nano slow ARM Cortex a53 chip, worth less than \$100, may not have 64 bit apps. USI Semicondutores Avançados do Brasil S.A. \$200 million Sao Paulo assembly factory 2020, 800 jobs.

\$175 Vnopn K1 desktop AMD A6-1450, Radeon HD 8250 graphics, 8 watts, obsolete #28 nano, AliExpress.com

\$117 Asus Computer VivoStick TS10-B017D, Intel Atom x5-Z8350, obsolete slow Intel HD Graphics 400, Windows 10, NewEgg.com

\$50 ARM Cortex a76 #28 nano Google desktop for TV, games requires copper heatsink & fan. China factories already manufacture #28 nano chips for \$25 Taiwan MediaTek 3rd world phones. China SMIC factory competes with Intel & AMD/GlobalFoundries at size #14 nano.

\$100 ARM a76 #14 nano desktop vs. \$200 AMD Zen3, Intel Pentium.

Rumor: Walmart ONN Google 8", Taiwan MediaTek MT8163 #28 nano, made in China Chunghsin to compete with \$35 Amazon Fire 7.

French STMicro #14 nano FD-SOI chip factory "wide-bandgap materials, specialized imaging 3D sensors."

China ZTE Nubia Red Devil 3, vector control keeps fan rotor drive direction consistent with rotor movement direction, turbine centrifuge, liquid cooling heat pipe.

Seco SBC-C43 desktop, Dutch NXP i.MX 8 QuadMax #14 nano, ARM Cortex-A72, Vivante GC7000XVSX GPU, VPU chip plays 4K HDTV.

\$35 China EL W40 Taiwan Mediatek MT6580M ARM Cortex-A7 #28 nano, 4" IPS 480p, Alibaba. Colorado System76 free open source laptop blueprints & controllers in the future.

\$70 Energizer Energy E500 Google Go phone, Taiwan Mediatek ARM Cortex a7 #28 nano.

\$600 65-inch TV Ultra HD LED backlit LCD with quantum-dot enhancement film. \$700 65" TV 16,000 mini-LED lights,

\$1,200 40,000 mini-LED backlights.

\$1,000 Walmart OP Gaming Laptop 15" Intel Core i5-8300H

#14 nano, NVidia GeForce GTX 1050 GPU, 1,000 gigabytes memory, 8 gigabytes RAM. Should be less than \$500.

\$288 Lenovo Z5 Pro, 6.4-inch 1080p OLED, Qualcomm 710 #10 nano Qualcomm Adreno 616 GPU. Finland Solar Foods manufactures protein food in bioreactor from carbon dioxide, water, electricity, trace elements.

\$60 Poptel P8 Taiwan MediaTek #28 nano, IP68 waterproof, 106 db speaker, 3750 mAh battery.

\$57 Xiaomi Zhimi electric heater, X-type alloy flakes provide faster heating, automatically shuts off when temperature exceeds 95°C or tilts more than 45 degrees.

SiFive RISC-V 64-bit U74-MC free blueprints chip supports Linux, similar to slow ARM Cortex A55. NY GlobalFoundries #12 nano chip factory Avera Semiconductor division 850 employees design custom ARM Cortex chips, SRAM, embedded TCAM, SerDes, interfaces.

\$25 China SSD memory 240 gigabytes chip. QLC (quad-level cell) NAND SSD 480 gigabytes for 65% of laptops late 2019.

\$40 Chinese Radxa Rock Pi desktop #28 nano Chinese ARM Cortex a72 for videogames. Obsolete graphics driver app for Mali does not yet support Vulkan language & OpenGL ES version 3.2.

\$255 Fossil Sport Google watch 1.2" OLED, Qualcomm Wear 3100 chip #28 nano. Should be \$100 MicroLED, #7 nano ARM Cortex a55.

\$1 RISC-V #28 nano or ARM Cortex a55 basic TV plastic (not silicon) printed chips 2025.

\$50 to \$100 Chinese TV projectors Vankyo Leisure 3, DR.J, QKK 2400lux, DBPower.

\$220 Zotac ZBOX PI335 pico slow desktop Intel Celeron N4100 Gemini Lake #14 nano. Should be less than \$100.

Wistron assembly factories Taiwan, Philippines (laptops) & Mexico (servers). Indonesia Pegatron laptop assembly factory.

\$20 La Frite Chinese Amlogic AML-S805X-AC slow desktop ARM Cortex-A53 1.2 GHz chip with Mali-450MP GPU #28 nano.

Chinese Meizu phone assembly factory Indonesia. Exclusively sold on Jingdong website, 2 year warranty.

\$245 Nokia X7 Qualcomm Snapdragon 710 #10 nano, low quality screen, should be less than \$200.

\$370 Xiaomi Pocophone F1 at B&H store Qualcomm Snapdragon 845 #10 nano. Price \$240 in China & OLED screens are better quality.

\$145 Lenovo K5 Pro Qualcomm Snapdragon 636 #14 nano, music SmartPA chip, 2-channel stereo speakers.

\$22 TV recorder only in Europe for \$35 Raspberry Pi 3B+. Raspberry Pi TV HAT DVB-T2/T tuner with free Kodi Google & Apple app.

Taiwan Gigabyte to ship 1 million GPU graphics chips, 3 million motherboards 4th quarter 2018. \$50 China Kendryte KD233 slow desktop RISC-V K210 64-bit chip for machine vision & voice commands.

\$26 China Kiemo 4062, 4" 480p bad screen, Taiwan MediaTek MT6580/6737 slow #28 nano phone.

\$26 China Kenxinda EL W40 480p bad screen, Taiwan MediaTek MT6580T slow #28 nano. <http://en.kenxinda.com>

\$50 Chinese AMLogic S905Y2 #12 nano TV desktop chip, Mali G31 MP2 GPU.

\$125,000 license fee DesignStart + 3% of sales above 1,000 chips for slow ARM Cortex a5. Any company, including India, could rent 10 year obsolete #40 nano meter or thinner chip factory for \$millions.

4 KB instruction cache, 4 KB data cache, 0.28 mm<sup>2</sup> area size, 100 µWatts electricity per MHz of CPU speed. #7 nano ARM Cortex a55 basic iPad chip much better, competes with free RISC-V blueprints. China LED chip factories added 300 MOCVD sets in 2018, total 3.45 million monthly LED epitaxial wafers.

\$460 Xiaomi Black Shark 2 Helo 6" OLED, 10 gigabytes LPDDR4x RAM, UFS 2.1 memory, Qualcomm 845 #10 nano phone with videogame joystick, dual-pipe vapor cooling system.

Qualcomm 675 #11 nano (Samsung factory) fast ARM Cortex a76, OpenGL ES 3.2 & Vulkan compatible Nintendo games.

Dutch NXP battery chip 15 Watt wireless power & Qualcomm Quick Charge 4.

\$40 China Konka MQWG101 Google 10" 720p tablet Taiwan MediaTek MTK8392 ARM Cortex a7 obsolete, battery 4,000 mah.

\$40 Konka Google watch 1" OLED, minimum order quantity 1,000 units AliBaba. [www.konka.com.hk](http://www.konka.com.hk)  
\$260 Samsung A6s 6" OLED or \$320 A9s 6.3" OLED, Qualcomm 660 #14 nano black, lemonade blue, bubblegum pink, koi red, purple.

\$90 Blu Vivo Go Taiwan MediaTek 6739 slow #28 nano ARM Cortex-A53, PowerVR IMG GE8100 GPU. ARM Cortex a55 is better & PowerVR has bad graphics driver app.

\$475 Xiaomi Mi Mix 3 6.4" OLED, Qualcomm 845 #10 nano, Onyx Black, Sapphire Blue, Jade Green. Kenya government invested \$10 million in \$50 Google Go phone assembly factory & programmers such as BRCK. Congo, Ethiopia & South Africa also working on phones. Egypt Sico Nile X. Competition is Chinese Transsion Tecno in Nigeria.

\$130 Dell 11.6" Google Chromebook laptop slow Intel Celeron N3060 #14 nano at Best Buy.

SunExchange lets people buy or rent solar panels peer-to-peer, decentralized market.

CNN, "Chinese entrepreneurial spirit & appreciation for frugality folks are cheap, crafty, food-crazed." "If computer component suppliers set up shop in India, it would bring \$2.5 billion in investment & create 50,000 jobs."

Xiaomi in India "3 more smartphone assembly factories & our first SMT local manufacturing of PCBA [printed circuit board assembly]"

\$600 HP Chromebook x2 12" IPS Google touchscreen. Intel #14 nano Core m3 medium speed chip (faster than Qualcomm, but slower than Intel i7 or AMD Ryzen 7).

French "BatiPrint3D uses a special polymer material that should keep building insulated. 18 days to make a house."

\$500 HP Pavilion 14 x360. 14 inch touchscreen laptop, Intel Core i3-8130U dual-core processor, 8GB RAM. Fast enough for most games, competes with superior AMD Raven Ridge.

Qualcomm Vision Intelligence platform, #10 nano chip, for low-end. QCS605 & QCS603. Both consist of a powerful new image signal processor (ISP), Spectra 270; Snapdragon CPU processor; Hexagon 685 Vector Processor; Adreno 615 graphics processing unit (GPU)."

AMD obsolete game chips are RX 580X (fastest), RX 570X, RX 560X, RX 550X, & RX 540X.

\$200 AMD #12 nano (NY GlobalFoundries) Desktop Ryzen 5 2600 Pinnacle Ridge CPU chip, 65 watts, X470 motherboard.

AMD #12 nano CPU laptop chips: Ryzen 3 2000U (YM200UC4T2OFB) Ryzen 5 2600U (YM2600C3T4MFB) Ryzen 7 2800U (YM2800C3T4MFB).

\$100 AMD Ryzen 3 2200G 45 Watts desktop (\$400 total with motherboard & included fan). Compared to less electricity Intel 5 or 10 watt Pentium fanless chip.

Semiconductor Manufacturing South China (SMSC) chip factory

#14 nano meters \$5 billion.

Sourcify connects to factories overseas. Customers pay \$500, plus 1-10% of order cost.

<\$100 Asus X00RD phone. Google Go apps for 3rd world market. 1GB RAM, Qualcomm 425 chip, #28 nano obsolete slow, 720p.

Same for \$30 India, \$20 Walmart.

AMD Ryzen Embedded V1000 #14 nano, 12 watts game chip for laptops. Less than \$100. "India to buy 200 million LED light bulbs in 2018, from Dutch Philips Lighting & LEDvance."

\$30 Indian Google Go phone Lava Z50 or Micromax BHARAT Go. 4.5-inch 480p screen, #28 nano Taiwan MediaTek MT6737M. \$30 Africa Google Go Phones from Transsion Tecno, Itel, Spice.

\$700 Smach Z videogame 6" touchscreen with joystick, AMD Ryzen Embedded V1605B #14 nano chip, 12 watts, noisy fan, AMD Radeon Vega 8 graphics GPU, Microsoft apps.

Nigeria phone market. Samsung 34%, China Transsion brands Tecno, Itel, & Infinix 32%.

\$50 AMD motherboard ECS A320AM4-M3 (AM4 Type). Compatible with \$100 AMD 2200GE chip. India "Google apps that cost just \$1 are seen as expensive. Many apps available for \$0.15"

\$150 Intel June Canyon N.U.C. desktop Gemini Lake Celeron

slow chip #14 nano.

Chinese slow AMLogic chip TV recorder (channels 2 to 13) Geniatech ATV598Max Google TV box with ATSC TV Antenna.

\$600 Moviphone from Wireless Mobi Solutions laser 720p HDTV projector phone. Slow Taiwan MediaTek 6750 ARM Cortex a53 chip. Italy STMicro chip factory renting GlobalFoundries German #22 nano FD-SOI (22FDX) factory.

China solar companies MCCE (Metal-Catalyzed Chemical Etching) treat surface of Diamond Wire Cut (DWC) poly-Si wafers. "China produced 1.4 billion smartphones in 2017. 173 million laptops, 86 million tablets, 280 million TV."

\$60 Chinese RockChip RockPro64 ARM Cortex a72 desktop.

Almost fast enough for Nintendo Wii Dolphin games.

Cannot because Mali game chip lacks Vulkan shader cache driver.

\$115 AMD Ryzen 3 2200g #14 nano desktop chip CPU & GPU

(A.P.U. Raven Ridge). AMD am4 standard motherboard.

\$300 T-bao TBook X8S Pro laptop with obsolete #28 nano Nvidia 920m GPU chip. 15" screen, slowest Intel Celeron CPU 10 watts.

N.Y. GlobalFoundries chip factory #12FDX #12 nano fully depleted silicon on insulator. "Operating

voltage less than 0.4v.”

\$290 Xiaomi Mi A2 Qualcomm 660 medium speed chip #14 nano, 6 inch IPS screen in Europe, Middle East, Asia, Mexico.

BroadBit sodium chloride (salt) battery. Ingredients cheap & abundant silicon oxide (sand), carbon (coal), sulfur (waste product of petroleum refining).

<\$400 Intel Bean Canyon NUC8i3BEK desktop, Coffee Lake-U Intel Core i3, 28 watts, #14 nano, Intel Iris Plus 655 GPU, 128MB eDRAM. “Energizer Google phones & cables in Thailand, Cambodia, Laos, Bangladesh, India, Philippines & Hong Kong.”

\$90 Amazon Fire TV Cube has Google & Alexa Voice Commands for changing TV channels via HDMI CEC cable. “China CATL biggest lithium-ion factories, 17 gigawatt-hours annually. Ahead of Korea LG, Tesla, Panasonic, China BYD. CATL to build 2 new plants & expand to 90 gigawatt-hours by 2020. It supplies BMW, Honda, Nissan, Toyota, Volkswagen.” “Hong Kong U of Science & Tech 3x lower power LCD by removing color filter, active-matrix field-sequential color-display panel based on electrically suppressed helix ferroelectric liquid crystal (FLC).” “LONGi Green Energy Technology, largest China solar mono-Si wafers maker, wafer thickness 0.18mm \$0.50.”

“2019 Kyulux & Wisechip flexible OLED black & yellow display with power consumption half of previous material.”

\$22 Xiaomi Mi Pocket Speaker 2, 7 hour 1,200 mAh battery, 5 watt speaker with 4 ohms impedance.” Samsung SM-J260 Google Go phone could be in 25+ countries, India, Bangladesh, Malaysia, Vietnam. China Alcatel 1 Google Go phone. 5” IPS 480p screen, Taiwan MediaTek ARM a53 #28 nano slow chip.

Qualcomm Snapdragon 632 #14 nano. Qualcomm Snapdragon 439 & 429 slow chips #14 nano for Google Go phones.

Thermacell mosquito-repellent vaporizes Allethrin oil (synthetic chrysanthemum).

\$44 India JioPhone 2, portrait physical keyboard, 2 inch bad screen, no Google apps.

\$35 British Broadcom Raspberry Pi 3 Model B+ desktop. Overheats less via heat spreader but slow A.R.M. Cortex a53.

150 million Bangladeshis. Only 10 million Google phones sold by Symphony, Chinese Transsion, Samsung, & Walton.

\$123 Xiaomi Redmi 5 India, 5.7” IPS, Qualcomm 450 slow #14 nano.

Xiaomi profit \$1+ billion 2017.

Overpriced Samsung Odyssey videogame laptop. “Z AeroFlow Cooling System, Dynamic Spread Vapor Chamber, Z Blade Blower.”

\$64 Intel LP CFL Pentium Gold G5400T, 35 watts. Competes with \$100 AMD Ryzen 3 2200GE.

NVidia GeForce GT 1030, DDR4 VRAM memory desktop game chip 20 Watts #14 nano.

Most popular TV: 1) Samsung 2) LG 3) China TCL 4) China Hisense

5. Sony 6) Philips 7) Skyworth 8) Sharp 9) Panasonic 10) Xiaomi.

“\$95 Xiaomi Yeelight Pro offers close to natural light spectrum ‘SunLike’ filters out blue light.”

Xiaomi phones retail at UK Three, Inc. stores, A.S. Watson stores Austria, Denmark, Italy, Ireland, Sweden, & Spain.

\$13 French STMicro “XH-M452 desktop to control temperature & humidity. 2 relays to control appliances like fans, air conditioners, de-humidifiers, or heaters.”

Indonesia & South Africa, Chinese Huawei Y3 Google Go phone with Taiwan MediaTek slow chip & 480p screen.

\$750 HP Envy x360 13 AMD Ryzen 5 2500U #14 nano, IPS touchscreen laptop 0.6” thick, 3 pounds, AMD Radeon Vega games.

AMD Radeon RX MECH 570 MSI “Torx 2.0 fan, 22% more air pressure for cooling while reducing noise levels. Large heatsink connects to 6mm copper heat pipes, nickel-plated copper baseplate with Premium Thermal Compound X.”

\$120 Dish AirTV desktop TV antenna ATSC free TV channels 1 to 13 on Google & Apple iPads. “5% of Africans own air conditioner. Sales of A.C. going up in India, Indonesia, & Middle East.”

India “water pump requires no electricity to operate & no pollution. Barsha Pump 43,000 litres of water a day & free to operate.”

\$19 Taiwan Mediatek MT6737 #28 nano Google TV desktop module on Chinese Taobao store.

\$157 Xiaomi Mi TV 4C 720p HDTV resolution with 178-degree viewing angle. 4 gigabytes music storage, 2 HDMI TV cables.

7 pounds, 2 stereo surround sound speakers 8 watt DTS-HD.

\$230 AMD Udoo Bolt v3 Microsoft desktop made in Italy, 12 watts, Ryzen Embedded V1202B chip. NY GlobalFoundries #14 nano chip factory 14HP (High Performance) FinFET & Silicon On Insulator for IBM. S.O.I. increases battery time.

Dell laptops 70% made in Taiwan by Compal, 20% Wistron, 10% Pegatron.

Apple’s former game chip British Imagination PowerVR sold to Chinese Yitai Capital \$750 million. Indonesia law “40% phone parts, screens, package, exterior frame must be made locally.”

Google hardware online store added Mexico, Brazil, Indonesia, Malaysia, Philippines, & Thailand. United Renewable Energy merger NSP, Gintech, & Solartech have solar factories Vietnam, Thailand, & Malaysia.

\$1 to \$2 Electric Dollar Store assembled in California, small LED lights, buzzers, sensors, free I2C-Driver app.

\$400 UP Xtreme desktop, medium speed Intel Core i3-8145U #14 nano, Intel UHD graphics 620, 15 watt heatsink & fan.

\$600 Vivo X27 Pro, 6.7-inch OLED, Qualcomm Snapdragon 710 #10 nano, 4,000 mAh battery, 22 watt Vivo FlashCharger.

\$800 HP Envy x360 15” touchscreen laptop, AMD Ryzen 5 3500U #12 nano, AMD Radeon RX Vega 8 graphics chip, Bang & Olufsen stereo speakers, 4.5 pounds.

\$140 Mad Giga AP34 Pro desktop, slow Intel Celeron N3450 #14 nano, China GearBest.com

\$58 Oukitel C12, 6.2-inch, Taiwan MediaTek MT6580 slow #28 nano, AliExpress.com

\$535 Xiaomi Mi Notebook Air, Intel Core m3-8100Y #14 nano, 4 gigabytes RAM, Harman Kardon DTS surround sound, 2.4 pounds. “\$20 Wyze Sense kit motion sensor, 2 contact sensors (for doors or windows).”

\$63 ODROID-N2 desktop ARM Mali-G52 GPU has Wayland Linux driver OpenGL ES 3.2.

\$500 Lenovo IdeaPad 720s 13" laptop, AMD Ryzen 5 2500U #14 nano.

Barnes & Noble Nook touchscreen division sold to Najafi.

\$370 Xiaomi Mijia Intelligent Water Purifier, 0.0001 micro-meter porous membrane filter.

Samsung warranty replacement prices for India [www.samsung.com/in/support//in-mobile-phone-part-cost/](http://www.samsung.com/in/support//in-mobile-phone-part-cost/)

India "If Intex & Lava wish to recover from this decline in popularity, they must focus on entry-level lower prices."

\$350+ Acer Aspire 3 14" laptop, Intel Core i7 #14 nano, Nvidia GeForce MX250 graphics chip, 16 gigabytes RAM, HDMI TV cable.

\$75 Samsung Galaxy A2 Core, 5-inch 540 pixels resolution, #14 nano Samsung Exynos 7870 ARM a53, 1 gig RAM, 16 gigs memory, Google Go Android 9, 2,600mAh battery, red, grey, or blue.

China 12-inch wafer chip factories SMIC, Hua Hong Semiconductor, Tsinghua Unigroup, Chongqing Alpha & Omega, Guangzhou CanSemi, SiEn (Qingdao).

AMD Ryzen Embedded R1505G #14 nano, Zen Vega game X86 64 bit chip, 12 watts (fanless would be 3 watts), from Advantech, Alphainfo, ASRock Industrial, Axiomtech, DFI, iBase, Kontron, MEN, Mentor, Sapphire, zSpace.

ASRock iBOX-R1000 desktop #14 nano AMD R1505G.

Ireland NOA Chinese phone store.

GPD Win Max 7" touchscreen with joystick, #14 nano AMD Ryzen V1605B 12 watts, late 2019.

Intel #14 nano Core i5-8210Y, Intel UHD Graphics 617 GPU, 7 watts.

\$150 Nvidia GTX 1650 desktop GPU chip, #12 nano Turing TU117 GeForce, 75 watts, from ASUS, Colorful, EVGA, Gainward, Galaxy, Gigabyte, Innovision 3D, MSI, Palit, PNY, Zotac.

\$875 Lenovo Legion laptop IdeaPad L340 Gaming or Y7000P, Nvidia GTX 1650 Max-Q #12 nano GPU game chip, 35 watts.

\$150 ASRock DeskMini A300W AMD Socket AM4 (#14 nano Raven Ridge 65 watts) Barebone System, does not include chip nor memory, NewEgg.com

\$330 Lenovo Flex 14 81HA000JUS laptop, #14 nano AMD Ryzen Vega 3 2200U, 4 gigs RAM, 14" 720p touchscreen, bad Windows 10 S software, 3.75 pounds, NewEgg.com

\$88 China ZTE Blade A7, #12 nano Taiwan MeidaTek Helio P60 ARM Cortex a73, Mali-G72 GPU chip manufactured by TSMC, 6" bad screen.

Columbia U 158 F Temperature Swing Solvent Extraction saltwater filter.

\$100 Guatemala La Chapina Bonita oven made of 70 bricks.

\$26 Chinese Rockchip RK3318 obsolete Google desktop Wechip X88 Pro TV Box, infrared remote, Alibaba.

Alibaba ships to 150 countries, allows sellers from Italy, Russia, Spain, Turkey.

\$370 Ipason F-Migrate desktop, #14 nano AMD Ryzen 3 2200GE, GearBest.com

\$60 Xiaomi Redmi Go phone <https://m.geekbuying.com/item/Global-Version-Xiaomi-Redmi-Go-5-0-Inch-1GB-8GB-Smartphone-Black-413632.html>

\$50 Amazon Fire 7 9th generation, 7" IPS 600p screen, Taiwan MediaTek #28 nano MT8163V obsolete 32 bit chip, 16 gigs memory + maximum 512 gig microSD, black, plum, sage or twilight blue, 10 ounces, 7 hour battery.

PowerVR Vulkan GPU can be DesignShare licensed for RISC-V chips.

\$80 Xiaomi Redmi 7A, #12 nano Qualcomm 439 ARM A53, Adreno 505 GPU Vulkan 1.1, maximum

256 gig microSD, 4,000 amp battery, FM radio, splash resistant P2i nano coating.  
\$580 Xiaomi RedmiBook 14 laptop, #14 nano Intel Core i5-8265U, Nvidia GeForce MX250.  
\$245 Meizu 16xs 6.2" OLED, #11 nano Qualcomm 675, black, blue, coral orange or silk white.  
\$87 ViviBright F10 HDMI low quality 50" projector TV AliExpress.com  
\$70 Khadas VIM3 Basic Chinese Amlogic S922X #12 nano ARM a73 (a77 is better) desktop.  
\$100 AcePC T5 slow obsolete Intel Cherry Trail Windows desktop.  
\$100 Nokia 2.2 #12 nano Taiwan MediaTek Helio A22 ARM a53, IMG PowerVR GE bad graphics chip driver, 2 years Google updates, steel or tungsten black, 5.7" IPS 720p, 3,000 amp battery.  
Brazil Positivo KaiOS phone (no Google apps), voice command lamp, electric plug, camera, alarm.  
\$25 Xiaomi Mi Band 4 fitness tracker, 1" OLED, black, orange, purple, burgundy, beige. Remote controls music but does not play MP3.  
\$150 #12 nano AMD Ryzen 5 3400G CPU desktop chip, AMD Vega 11 GPU, 65 watts, Indium Tin solder.  
\$420 HP Envy x360 13" touchscreen laptop, #14 nano AMD Ryzen 5 2500U, Radeon Vega 8 GPU, NewEgg.com  
Free prosthetic leg blueprint U of Michigan  
<https://news.umich.edu/open-source-bionic-leg-first-of-its-kind-platform-aims-to-rapidly-advance-prosthetics>  
\$10 Rock Pi S slow ARM a35 Chinese Rockchip RK3308 desktop.  
Intel 8 & 9th generation desktop chips 10% price cut. \$35 to \$55 (4 gigs LPDDR4 RAM) Raspberry Pi 4 desktop, Broadcom BCM2711 #28 nano ARM Cortex a72, VideoCore VI GPU OpenGL ES 3.0 (3.2 is better) 4K HEVC hardware acceleration, Mesa V3D graphics driver, 2 micro-HDMI TV \$1 cables, USB 3.0, \$8 USB-C electricity.  
\$175 Xiaomi Mi CC9e 6" OLED 720p 102.7% NTSC color gamut, Gorilla Glass 5, #11 nano Qualcomm Snapdragon 655.  
\$240 Xiaomi Mi CC9  
6.4" OLED 103.8% NTSC color gamut Gorilla Glass 5, #10 nano Qualcomm Snapdragon 710, Adreno 616 GPU, 256 gigs memory.  
\$275 Lenovo Z6, 6.4" OLED HDR10 DCI-P3 color gamut, #8 nano Qualcomm Snapdragon 730G, Adreno 618 GPU, maximum 512 gigs.  
Qualcomm 215 mobile platform #28 nano ARM Cortex a53 64 bit.  
China Vivo Y15 Y17 phones U.A.E., Pakistan.  
China, Ethiopia cheap phones Transsion I.P.O. Shanghai STAR Market.  
\$140 India Samsung Galaxy Tab A 8.0 2019, #12 nano slow Qualcomm 429, 8", 5,100 amp longer battery. Compare to \$50 Amazon Fire 7" #28 nano.  
\$450 Xiaomi Mi 9T Pro same as Redmi K20 Pro, #7 nano Qualcomm 855, 6.4" OLED.  
Arizona Universal Electronics smart homes outsources to Philippines, Monterrey, Mexico.  
Vietnam Seditex outsources basic plastic, metal.  
Intel Lightning Mountain slow chip #14 nano obsolete 2020.  
\$110 China Lenovo Tab M8 HD, 8" LCD, #12 nano Taiwan MediaTek A22 ARM a53, bad IMG PowerVR GE GPU, 2 gigs RAM, 16 gigs memory.  
\$175 China Oppo A5 (model number 2020) #11 nano Qualcomm 665, 6.5" IPS screen, 5,000 amp battery, India.

NY GlobalFoundries 12LP+ Leading Performance #12 nano finFET chip factory.  
Microsoft Airband TV antenna internet charity for 40 million Colombians & Ghanaians.  
AMD Radeon E9260 GPU #14 nano PCIe card, 50 watts.  
Chinese Amlogic S805X2, S905X4, S908X hardware accelerated AV1 player desktops 2020.  
Georgia Tech LoCHAid low-cost, affordable hearing aid.  
ARM Mali-G57 GPU & Mali-D37 display processor for mid-end.  
Xiaomi selling phones in Africa with Shenzhen Keting & Jumia.com  
SiFive U84 & U87 RISC-V out-of-order chip blueprints #7 nano.  
Samsung partners with Dixon India slow feature phone assembly.  
Intel #14 nano Pentium Silver N5030 6 watts. Pentium Silver J5040 10 watts.  
Japan Ochanomizu University BubBowl electrolysis prints onto drink.  
Free T-Mobile 5G Connecting Heroes Initiative first responders for 10 years.  
Taiwan Pegatron outsources to Batam, Indonesia, India, Vietnam.  
Taiwan MediaTek S900 8K HDTV chip #12 nano TSMC FinFET Compact (12FFC).  
Tinker Edge T Dutch NXP i.MX8M #28 nano ARM a53 Google desktop.  
AMD Radeon RX 5300M #12 nano low-end laptop GPU.  
China SMIC chip factory #12 nano 2020.  
Taiwan VIA Centaur x86 (compatible with Intel/AMD/Microsoft apps) desktop server CPU chip, 2.5 gigahertz AVX-512, A.I. coprocessor, TSMC #16 nano, DDR4-3200 RAM.  
India Samsung & Dixon to manufacture 55" TV.  
Peru Google Loon & Telefonica Internet para Todos.  
Amazon Alexa voice control for obsolete appliances with 1 megabyte RAM, Cortex-M slow chip via server.  
Vietnam president asked Samsung to build chip factory.  
Think Silicon NeoX|V 3D GPU chip, RISC-V, FP64 SIMD, OpenGL ES, Vulkan via Glove.  
AMD Ryzen Embedded V1000, R1000 #14 nano desktops from ASRock Industrial, EEPD, OnLogic, Simply NUC, 6 to 55 watts.  
Taiwan Asus ADT-3 official Google TV small box Chinese AMLogic ARM a53.  
Chinese Zhaoxin KX-7000 x86 CPU #7 nano 2021, then #5 nano.  
Andes 64-bit AX27 RISC-V #28 nano, Vector Register File summer 2020.  
U:Kit open source smoke detector.  
AMD Athlon Silver 3050U #14 nano laptop chip.

**Free Apps:**

Free Locast app TV channels 2 to 13.  
Free Intel SVT-AV1 Scalable Video Technology app for high-end laptops to compress TV.  
Free Intel Media Driver Linux app for GPU chip accelerated TV HEVC 10-bit HDR10 encode & decode.  
Free Google Live Transcribe app for the deaf.  
Free AudioKit Synth One musician app.  
Free LibreOffice 6.4 app.  
Free Google Rivet education app for kids.  
Free Google Android Bionic Library app optimized for AVX2 Intel.

Veterans can use Apple Health medical records at VA. “Nantendo: How video games made for kids can be awesome for seniors,” CBC.

Video game publisher Ubisoft & Mozilla A.I. programming assistant Clever-Commit app.

Free WINE Hangover app for Google converts Windows x86\_64 (DirectX 9) to 64-bit ARM (OpenGL ES 3.2).

Free Chamferwm Linux app converts X11 to faster Vulkan graphics compositor.

Free Couch Slouch app for \$45 HDMI CEC to USB cable Pulse Eight on Apple laptops or desktops.

Free Kodi or Plex app can use regular TV remote control when connected by HDMI to TV screen.

Free Nintendo Gameboy Switch MonoNX app for Google ARM Cortex a76, could take years to work, programmed in C#. Yuzu app already works on Intel & AMD.

India Infosys InfyTQ app free courses for engineers.

AMD hiring 10 programmers on free Mesa OpenGL Vulkan graphics driver, Mesa multimedia (TV hardware acceleration), kernel, Linux LLVM compiler back-end, container apps.

Free Qt 6 programming tool-kit 2021, GTK4 apps by 2020.

Most apps can be recompiled/interpreted from AMD/Intel x86 to A.R.M. Cortex a76 chip, Vulkan.

ARM Mali GPU Shader Development Studio, Mali GPU User Interface Engine app.

Microsoft Windows 2020 maybe compatible with Xbox Direct3D games. Free Xenia app for Xbox 360 on laptops.

Free Google Dart DevTools programming app.

Amazon FreeRTOS app for RISC-V chip.

French STMicro chip factory, HP, & Iowa State University of Science Technology joined free app Linux Foundation.

Google Android Q Sensor Framework may have motion controls (gyro & accelerometer) for \$40 Sony PlayStation 4 joystick.

Free GPU.js app, JavaScript using game graphics chip hardware acceleration.

Free DAV1D 0.2 app for AV1 TV compression supports SSSE3, AVX2, NEON SIMD hardware acceleration.

Intel oneAPI (app programming interface) for CPU, GPU, FPGA chips.

Berkeley Out-of-Order Machine (BOOM) free open source RV64G RISC-V chip blueprint written in Chisel hardware construction language, can be rented on Amazon EC2 F1 FPGA instances.

Unity 2018.3 videogame programming app has HDR render pipeline OpenGL Vulkan.

Free RetroArch app PlayStation 1 Beetle PSX HW OpenGL Vulkan SSAA (Super sampled Anti Aliasing).

MIPS chip free blueprints, Instruction Set Architecture R6 CPU.

8 billion slow MIPS units sold, anybody may make RISC-V iPads.

Free MIPI I3C Basic cable blueprint.

Free VK9 app translates Microsoft Direct3D 9 to OpenGL Vulkan videogames, compatible with closed-source AMD graphics chip driver.

JustFix.nyc free app helps tenants track disputes with landlords.

ANGLE Almost Native Graphics Layer Engine for Google Android Q will convert OpenGL 2D games to Vulkan program language 2020.

Free CW & CW Seed TV Google apps.

Free LibreRouter app Wi-Fi mesh network tested in rural Mexico.

Improve old videogame visual quality with super-resolution texture tools from Nvidia GameWorks, Topaz Lab AI Gigapixel to upscale, ESRGAN Enhanced Super Resolution Generative Adversarial Networks app.

Free Qualcomm CPUFreq driver qcom-hw for controlling chip speed.

Free SuperTux videogame version 0.6 has OpenGL 3.3 (core context) rendering support for Intel & AMD laptops, OpenGL ES 2.0 for Google ARM chips.

Free AMD OpenMandriva Znver1 apps compete with free Intel Clear Linux.

Free Wikipedia & biology educational books with Kiwix app

(ZIM files) for Google, Apple, Microsoft. <http://wiki.kiwix.org/wiki/Content> [www.kiwix.org/downloads](http://www.kiwix.org/downloads)

Free LibrePCB EDA app to develop printed circuit boards for Linux, Windows & Mac.

Free LibreSilicon obsolete #500 nano chip factory blueprints, QTFlow VLSI development EDA based on Qt5, C++.

Free Software Foundation Linux \$1 million donated by Handshake.

Google Flutter apps compatible with Microsoft & Apple via Hummingbird HTML5 JavaScript.

NVidia Video Codec SDK 9.0 for Turing GPU chips faster hardware acceleration for H265 TV playback.

European Union \$30,000 bug bounties for free charity apps Kafka, Notepad++, VLC Media Player, 7-zip, Drupal, GNU C Library (glibc), PHP Symfony, Apache Tomcat.

Free LibHybris app for ARM chips converts Google Android drivers (Bionic) to Ubuntu Touch & other Linux.

AMD-KFD Linux kernel driver app compatible with 64-bit ARM Cortex a76 desktops, via PCIe x16 cable to AMD Radeon GPU game chip.

South Korean Hyundai joined free apps Linux Foundation, Automotive Grade Linux.

Bangladesh dermatologists used Polyfins Tibot app for diagnosing Myanmar Muslim refugees.

OpenGL Vulkan videogame programming examples. <https://github.com/SaschaWillems/Vulkan> <https://vulkan-tutorial.com>

Free app charity Linux version 5.2, Ubuntu 19.04 April.

\$25 ARM Mali GPU game chip has free Panfrost Gallium3D OpenGL driver compatible with Kodi TV app. Qualcomm, Intel, AMD, Nvidia have better software drivers for Vulkan videogames. <http://armdevices.net/2019/04/02/collabora-shows-radxa-rock-pi-4-running-panfrost-open-source-mali-gpu-driver/>

Free AMD-VLK OpenGL Vulkan 1.1.96 game driver for Linux.

Free MIT visual programming language Scratch 3 for Raspberry Pi.

Free Ad Block Radio app.

ShakeAlertLA app Los Angeles few seconds warning earthquakes.

Free CWiid library app for Raspberry Pi to use Nintendo Wiimote joystick with \$20 Dolphin Bar cable. Raspberry Pi ARM a53 too slow for modern videogames & does not have Vulkan. [www.piandchips.co.uk/uncategorized/digital-graffiti/](http://www.piandchips.co.uk/uncategorized/digital-graffiti/)

Intel High Dynamic Range TV support in free Wayland Linux app. Amazon IMDb website free with ads streaming service Freedive.

Free with ads Sinclair STIRR online TV.

Viacom \$340 million purchase of free online Pluto.TV.

Free Epic Games Unreal Engine programming app \$25 million fund to encourage “more open videogame engines.”

\$25 Raspberry Pi member of RISC-V free chip blueprint charity, supports Linux app toolchain, kernel, userland, SIMD fastpath, JIT.

Godot 4.0 Game Engine supports OpenGL Vulkan.

Free Google Android x86 9.0 Pie for Intel, AMD laptops has

OpenGL ES 3.2 Vulkan, converts ARM apps to Intel via native bridge mechanism.

Unity 3D Android Game SDK Vulkan programming for Google.

Free Verizon spam alert app.

Free Lakka 2.2 for x86\_64 AMD or Intel CPU chip with NVidia GPU graphics. Vulkan (VK\_KHR\_display extension) for Playstation 1 Beetle-PSX, Nintendo Wii Dolphin, Parallel-N64, Playstation Portable PPSSPP apps.

Linux GPU game chip OpenGL 4.6 hardware acceleration in Project Crostini app for Google Chrome OS laptops Dell Inspiron 14, Lenovo Yoga Chromebook C630, Acer Chromebook 13, Acer Chromebook Spin 13, HP X360 Chromebook 14.

Free to play games \$88 billion revenue 2018 ads & optional features.

Samsung Neuro Game Booster app for Exynos Mali ARM chip.

Mali GPU worse graphics driver app than Qualcomm, AMD, Intel.

Free OpenCue visual effects render manager app by Google & Sony Pictures Imageworks.

Google may announce free Android Q app May 7.

Free TV recorder app MythTV version 30 for \$50 Google desktops, VA-API video player acceleration, or through Kodi app.

Tim Wu monopoly book, “Curse of Bigness: Antitrust in the New Gilded Age.”

Free Microsoft Shader Conductor videogame programming app.

Programming the Microsoft Windows Driver Model” book by Walter Oney, “Linux device drivers” by Alessandro Rubini.

Free Google Watch Wear O.S. app version H.

Netflix app Hailstorm for Chinese AMLogic \$25 to \$50 desktops.

Uber joined Linux Foundation free app charity as gold member.

YouTube “The Terminator” & “Legally Blonde” free with ads.

Virus Explorer molecule models.

[www.hhmi.org/biointeractive/virus-explorer](http://www.hhmi.org/biointeractive/virus-explorer)

Free Doodle Master app converts drawing into app visual interface. Google \$200,000 sponsorship of performance speed JavaScript programming frameworks.

Free Amazon Corretto Open Java Development Kit (OpenJDK) app for programming.

MPEG Part 3 Versatile Video Coding app compresses TV shows smaller than H265, October 2020.

MPEG-G ISO/IEC 23092 Genomic Information Representation standard Part 2 compresses DNA files, January 2019.

China testing free Google Fuschia basic apps.

Free charity app Julia programming language.

Free videogame Simple DirectMedia Layer 2 app compatible with Xbox 1, PlayStation 4, Nintendo

Switch joysticks.

Lutris free charity app for Linux games includes Nintendo GameBoy Citra & Dolphin apps, RetroArch (Arcade).

Disney cartoon app & Oscars partner with Linux free app charity for Academy Software Foundation. Free Nintendo Dolphin (Wii) Google app has cover art for games.

OpenGL Vulkan game programming language improvements working on more FP16/INT8 support, interface for querying driver properties, variable-resolution rendering support, performance counter exposure through Vulkan API, memory management improvements, ray-tracing, new synchronization primitives 2019.

Nigerian women invented FD Fake Drug Detector app.

NVidia Material Definition Language programming for defining cartoon rendering. Converted into OpenGL GLSL, NVIDIA PTX,

x86 Intel/AMD instructions, or LLVM IR. For example, a piece of carpet, upholstery or clothing.

Ikea joins Khronos Group to support OpenGL.

Valve compatibility tool app Steam Play Proton, allows some Windows games to run on free app charity Linux SteamOS laptops. Based on W.I.N.E. app.

Envision AI app for the blind.

Google Go Android 9 Pie faster apps for \$30 to \$75 phones. 200 different Google Go phones in 120 countries.

Nintendo Wii guitar & drums for Guitar Hero & Rock Band compatible with free app charity Linux, Dolphin app.

Free app charity Linux Mesa OpenGL ES 3.2 is supported by AMD RadeonSI with GL\_ANDROID\_-extension\_pack\_es31a. “Hey Google tell me something good” voice command for news.

GOG game store said fuck Digital Rights Management crippled apps.

Google Android 9 Pie compatible with Xbox One S wireless joystick.

Enveritas coffee & palm oil farming free app. Checks for 30 standards: social, environmental & economic. No child labor. Workers rights. No deforestation, pollution or banned pesticides. Fair wages, ethical business, pricing. Indonesia, Ethiopia, Uganda, Nicaragua, Costa Rica, etc.

Intel Adaptive Sync, AMD FreeSync, Nvidia G-Sync technique for improving game GPU performance on TV.

Google Go app for phones has robot voice to say webpages out loud in 28 languages.

Free Kicad 5.0 EDA app to design schematics & layout chips.

Free GLOVE app for Google & Microsoft plays OpenGL ES 3.2 games converted to Vulkan programming language.

Google Pie software optimized for ARM big.LITTLE chips. 4 big CPU chips (Cortex a76) fast & use more electricity + 4 little slow chips

(ARM Cortex a55) that use less electricity.

Vizio online TV service WatchFree.

NVidia Adaptive Temporal Anti-Aliasing (ATAA) improves quality.

500 games free app charity Linux, mostly C++.

12% free charity apps for Google use Kotlin program language.

Free Optic app gives programmers a way to use common code.

Qualcomm Adreno A630 game chip getting free app charity Linux Freedreno Gallium3D hardware

acceleration for OpenGL games.

“To be full programmer, you must master 100,000 pages documentation. Solution is tech that doesn’t require PhD.”

VKGL free app to convert OpenGL 3.2 to Vulkan.

Google free Filament physically based rendering app engine uses OpenGL Vulkan.

Free Kodi TV app version 2018 Leia plays 1990’s Nintendo games. Kodi version M late 2019 RetroPlayer app will have more RetroArch OpenGL 2000’s Nintendo games.

UC Santa Barbara free Google app identifies UTI bacteria in 1 hour.

Google extends app updates on waterproof phones: Zebra TC25, TC51, TC56, TC70X, TC75X. Honeywell CT40, CT60, CN80. Sonim XP8, Point Mobile PM45, Datalogic Memor 10.

European Union LPGPU2 app extends mobile battery life by more power efficient code for GPU graphics.

CPU chip loads plan for game to draw on GPU graphics. GPU has 1,000 small cores, each for chunks of image. Tiny game shaders define color of each pixel dot on screen. NVidia demonstrated Adaptive Shading games with 20% improvement in frame rate speed.

Unity videogame programming app also teaches how to repair plumbing, customize cars, construction, & Hollywood.

Free DobieStation PlayStation 2 app for Google after 2020.

NVidia Turing game chip Mesh Shaders, programmable geometric shading pipeline generates compact meshlets in OpenGL Vulkan.

Ideas Beyond Borders charity translates educational books to Arabic for Middle East.

Free W.I.N.E. D.X.V.K. app (Microsoft DirectX to OpenGL Vulkan game converter) shader cache makes it faster.

Libre 3D GPU game chip charity blueprints for RISC-V will support OpenGL Vulkan, \$250,000 invested.

Free app charity Zink app translates OpenGL Gallium3D A.P.I. into Vulkan videogame programming language.

Free Kodi TV app more than 30 million users.

Free app Dav1d AV1 compressed video player.

Google Voice Access app allows disabled users to navigate apps. “Ray tracing (DXR lighting, reflections), DLSS (anti-aliasing quality).”

Free India Google Bolo Hindi & English learning app.

Free AMD Linux driver app xf86-video-amdgpu DDX, DCC color compression uses less electricity.

Free Maru 0.6 app merges Google Android (LineageOS Oreo, should be version Q) with Linux Debian 9 Stretch (many apps require OpenGL 4.6) for ARM chips.

Free Turnip driver Mesa app Qualcomm Adreno game chip, Vulkan.

Free Intel Linux graphics driver for Comet Lake, Icelake generation 11, Xe GPU, 2020 Elkhart Lake #10 nano laptops.

(Intel i915 DRM & Mesa driver app).

Free Google Android version Q, Vulkan 1.1 ANGLE Almost Native Graphics Layer Engine, AV1 HDR10+ TV, Opus MIDI music.

Google Chrome app compatible with Nintendo Switch joystick.

Developer.Android.com/Games for Google Unity programming 64-bit.

Vulkan game programming language 1.1.104 has “VK\_AMD\_display\_native\_HDR.”

WebAssembly (Wasm) converts C++ to web browsers. App threads for parallel compute on multiple CPU cores.

Hardware accelerated video player free Kodi TV app with V4L2 Mem2Mem API, zero-copy rendering DRM atomic kernel drivers, DMA-BUF from V4L2 to DRM, FFmpeg V4L2 Mem2Mem, Kodi GBM display software.

Unreal Engine 4.21 videogame app on Google with Vulkan is 20% faster than OpenGL ES.

Free Google Android Studio programming on \$150 Chromebooks.

Google Android Pie Apex app for free modular updates.

South Africa free with advertising TV2Go 100 channels.

SemanticScholar.org 40 million free computer science & biomedicine papers.

Microsoft free AV1 TV compression codec for Windows 10.

Free Apple iPad app iSH converts some free Linux apps via emulation & syscall translation.

Samsung updated OpenGL Vulkan videogame language, partnership with Unity Adaptive Performance to provide heat control A.P.I.

Google Assistant voice command, “Listen to the news.”

Google requires any phone 100,000+ units get 2 years app updates.

Free Google Bliss OS for Intel & AMD chips.

600 free online college classes on Coursera.

Free RetroArch Nintendo & PlayStation app new menu interface for Google touchscreens named Ozone.

Free technical websites: <https://developers.500px.com> <https://8thlight.com/blog> <https://99designs.com/tech-blog> <http://tech.adroll.com/blog> <https://medium.com/build-addepar> <https://build.affinity.co> <https://airbrake.io/blog> <https://www.airpair.com/software-experts> <https://advancedweb.hu> <https://airtame.engineering> <https://blog.algolia.com> <https://allegro.tech> <https://techblog.appnexus.com> <http://blog.arkency.com> <http://artsy.github.io> <https://blog.asana.com> <https://developer.atlassian.com/blog> <https://auth0.com/blog> <http://blog.avenuecode.com> <https://aws.amazon.com/blogs> <https://www.azavea.com/blog/category/software-development> <https://bytes.babbel.com/en> <https://lab.getbase.com> <https://blog.developer.bazaarvoice.com> <https://medium.com/bbc-design-engineering> <https://benchling.engineering> <https://www.benefitfocus.com/blogs/design-engineering> <http://www.bigeng.io> <https://binary-studio.com/blog> <http://word.bitly.com> <http://rockthecode.io> <https://code.blender.org> <http://engineering.blogfoster.com> <http://engineering.bloomreach.com> <http://engineering.brandwatch.com> <https://www.buzzfeed.com/techblog> <https://research.googleblog.com> <https://software.intel.com/en-us/blogs> <http://engineering.khanacademy.org> <https://www.kickstarter.com/backing-and-hacking> <https://medium.com/netflix-techblog> <https://open.blogs.nytimes.com> <http://blog.apps.npr.org> <https://blogs.nvidia.com> <http://www.schibsted.pl/blog> <https://stackoverflow.blog/engineering> <https://android-developers.blogspot.com> <https://medium.com/walmartlabs>

Google Grasshopper JavaScript programming free app.

Free DamonPS2 PlayStation 2 app for Google, not Apple.

Free OpMon Pokémon app. “Apple laptops & desktops can play OpenGL Vulkan games via free MoltenVK library app.” This benefits Nintendo Dolphin free app that already uses Vulkan on Google & Microsoft. Apple game programmers can use OpenGL Vulkan S.D.K. Software Development Kit LunarG on Mac laptops & desktops.

Google Chrome OS laptops, Crostini Linux free apps.

Free Flutter Google Android programming SDK app.

Free Intel OpenGL driver on-disk shader cache app, faster videogames. Only from Qualcomm, Intel, AMD, NVidia, & Broadcom.

Viacom ad-supported streaming TV service.

Nintendo Dolphin app faster with OpenGL Vulkan Framebuffer D24S8 on Qualcomm.

Free RetroArch game app supports Nintendo Dolphin Wii on Google.

Free Dolphin Nintendo app improved by NVidia driver.

“Faster integer multiplication in areas of fragment-heavy scenes.”

TraceLink app identifies counterfeit drugs, \$60 million invested. “App Maker, Google low-code tool for building business apps.”

Free Qt 6.0 programming app November 2020.

Free Wikipedia, Khan Academy Kiwix app on Raspberry Pi.

China Tencent joined Linux Foundation as platinum member.

\$100 million POSH free open-source silicon block library. IDEAS commercial tools automate testing blocks & knitting printed circuit boards. If successful, companies can design low-volume chips.

Sweden paid \$2.5 billion for German SUSE free app charity Linux. Intel ANV OpenGL Vulkan videogame driver supports automatic on-disk shader cache.

Free RetroArch app has Apple Metal renderer for Macs.

Programmer made \$100,000/year giving away free game.

He charged for online play.

V-EZ easier OpenGL Vulkan programming language.

Desktop PC Building Simulator app.

Unity videogame programming app supports Vulkan.

AMD & NVidia Enhanced Quality Anti-Aliasing (EQAA).

Google Pie apps support Dynamic Processing Effect music.

British Mali GPU chip driver implemented OpenGL EXT\_buffer\_storage for Nintendo games 2019.

IBM Verifier app identifies counterfeits.

\$1 million donated to Linux GNOME free app charity.

Intel free ANV Vulkan graphics driver for Google apps. Intel Chromebook laptops with Google games ARC++ program runtime.

Free IBM Java programming app Eclipse OpenJ9.

\$1 million X-Prizes awarded to 5 free education apps CCI, Chimple,

Kitkit, Onebillion, & RoboTutor.

Free NVidia NVGPU graphics driver app for Google.

British Synthace free open source biotech apps.

Microsoft donated to free app charity Open Source Initiative.

Free Nvidia blueprints for Deep Learning Accelerator A.I. chip.

Samsung invested \$8 million Pluto free TV app.

Linaro Open Source Foundries Linux free app charity. Programming for British A.R.M. Cortex chips.

Google Fuschia may support JavaScript apps 2023.

Free Orbital PlayStation 4 app for Microsoft & Apple (Intel/AMD) laptops, OpenGL Vulkan, QEMU, SPIR-V, requires AVX2 12GB RAM, currently plays no games.

All PlayStation games up to PS2 work on Google ARM chips.

ARM Vulkan best practices for mobile developers.

[https://github.com/ARM-software/vulkan\\_best\\_practice\\_for\\_mobile\\_developers](https://github.com/ARM-software/vulkan_best_practice_for_mobile_developers)

Free Greenfield app converts JavaScript, WebAssembly Linux apps to web browser Wayland.

Google apps can be programmed from \$35 Raspberry Pi 3A+ with free Raspbian, Node.js, Firebase-tools, Pyrebase Python apps.

Free GNU Parallel app for Linux converts apps that only use 1 CPU chip to multiple CPU.

Videogame programming education:

<http://stephaniehurlburt.com/blog/2016/10/28/casual-introduction-to-low-level-graphics-programming>

<https://renderdoc.org/blog/Graphics-in-Plain-Language/>

[www.thebookofshaders.com/](http://www.thebookofshaders.com/)

[www.processing.org/tutorials/](http://www.processing.org/tutorials/) [www.graphicscodex.com](http://www.graphicscodex.com)

Google Summer of Code charity, “TV OpenMAX HEVC/H.265 hardware acceleration Gallium3D driver, compressed texture tiling for Qualcomm Freedreno.”

Google TV apps have 10% smart TV market share.

Free Carnegie Mellon adaptive learning app for colleges.

Free Debian Linux app \$300,000 donated by Handshake.

China Peng Cheng Laboratory member of Linaro Linux ARM charity.

Free SPURV app, containerized Google apps on Ubuntu Wayland laptops.

Free Khan Academy Official LSAT Prep lawyer app.

Docker app compatible with ARM Cortex a76 desktops, Javascript Node.js, Python, Java, C++, Ruby, .NET core, Go, Rust, PHP.

Free George Clooney TrialWatch app “monitors trial human rights violations: Trials that oppress vulnerable groups, silence speech, or target political opponents.”

Free AMD RADV graphics driver app Mesa 19.1, Vulkan 1.1 on Google Android x86.

Free Raven Reader RSS news app, Windows, Mac, Linux.

Free RSS websites <https://search.feedi.me>

Free 3,500 charity Linux apps for Intel & AMD [www.LinuxAppStore.io](http://www.LinuxAppStore.io)

Free Windows 10 Subsystem for Linux 2 compatible with Docker charity apps.

Google Project Euphonia voice command, gestures & facial expression app for A.L.S.

Free Google Jetpack Compose Kotlin programming app.

Videogame shader programming for beginners.

<https://github.com/lettier/3d-game-shaders-for-beginners>

Free Nuru cassava disease diagnosis app.

Google & Binomial Basis Universal game texture codec, super compressed DXT, PVRTC.

GitHub Sponsors for donating to programmers.

Free CodeSpeak voice command programming app by a blind person [www.CodeSpeak.io](http://www.CodeSpeak.io)

WolframAlpha.com calculates “AC source 110 volts.”

Free 300 open source games [OSGameClones.com](http://OSGameClones.com)

Free Dorn Cox agriculture techniques website awarded \$35,000 by FoodShot Global.

Linux Mesa 19.1 Turnip Vulkan for Qualcomm.

Google Game Builder creates JavaScript videogames without programming for Windows & Mac.

NVidia Tegra ARM chip 2020 has CUDA language.

Free RetroArch app adding Play! PlayStation 2.

Free Quirk Talk Therapy App

<https://github.com/flaque/quirk>

Free Microsoft Windows 10 WSLDL app to install Linux.

IBM donated Power CPU desktop chip blueprints, Open Coherent Accelerator Processor Interface OpenCAPI, Open Memory Interface to OpenPowerFoundation.org

AMD RDNA Navi GPU documentation “True Audio Next, Radeon Multimedia/Display Engines, caches, SIMD” [www.amd.com/system/files/documents/rdna-whitepaper.pdf](http://www.amd.com/system/files/documents/rdna-whitepaper.pdf)

Ideal hardware accelerated ASIC FPGA chips designed for each basic app <https://semiengineering.com/synthesizing-hardware-from-software/>

Google Android TV free app XUMO 160 channels.

Vulkan Video language compress & playback TV hardware accelerated H.264, HEVC, VP9, AV1, summer 2020.

Free Dav1d AV1 TV decoder has OpenGL & Vulkan hardware acceleration Self-Guided Restoration, Constrained Directional. Enhancement Filter.

Free NetNewsWire 5.0 RSS app for Mac & iPads.

\$35 Raspberry Pi 4 desktop won't have Linux 5.2 GBM V4L2 video pipeline app until 2020.

Free Nintendo Citra app for Google Chinese version <https://github.com/weihuoya/citra/releases>

Free Box86 app converts Intel/AMD Linux apps to ARM chip.

India phone number 000 0800 9191000 for free Hindi Google voice commands.

Free Ad Block Radio app for Ubuntu. <https://github.com/adblockradio/buffer>

Libre RISC-V chip wants investors for NEON/SSE Video Player Acceleration for Ffmpeg & Mesa 3D games.

Free Apple Mac laptop apps charity <https://github.com/serhii-londar/open-source-mac-os-apps/blob/master/README.md>  
ARM Mali CPU & GPU chip partnered with Unity game programming SDK.

\$35 Raspberry Pi4 Broadcom GPU V3D VideoCore VI driver OpenGL 3.2, OpenGL 2.1, Compute & Geometry Shaders.

NVidia hiring 6 RISC-V chip engineers.

Free game programming apps BGFX rendering, Serpent framework, Newton Dynamics physics, OpenAL audio.

<https://github.com/lispysnake/serpent>

Google Paper Phone app prints Anagram, Conversion Charts, Italian Phrasebook, Knots, Maze, Multiplication Table, Origami Pigeon, Recipes, Riddles, Sign Language, Sudoku, Typography, Word of the Day.

Free Zink driver converts OpenGL 2.1 or OpenGL 2 to Vulkan in Linux Mesa 19.3.

Arabic ﻞّغّة programming language.

Machine Programming is automated.

<https://newsroom.intel.com/news/why-more-software-development-needs-go-machines/>

Free Qt Quick 3D 6.0 programming app supports Vulkan.

Nintendo Dolphin app compatible accelerometer motion controller Sony DualShock 4.

Free vkBasalt app FXAA sharpening for all Vulkan games.

Robocorp robotic process automation \$5.6 million invested.

Google OpenTitan open source secure chip.

Google Android 10 compatible Nintendo Switch Pro Controller.

Microsoft .NET 5 language compatible with Windows, Google, Linux, Apple Mac, iPad & watch,

WebAssembly, 2021.

Facebook Military & Veterans Hub, 1 year career development program on augmented & VR.

Google, ESET, Lookout, Zimperium App Defense Alliance antivirus.

Free Handbrake TV compression app version 1.3 reads AV1 libDav1d.

Free FFmpeg app has libRAv1e encoder.

Rust programming language can speed up Graphical User Interfaces.

<https://raphlinus.github.io/rust/druid/2019/10/31/rust-2020.html>

Google.org donated \$2 million to Wikipedia.

Amazon & Facebook donated \$1 million to Wikipedia.

IBM bought Red Hat free open source server apps \$34 billion.

Can old phone run Linux?

<https://many.tuxphones.com>

Video about homeless operating system programmer who was poisoned. [www.bbc.co.uk/sounds/play/m000b4r3](http://www.bbc.co.uk/sounds/play/m000b4r3)

Free Codeplay Vulkan, SYCL, SPIR-V layer to run Intel oneAPI, DPC++ on NVidia CUDA GPU.

Free with ads Amazon Music on iPhones & Google.

Google Your News Update is customizable.

Free convert WindowsRT C# apps to WebAssembly.

[www.theregister.co.uk/2019/11/20/winui\\_and\\_winrt\\_official\\_modern\\_windows\\_api\\_now\\_universal\\_thanks\\_to\\_webassembly/](http://www.theregister.co.uk/2019/11/20/winui_and_winrt_official_modern_windows_api_now_universal_thanks_to_webassembly/)

Indonesia Google Bangkit 6 month training, Kormo career app.

Linux for Intel Nintendo Dolphin & Citra game speedup from OpenGL 4.6 GLThread.

Wikipedia co-founder Larry Sanger EncycloSphere.org has multiple versions of every article biased to different religions, language & politics.

Ubuntu Touch apps support ARM64 bit libHybris & Raspberry Pi.

Free WebGLstudio.JS 3D graphics editor web app.

Free Jor1k Linux OS web app.

Epic Games store donated \$25,000 to free Lutris videogame launcher.

LibreOffice 6.5 uses Google Skia drawing interface library with OpenGL Vulkan.

Rewrite apps to faster Rust language <http://adventures.michaelfbryan.com/posts/how-to-riir/index.html>

Flutter Dart programming webapp [www.DartPad.dev](http://www.DartPad.dev)

Hastlayer converts .Net assemblies to FPGA chips.

Free Collabora Office for Google.

### **Batteries, Solar:**

\$0.32 per kWh Tesla NY recharge stations.

\$1.75 per watt Tesla solar.

\$7.50 Pale Blue rechargeable AA battery.

\$8 bendable battery PowerStream lithium polymer.

\$30/MWh Colorado wind, solar, & battery installation, large batteries “from 100MWh (25MW 4-hours) to 1,500MWh (150MW 10-hours)”

\$5,200 for 6 Nissan solar panels, \$10,300 for panels & 4-kWh battery, including installation.

\$5,800/ton China Tongwei solar polysilicon factory.

\$42,500 Tesla Solar Glass Roof 2,000-square-foot 10 kWatts.

2022 new battery ZapGo.

2029 CO2 carbon breathing batteries/fuel cells.

2033 perovskite & organic solar panels 99% efficient & cheaper. “Battery materials like manganese & iron instead of cobalt.” “Clemson U wireless triboelectric nanogenerator, W-TENG battery.” “SolidEnergy solid state battery, twice as much energy.” “Taiwan National Cheng Kung sodium ion electrolyte battery.”

Amionx safer battery 2020.

Astrolabe Analytics app for inventing better batteries.

Rechargeable Zinc-Ion batteries stretch, bend, & weave like yarn.

Tesla bought Maxwell ultracapacitor batteries for \$218 million.

Berkeley thermal regulator keeps batteries at 70 to 100 degrees F even in winter.

Plant battery “Sustainable Energy Fuels paper on understanding how the 3D structure affects the supercapacitor properties of biocarbon materials derived from plant cellulose.”

Royal Dutch Shell bought German battery company Sonnen.

Zinc Sulfide nano-particles for artificial photosynthesis (convert sunlight & water to hydrogen fuel) on Indium quantum dots.

Laser-Induced Graphene (LIG) consists of microscopic, cross-linked flakes of graphene & can be used to make electronic devices, such as supercapacitors, electrocatalysts for fuel cells & biosensors. India may buy 100 gigawatts of solar electricity. “Immune enzyme, terminal deoxynucleotidyl transferase, writes DNA instead of copying. Tie a nucleotide (forms polymers in DNA) to each enzyme with cleavable linker, the enzyme produces DNA sequences quickly at 200 bases per minute for biofuels.”

\$100 or less liquid cooling for desktops, servers from CoolIT, Asetek, Green Revolution Computing, Ebullient. “Venezuela oil is too thick & heavy for pipelines. Railroads too expensive to ship Canadian crude to US Gulf.”

Geothermal heat Dandelion Energy \$16 million invested.

South Africa ocean has 60 trillion cubic feet natural gas.

Eskom coal power plant \$30 billion debt.

Brazil 4,000 dams risk collapse, Vale dismantling all upstream dams. “Indonesia crude palm oil 46 million tonnes/year, B100 fuel from PT Pertamina & Italy Eni refinery.”

California volcanoes Medicine Lake, Mount Shasta, Lassen, Clear Lake, Long Valley, Coso, Salton Buttes. “What would it take to make electric ship carry 18,000 TEU (20 foot containers)? 30 day trip diesel boat burns 4,700 metric tons fuel,

55 gigawatt-hours. Lithium batteries (300 Watt hour/kg) weigh 100,000 tons.”

Baseload Capital geothermal heat pump invested by Breakthrough Energy Ventures Jeff Bezos, Bill Gates, Jack Ma (AliBaba).

Morocco OCP Group building Nigeria ammonia factory,

\$3.7 billion chemical factory in Ethiopia 2024.

Ivory Coast floating solar panels \$80 million invested by France.

Germany would need 650 feet tall wind turbines every mile across cities, mountains & water to be powered 100% by wind. Obsolete fossil fuel electricity plants for backup & 40% efficient solar perovskite.

Kentucky Republican congressman Thomas Massie built house with Tesla battery, Raspberry Pi,

solar & geothermal.

Tesla said Greek islands should replace gasoline with solar array batteries.

Google 10 megawatt solar for Taiwan servers.

McDonalds solar panels 2020.

France approved 103 large solar projects total 720 MegaWatts.

German Solar Association goal to reach 200,000 household batteries within 2 years.

Egypt \$2.8 billion Benban Complex 2019 solar 1.8 gigawatts.

German Tesla factory.

Alaska Quadco repairs oil & gas with Hemp Inc. DrillWall.

Africa has 40% world's potential hydro-electricity; diamonds & chromium; 50% gold; 90% cobalt; 50% phosphates; 40% platinum; 7% coal; 8% petroleum reserves; 12% natural gas; 3% iron.

Sierra Leone 10% of population has electricity. Easy Solar rents solar lanterns, batteries to 50,000 Sierra Leoneans (out of 7 million people) with 100 community sales agents. "Eclipse" scifi TV show. Solar flare disaster monitored by workers in special suits that protect them from sun's radiation.

\$18,500 German Sono Motors Sion electric car has solar roof.

Walmart tested wireless electricity Ossia.

Nigeria 10,000 solar sites with output of 100 kilowatts (kW) by 2023 would power 14% of population, \$3 billion annual revenue.

Europe predicts 23% electricity from wind, 7% solar 2030.

Taiwan Edison Creative Technology LED street lamp powered by solar, 1,150 watt wind turbine, 1,200 watt battery.

French Voltalia \$80 million solar power in Kenya.

Hyundai & Kia cars with solar panels on roof & hood 2020.

ETH Zurich university thin, sinuous layers of heating coils & solar cells built into concrete.

Stanford appliance collects solar energy & reflects infrared radiation to space, both heater & air conditioner.

\$30,000 Quench Mobile MaxClear 900-watt solar 5. 4 kWh GEL-sealed lead-acid battery, motor pumps water through filters.

Maersk Tankers installed 100-foot-tall rotating cylinders on boat as high-tech sails that cut fuel bill 10%.

Spanish Tecnalia Corporación Tecnológica Suprapower. Weight of the top of regular windmills too huge. So how do you remove tons from magnets, gears, iron cores, kilometers of copper winding? Exchange magnets & copper winding for coils of superconductors.

NASA \$1 million prize to convert carbon dioxide into glucose. Mars atmosphere 95% CO<sub>2</sub>, glucose is fuel.

Excellent (charity) constructed 1,000 sand dams in Africa, South America, & South Asia.

China LONGi Green Energy Technology construction delay for solar factory in Gujarat, India because of uncertainty in government.

French boat with solar, windmill & hydrogen gas. Energy Observer catamaran fuel from sea water hydrogen. Sides are bi-facial solar panels, generate from direct sunlight & light reflected off water. 106 kiloWatt-hour (equivalent to a Tesla) battery for immediate, buffer, storage & energy demands. Stores excess as hydrogen gas.

Hartford will get 20 megaWatt electric grid powered by fuel cells.

New Zealand Scion converts waste wood to bio-fuel.

Mexico Nopalimex \$0.65/liter prickly pear cactus fuel.

New Jersey wants to be solar & wind powered 100% by 2050.

EnergySage & PickMySolar.com compare solar prices.

United Renewable Energy solar \$17 million PV module USA factory annual capacity 500-1,000 MWp.

Tesla selling solar panels & batteries at Home Depot. “\$1 billion Gigawatt Global to install 800 megawatts solar & wind in Burkina Faso, Senegal, Mali, Nigeria, Gambia.”

Ethiopia geothermal from volcanoes potential 10,000 MegaWatts.

South Africa 1,400 megawatt battery network 2022,

70% electricity is from coal. “England energy-storage 5 MegaWatt / 15 MWh uses excess electricity to cool ambient air -196°C (-320°F), gas becomes liquid. Liquid stored in insulated, low-pressure container. Liquid pumped back to high pressure, it becomes gas & warms via heat exchanger. Hot gas drives turbine to produce electricity.”

NY \$1.4 billion to 22 solar projects, 3 wind, & 1 hydroelectric.

Volkswagen invests \$25 billion in battery supplies, 16 factories to build electric cars by 2023.

India BuffaloGrid solar battery phone charging stores.

LG electric car battery factory Poland 2019.

Steve Jobs’ widow invested \$10 million solar panel Angaza.

Solar electric boats cost less. “Convert heat to electricity with 15% efficiency by sound wave phonons. Electrons can carry heat.”

\$50/month Tesla solar roof rentals Arizona, California, Connecticut, Massachusetts, New Jersey, New Mexico.

Toyota Prius PHV 0.001 inch thin solar roof.

Taiwan Giga Solar Materials pure silicon, silica dioxide battery anode, cathode lithium iron phosphate factory 2020.

CanaPux crude oil from Canada sands mixed with polymer, solid puck for transport to China, India, South Korea. BP discovered 1 billion barrels of crude oil in Gulf of Mexico.

Ideanomics said blockchain & artificial intelligence apps could monitor Nigerian oil.

Taiwan oil CPC Corp to study feasibility of petrochemical complex in India \$6.6 billion.

Saudi Arabia bought 20% South Korean gas refiner Hyundai Oilbank \$1.6 billion.

Oil bitumen to asphalt, vanadium batteries, plastics & carbon fibre.

Janus membranes with salty sea water on one side & fresh river water on the other 35.7% efficient electricity generation 2021. “Tesla considering Gigafactory in Germany.” “Guyana 3.2 billion barrels of light crude oil underwater.”

Utah 13 billion barrels oil in tar sands.

Azerbaijan “Over the next 30 years, \$40 billion invested in oil.”

Israel invested \$60 million StoreDot battery Quick Charge.

“India deficient in crude oil, high-grade coal & gas. Must import energy & rare-earth metals.”

BMW i3 FastCharge cable 350 kW 400, 800 volts, Porsche cooling system 90 kWh battery 400 kW recharge speed, Tesla 120 kW.

Malta, inc \$26 million invested heat pump battery, similar to refrigerator, extracts heat from chamber of antifreeze, lowers temperature to -58 °F, then another chamber heats salt to 1,000°F.

Ford 2020 Explorer Hybrid liquid-cooled lithium-ion battery.

Apple hired a Samsung battery business executive.

Energy Vault battery system of 6 cranes which stack bricks into tower, then drop each brick & harvest electricity \$200 per kilowatt hour, India Tata Energy prototype.

2025 lithium-ion batteries \$94 billion global market.

Magnesium slow & sulfur battery doesn't last long.

Rolls-Royce SAVe Energy liquid cooled boat battery.

\$50 Nimble battery with industrial hemp & recycled PET rubber bioplastic frame, cables are BPA & PVC-free.

Compress air using electrical compressors, store energy as pressurized air battery. When you need electricity, let air out to turn electric generator.

Manganese-Hydrogen big battery for buildings.

Electric car battery faster charging. "WMG probe fiber optic sensor, protected by chemical layer, inserted into lithium-ion battery cell to measure heat."

Congo increased price for cobalt, coltan, & germanium.

Apple & Samsung want to buy battery cobalt directly from Congo miners."

Harvard liquid battery uses Methuselah molecule for power grids.

Hoover Dam converting to water pump energy storage. Excess renewable electricity pumps water up. Existing hydroelectric generator will discharge battery at low times.

General Motors \$5,000 car battery.

Tesla battery charging convenience stores.

Rapid Earth Fault Current Limiters power diverters protect electricity substations from fires.

British Oxis Energy lithium-sulfur battery.

Swiss Energy Vault system for storing energy in concrete blocks. Blocks lifted by crane when surplus energy available (when sun is shining) & when energy is needed later, allowed to fall, turning turbines to generate electricity.

Heliogen solar mirror oven for manufacturing cement, steel, glass.

Solvatten solar water filters in 20 countries won Applied Materials Tech for Global Good award.

Australia Deakin Institute for Frontier Materials solid polymer, weakly bonded to lithium-ion, lithium metal anode battery.

Rice University & China Fudan perovskite solar, Indium to replace lead.

General Motors LG \$2.3 billion Ohio battery factory.

Mountain Gravity Energy Storage sand gravel reservoir.

China new record for organic solar efficiency 17.3%.

China Qing Tao Energy Development solid-state battery factory.

Argonne National Lab lithium-air battery.

Berkeley lithium-ion battery cathode, no cobalt, 50% more energy.

CAP-XX battery, 3 volt thin, prismatic supercapacitors.

China carbon nanotube flywheel mechanical battery prototype.

Dyson electric car solid-state battery delayed to 2021.

High density lithium graphene battery.

Honda, NASA, Caltech liquid electrolyte BTFE fluoride battery.

University of Michigan ceramic, solid-state electrolyte for lithium metal batteries.

“Ceramic-polymer composite electrolytes comprising ceramic nanofillers & polymer matrix are better for batteries.”

Lithium-ion batteries safer from fire with liquid electrolyte 200 nanometer wide silica particles that become solid on impact.

EcoFlow \$4 million invested in batteries.

Xiaomi sold 100 million USB batteries.

India Log 9 Materials graphene metal-air battery.

Japan NGK Spark Plug solid-state battery, ceramic electrolyte.

Lithium-iron-oxide battery Northwestern University.

Magnesium-ion battery Texas A&M University.

NantEnergy Zinc-Air battery less than \$100/kWh.

China JD.com online shopping sells solar, including modules, inverters & installation.

Perovskite solar crystals, lower cost & easier development.

MIT strained silicon solar cell, tuned bandgap 1,000 times thinner. “Solar panel bacteria works even if cloudy” journal Small. “Potassium iodide to perovskite solar extends efficiency.”

XNRGI lithium-metal battery.

Korea Jenax J.Flex folding battery.

### **Fashion:**

\$40 ActionHeat socks.

\$66 Xiaomi Uleemark DuPont jacket.

\$95 Reebok plant-based shoes, corn bio-based TPU (DuPont Susterra Propanediol) cotton, beans.

\$150 Xiaomi Mijia smart running shoes with automatic laces.

\$180 Polar Seal battery-heated shirt.

\$180 Aftershokz OptiShokz bone conduction music sunglasses.

\$200 Kistler Aerogel jacket.

\$280 Misfit Vapor X 1.2” OLED Google watch, Qualcom #28 nano Snapdragon Wear 3100, 1.5 ounces, should be \$100.

\$300 heated jacket with voice commands from Ministry of Supply “3 heating elements: each pocket & the back. 10,000 mAh battery. 10 watts heat, up to 135 degrees F. Heating elements turn off automatically if exceed temperature.”

\$500 Epson Moverio BT-30C OLED smart glasses without chip.

\$1,700 Kjus Hydro\_Bot jacket

electro-osmosis reduces water.

\$3,500 Trimble XR10 hardhat with Microsoft HoloLens 2 glasses, carbon fiber case, #10 nano Qualcomm Snapdragon 850.

45 million Google, Samsung (Tizen Linux apps) & Apple watches sold 2018.

North Face Futurelight fabric non-PFC DWR

(durable water repellent).

Mylo mushroom leather clothing.

Kenya business e-commerce MarketPlaceAfrica.com global store for African art, clothing, bags, jewelry, shoes, cosmetics, crafts, carvings. “Starting in Nigeria, then Kenya, Rwanda & the rest of Africa.”

Australia Flinders University Kevlar shark suit.  
Israel Weizmann Institute glowing cotton & magnetic clothing.  
Electronics built on polymers, cardboard, cork, cloth, toast, coconut shells & potato.  
Kanye West hydroponic algae shoe.  
Netflix "Shoe Dog" biography of Nike Phil Knight.  
Nike Fit shoe size sensor.  
Dyson considering wearable air purifier headphones.  
Chinese Huawei music eyeglasses Smart Eyewear, IP67 water resistant, July.  
Google bought intellectual property of Fossil watch \$40 million.  
Carnegie Mellon University LumiWatch that can turn your arm into a touchscreen with laser projector.  
Xiaomi watch maker Huami I.P.O.  
Rumor: "Apple Watch removing a moving part (physical button) to be more reliable, easier to build, increase space for battery."  
Timex watches licensed Blackberry apps.  
Rumor: Intel laser projector glasses.  
Magic Leap virtual glasses, Saudi Arabia invested \$461 million.  
Stanford Synchrotron Radiation Lightsource (SSRL) combines machine learning — artificial intelligence computer algorithms glean knowledge from enormous amounts of data — with experiments that quickly make & screen hundreds of sample materials at a time. Discovered 3 new blends of ingredients that form metallic glass. "Corning Valor Glass to build a high-volume manufacturing facility that will create over 300 new jobs in North Carolina."  
MIT G3DP2 3D prints glass.  
Amazon working on voice command glasses.  
Feher Research thermoelectric Air Conditioned Baseball Cap.

**Food:**

\$0.07/pound Indian vegetables.  
\$0.18/pound South American bananas German Aldi.  
\$1.70 per kilogram China exports frozen fish to Africa.  
\$2 Impossible veggie burger at White Castle.  
\$2.50 Del Taco Beyond Meat.  
\$4.50 Burger King vegetarian Impossible Whopper.  
\$24/month for 10 pounds fruits & vegetables Misfits Market \$16.5 million invested.  
\$60 Xiaomi Mijia multifunctional electric cooking pot.  
\$104 Xiaomi Mijia cooking machine.  
\$400 GoSun Fusion electric solar stove 550 degrees F.  
\$800 Furrion Rova electric cooler, 1 week 400 watt lithium battery.  
Free OneSoil farm satellite sensor app.  
Instacart \$3 minimum fee for delivery drivers.  
South Mexico government planting fruit, timber trees, cacao, coffee  
1.5 million acres. Australia to plant 1 billion trees by 2050, 1.2 trillion trees could be added worldwide.  
Kenya Seedballs planting trees.

England 50 million new trees over 25 years.

China 60,000 soldiers plant trees in size of Ireland.

Apple investing in Colombia to restore mangroves & sequester 17,000 metric tons carbon dioxide in 2 years.

Moringa trees, bambara groundnuts, Malaysia sour kedondong berry easy to farm in tropics.

India Barefoot College teaches solar LED lights, irrigation, grain mills.

Microsoft hired by Albertsons grocery to track inventory.

Motif Ingredients vegetarian protein \$90 million invested.

Spain Neoalgae aquaculture of algae Omega-3.

Presto restaurant ordering tablets \$30 million invested.

DoorDash & mRelief food stamps in California. "Mexico subsidizes corn farmers \$300/ton.

India Grofers grocery delivery \$60 million invested.

Irish Flipdish enables restaurants to directly accept online orders, \$5 million invested.

Rwanda OffGridBox solar water filters sell electricity \$0.18 per day, 12 kWatt-hours per day total.

\$15,000 to build, \$10,000 to deliver & install, \$1.6 million invested.

Fresh EBT app for managing food stamps \$12.8 million invested.

India Swiggy food delivery to raise \$1 billion. Most ordered: chicken biryani, masala dosa, paneer butter masala, mutton biryani, chicken fried rice, tandoori chicken, dal makhani.

Ohio State University conical bumps for desert fog water harvesting.

Fridge 0.2 consists of a chest freezer, thermal mass, inverter, computer control & solar battery.

Spain Novameat 3D printed vegetarian steak of rice, peas & seaweed.

Whole Foods 2-hour delivery Prime Now all suburban stores

Intel TrailGuard camera spots poachers using Movidius Myriad 2 chip, endorsed by Leonardo DiCaprio Foundation.

Impossible Burger version 2.0 gluten-free, 0 cholesterol, at restaurants through food distributors.

Postmates food delivery \$100 million invested.

Walmart partnered with Point Pickup, Skipcart, AxleHire & Roadie grocery delivery.

Farming Simulator game contest \$280,000 prize.

Sustainable Ocean Alliance \$1.5 million donated Salesforce Benioff.

Canada Maple Leaf Greenleaf Foods Lightlife veggie burger. "Watering plants in space is hard because water does not mix with soil particles."

New Yorkers average \$125,000 restaurant delivery during lifetime.

PlantVillage app diagnoses diseased plants infrared satellite data.

Brazil Movile \$400 million invested iFood delivery

50,000 restaurants.

Salad store Sweetgreen \$200 million invested.

Ricul app helps 2 billion farmers get credit, seeds, fertilizer, predict weather, sell crops, maximize yields with personalized soil tests.

Google Express delivers Whole Foods \$15 minimum.

Walmart \$500 million investment Chinese online grocery service Dada-JD Daojia.

NovoNutrients converts carbon dioxide into protein-rich fish food. Natural fermentation process, feeds microbes into

chemoautotrophs & vitamins.

South Africa farms 245 million 10 kg bags of potatoes \$2 each. Poland grows 1/3 of Europe's apples. Pests Psylloidea, apple blossom weevil, codling moth, Cottbus aphid, Swallowtail butterfly, fruit beetle, thistle, purple dead-nettle, field pansy, small-nettle, annual meadow grass, common dandelion & fringed willowherb.

Swedish Karma \$12 million invested to let restaurants & grocery stores offer unsold food at a discount.

Full Harvest raised \$8.5 million to bring excess fruits & vegetables to commercial buyers.

Shelf Engine app \$800,000 invested in restaurant order prediction, analyzes historical sales data to recommend how many ingredients retailers should buy to minimize waste.

Wheat genome mapped.

DoorDash delivery \$250 million invested.

Kenya Java House sells 15 tons/month Arabica coffee to China.

Kenya Twiga Foods \$30 million invested, may expand to French West Africa.

WeFarm marketplace \$13 million invested.

Geltor animal-free collagen Collume.

Eclipse Foods, Humphry Slocombe, Oddfellows vegan corn cassava ice cream.

Soylent nutrition drink Walmart.

DoorDash grocery delivery with Walmart.

Walmart grocery delivery with Postmates.

India Jawaharlal Nehru University, International Centre for Genetic Engineering Biotechnology, U of Illinois transgenic rice survives high salinity, high temperature & drought.

Walmart town centers with restaurants, day care, health clinics, bowling alleys, food trucks, bike rentals, driving ranges, fuel.

All 7.5 billion people use total 400 billion gallons of water.

Instacart delivery \$600 million invested.

Farm marketplaces Yagro, Hectare Agritech, Farm-r let farmers transact machinery & goods, WeFarm knowledge sharing, food procurement marketplaces CollectivFood, Pesky Fish, COGZ, direct-to-consumer services Farmdrop & Oddbox.

NY WeWork Food Labs access to commercial kitchens & farmland.

Postmates delivery minimum order \$15.

Deliverr \$7 million invested, 10 warehouses.

Pivot Bio nitrogen-producing microbial treatment for corn farms.

Kroger grocery items ordered online & picked up at Walgreens.

Argentina \$600 million satellite microwave images soil moisture.

\$1,230 Dukers LG-430 14.7 cu. ft. Commercial Single Swing Door Glass Merchandiser Refrigerator.

Amazon Prime subscribers 10% discount at Whole Foods.

Bayer \$100 million for Nitrogen-fixing microbe fertilizer.

UCLA Electrocaloric Refrigerator, no moving parts "Electric field to electrostatically shuttle thin film polymer between cold & hot ends."

Israel SuperMeat, Future Meat Technologies, Meat the Future selling \$300 million cloned meat to China.

Israel DouxMatok 30% less sugar substitute.

Eggxyt "makes it possible to count your chickens before they hatch" determines male or female egg

based on DNA.

Melania Trump farms “lettuce, kale, peas, radishes, & Swiss chard.” “Synthetic biologists to engineer nitrogen fixation into crops.” “*Nannochloropsis* salt algae flourishes in brackish water.”

Pizza Meal Ready-to-Eat for military, 3 year shelf life.

Food stamps for grocery delivery at Walmart, AmazonFresh Prime Pantry without membership fee, ShopRite, Dash’s Market, FreshDirect, Hy-Vee, Safeway, Wright’s Markets.

Indonesia, Thailand, Malaysia HappyFresh grocery delivery \$20 million invested.

BentoBox 4,000 restaurant websites, \$16 million invested.

Boxed bulk groceries through online store \$111 million invested.

India armyworm moth eats corn. “Why does a restaurant like Chick-fil-A want Kubernetes at the Edge? Low-latency, internet-independent applications that can reliably run business servers.”

Wild Earth clones mice meat for cat food, invested by Peter Thiel.

Chile, Argentina, Brazil Not Company vegetarian mayonnaise, milk replacement, NotYogurt, Not Ice Cream, sausages &

ground meat replacements 2020.

\$0.50 Xiaomi Pingyi Tea Drink.

Starbucks coffee delivery AliBaba in China, competes with Luckin.

41% of U.S. land (except Alaska) is for cows. Fruit & vegetable farms add up to size of Colorado.

Venezuela farms 25% of national consumption, previously 75%.

Kroger free grocery delivery \$35 minimum order.

YaDoggie Fresh & kitchen appliance maker Instant Pot, turkey & salmon dog food.

Swiss PeakBoil stove for boiling water.

Sokowatch app \$2 million invested.

Connects retail stores to suppliers—such as Unilever, Proctor & Gamble—by digitizing orders, delivery, & payments. To expand in East Africa markets such as Tanzania.

Conservationists trying to restore grasslands coat seeds with capsaicin, to prevent mice.

Idaho Simplot licensed CRISPR potato modification, takes 5 years. Alibaba food delivery merged Ele.me & Koubei, looking for \$3 billion.

\$9.5 million invested in Ordermark restaurant order management.

Dutch floating dairy greenhouse on top of river.

Walmart Jet.com 3 hour grocery delivery. Voice command

“Siri, add oranges to my grocery list.”

Walmart acquired Mexico & Chile grocery delivery service Cornershop \$225 million.

Indigo microbes protect against disease & pests \$250 mil invested.

Amazon invested \$575 million India Aditya Birla Group groceries.

Groundcherry fruit was CRISPR to be farmed in New York.

China boosts domestic soybean farms & no tarrifs on Indian soy. China to import more food from central & eastern Europe.

Modern Food Preservation, “For berries, nuts: Scotland U of Strathclyde high-intensity blue light. Radio waves for eggs: USDA electrodes pulse radio through shells, space between white & yolk where salmonella dwells. Plasma cloud for fruits & vegetables, seeds, salads: cold plasma, nitrous oxides, hydrogen peroxide.

For frittata, mac & cheese, salmon: microwave-assisted thermal sterilization, packaged food cooks

inside pressurized tube.”

DoorDash delivery \$535 million invested by Japan SoftBank. “University of Edinburgh gene-edited pigs resistant to porcine reproductive & respiratory syndrome (PRRS).”

Vanishing FruitWash labels. “Apeel Sciences Edipeel edible coating doubles avocado shelf life. Also for asparagus, peaches, lemons, pears, & nectarines.”

\$12 Little Caesars vegetarian sausage Impossible pizza.

\$290 Xiaomi Mijia smart stove.

Tyson Raised & Rooted meatless chicken nuggets.

\$100/year Walmart Grocery Delivery Unlimited.

India AgroStar farm app \$27 million invested.

Clean label foods have no heavy metals, pesticides, BPA, BPS, acrylamide, melamine.

Ghana Bitland app blockchain public land registry ownership.

Botswana farmers track inventory, livestock, employee payments on blockchain Plaas.

Slice, Inc. helps pizzerias get online.

Saudi Arabia solar water desalination.

Amazon Prime delivery raised to \$120/year. “Domino’s pizza dough made from flour, water, salt, sugar, yeast, oil. Connecticut factory 500-lb dough every 5 minutes. Water flows into metal mixing bowl followed by yeast & 6-liter salt & sugar. Flour piped through ceiling from 70,000-lb silos.”

Toast \$100 million invested restaurant iPad. Competes with TouchBistro, Revel, Upserve.

Instacart food delivery another \$200 million invested.

NYC grown lettuce Queens Crisp, Blooming Brooklyn Iceberg.

Canola oil “crop disease clubroot challenges Monsanto, along with rival seed developers DowDuPont & Bayer.”

General Mills bought Blue Buffalo dog food \$8 billion.

Yeast non-milk proteins replace whey & casein.

Walmart Sam’s Club with Instacart same-day grocery delivery.

Amazon delivers groceries in England & France.

\$1,000 Awn Nanotech pulls fresh water from the sky. “Realizing Increased Photosynthetic Efficiency (RIPE) project have engineered crop plants to use 25% less water.”

India \$50 billion/year restaurant industry. “Kroger in talks with Alibaba over potential partnership.”

Walmart & Japan Rakuten online grocery.

Dutch Texel “salt-tolerant potato, carrot, onion, cabbage & barley.”

Keurig coffee will buy Dr Pepper Snapple for \$21 billion.

Tyson Foods invested in Memphis Meats (lab cloned).

U of Nebraska LIDAR scan structural properties of plants.

Amazon Prime Now grocery delivery Manhattan, Brooklyn, L.I. 2-hour delivery free with minimum order \$35.

Trump \$12 billion aid for farmers hurt by China tariffs.

Seattle Food Tech vegetarian chicken nuggets.

U.S. wheat exports to Mexico \$285 million first 5 months of 2018.

U.S. wheat exports to all countries \$2.2 billion.

Couette cell plant-based steaks.

“Qualcomm StoveTrace sells \$80 clean burning stoves in India.”  
KFC Ireland test of vegetarian chicken.  
\$150,000 donated by Goldman Sachs to \$5,000 water pumps in Pakistan “Bondh-E-Shams (drops of sunshine) solar water pumps in rural aquifers. 600 million Indians high stress over water.”  
\$230 Xiaomi Viomi kitchen waste processor.  
Global online food ordering market \$35 billion.  
Chinese tea industry employs 80 million people.  
Amazon France with retail Monoprix delivers groceries.  
Nigeria FarmCrowdy & ThriveAgric “fund \$200 to \$750 per harvest cycle (6 months)”  
FDA approved Cordoba, Spain Institute for Sustainable Agriculture “CRISPR to reduce gluten proteins in wheat.”  
Pizza Hut vegan cheese in England.  
Shake Shack CEO investing \$220 million in food businesses.  
BASF bought Bayer Seeds & Herbicide \$7 billion.  
Eclipse vegan cream cheese.  
McDonald’s \$300 million for Dynamic Yield A.I. app.  
Aquaculture feeding fish corn is more expensive than rice bran.  
Nestle Incredible veggie burger in Europe, Awesome Garden Gourmet in USA.  
New Zealand New Culture vegan mozzarella cloned casein protein 2021.  
Kenya Farm-ula app \$100,000 invested.  
CottageCraftWorks.com windmill compressed air powered appliances Bosh Universal Mixer Blender, Cuisinart Ice Cream Maker, Sunbeam mixer, VitaMix, sewing machine, wringer washer motors, ceiling fans.  
Electrolux oven voice command hands-free cooking.  
China JD.com selling Walmart foods.  
\$550 GoSun Chill solar fridge.  
“Cosmic Crisp apples can be stored 1 year without spoilage.”  
Taiwan FruitPay weekly subscription.  
Scotts Miracle-Gro acquired Sunlight Supply \$450 million.  
Indonesia TaniGroup farms sell direct to 400 retailers \$10 million invested.  
Cathay Innovation & AfricInvest to invest \$168 million in Africa farms & tech.  
Uganda Farmers Companion app for pesticides.  
TeranGroup app simulates rising dough, cookies.  
Ohi 3 month warehouse rentals, Postmates & Doordash same day delivery, \$2.75 million invested.  
DiGiorno Rising Crust Meatless Supreme, Stouffer’s Meatless Lasagna Sweet Earth Awesome Grounds.  
FCC \$1 billion 5G antennas precision agriculture.  
Dutch Meatable cloned pork \$10 million invested.  
Korea LG home lettuce cultivator.  
Israel Watergen \$5,000 Solar Genny water from air humidity.  
Accelerating Photosynthesis RubyPlants.com

**Medical Tech:**

2020 paper diagnostic of virus, bacteria.

2023 designer antibiotics custom macrolides.

2030 antiviral pills “based on isg15.”

\$1 PBO piperonyl butoxide mosquito bed net.

\$5 China eyeglasses (\$4 frame, \$1 lens).

\$30 Xiaomi Mijia helmet protective gear set.

\$125 bleed control kits of tourniquet, trauma bandage, adhesive chest seal, foil blanket given to London bars.

\$130 Clove waterproof sneaker for 3.75 million nurses.

\$170 Bzigo mosquito tracker.

\$2,650 Eargo Neo HiFi hearing aid \$52 million invested.

Johns Hopkins stethoscope, active acoustic noise cancellation, artificial intelligence (AI) pneumonia diagnosis.

Celularity \$100 million invested stem cells.

Amphibio 3D-printed gill for humans, superhydrophobic (water-repellent) porous garment prototype extracts oxygen from surrounding water & dissipates carbon dioxide.

\$150 Raspberry Pi 3A+ DNA test. <https://makezine.com/projects/document-your-dna-with-a-raspberry-pi-gel-imager/>

Frozen Montana cat saved by warm water, hair dryer, heated towels.

Mosquitos reduced by NPY poison.

\$600 North Focals smart glasses, \$200 prescription lenses,

\$100 blue light blocking.

Israel Sight Diagnostics A.I. blood testing \$27 million invested.

Acceligen genetically modified cattle for the tropics.

UC San Francisco CRISPR modified stem cells don't get rejected by immune system.

University of Texas & Synthorx synthetic DNA 8-letter hachimoji (4 natural nucleotides, 4 artificial).

RNA binds to liver tumors, breast cancer cells, viruses in petri dish or can be biological memory.

\$137 vial of Eli Lilly Insulin Lispro for type 1 diabetes.

Esketamine Spravato FDA approved antidepressant nose spray wholesales \$590 to \$885 per treatment session, first month 2 sessions a week \$4,720 to \$6,785. Ketamine blocks glutamate receptor in a few hours.

Flinders University CRISPR removed gene RCAN1 in mice to increase thermogenesis which expends calories as heat,

stopping weight gain.

Atomic force microscopy detects bladder cancer in urine.

Zymergen manufactures molecules that are genetically modified, \$400 million invested.

LemonBox imports vitamins from USA to China, \$2 million invested.

UC San Francisco CRISPR can prevent severe obesity in mice.

FDA approved clinical trial for in vivo CRISPR to treat Leber's congenital amaurosis type 10 inherited blindness.

New York Touro College of Dental Medicine digital dentistry, 160 NVidia Linux free app charity thin client slow desktops.

Foxconn H. Spectrum & Merck Innovation Lab bio-chip sensors, interfaces, liquid biopsy, precision medicine.

Mosquito repellent Sensorygen \$50,000 invested.

University of Washington genetically modified devil's ivy removes chloroform & benzene from the air.

New Protein Fund vegetarian & cloned meat \$100 million invested.

Osaka University Japan AI app identifies types of cancer cells from microscope images.

Lifevac anti-choking device inspired by sink plunger.

University of Cambridge cloned placentas.

Congo sleeping sickness caused by river tsetse flies. Card agglutination test for trypanosomiasis (Catt), treated with Fexinidazole.

Israel Voiceitt signal processing, speech recognition for garbled speech from stroke.

Taiwan BenQ Dialysis hemodialyzers, Lily Medical ultrasound.

\$70 Nurx at-home HPV testing kit.

China 5,000 pharmaceutical & 160,000 chemical companies.

Human protein RBBP6 fights Ebola virus.

IBM & Medtronic Sugar.IQ diabetes app.

Locus Biosciences CRISPR-cas3 to target antibiotic resistant bacteria.

Pokemon Niantic \$190 million invested.

Google Verily Life Sciences raised \$1 billion.

University of Illinois Urbana photosynthesis enzyme RuBisCO genetically modified to grow 40% larger.

Bristol-Myers bought Celgene for \$74 billion.

Sintronic UVC LED cleaner water bottles summer 2019.

DSG Labs plant tissue culture cloning.

\$818 million deal between Locus Biosciences & Johnson & Johnson CRISPR treatment of respiratory organ infections.

\$500 D Free bladder ultrasound sensor attaches to stomach, app.

\$500 Omron HeartGuide blood pressure FDA-cleared watch.

\$130 Withings ECG sensor watch.

\$250 Withings BPM Core senses blood pressure, EKG & valvular health (digital stethoscope) this summer.

\$500 Willow 2.0 breast pump.

USA 100 million square miles of forests need CRISPR for chestnut blight, root rot, etc.

\$300 Owlet Band fabric passive ECG sensor for pregnant women records baby's heart rate, kicks, contractions 2020.

UC San Diego bio-printed section of spinal cord neural stem cells.

University Basel transformed EMT breast cancer to fat in mouse.

Awesome Games Done Quick \$2.4 million to Prevent Cancer.

U of British Columbia cloned human blood vessels for diabetes. Ciitizen \$17 million invested for cancer health records.

Scripps Research synthetic DNA has 6 chemical letters A (Adenine), C (Cytosine), T (Thymine), G (Guanine), X & Y.

Synthorx Interleukin-2 less toxic (binds only to beta & gamma units) more effective cancer medicine that stimulates lymphocytes.

Mosquito pesticide bacteria Xenorhabdus.

Alternatives to CRISPR DNA modification Lambda-Red Recombinase, Phage Integrases, TAL Deaminases, Chemical Targeting.

Microsoft gifted programming plastic Code Jumper to American House for the Blind.

Congo received 120,000 doses of Ebola vaccine from Merck.

UCLA mature T cells from pluripotent stem cells.

OneHealth dog cancer gene sequencing \$5 million invested.

Mantis shrimp have 14 photoreceptors, better than human eyes.

Camera recognizes chefs with poor sanitation.

Middle East & Africa medical device market \$11 billion.

BenQ H1300 8-inch portable diagnostic ultrasound.

Israel Accelerated Evolution Biotechnology claim MuTaTo (multi-target toxin) cures cancer.

AliveCor app identifies heart attacks.

Centre for Conflict Wound Research at Birmingham Queen Elizabeth Hospital investigates molecular process that leads to scars.

\$60 L'Oreal My Skin Track/UV sensor, humidity, pollen & pollution.

Synthetic DNA-encoded monoclonal antibodies protect against Ebola in preclinical studies.

CMU wearable sensor heart & blood sugar monitor.

\$1,000/year Ezra MRI prostate cancer screening subscription service in NYC, patients get 1 MRI, access to medical staff.

DocFax lets doctors send faxes without fax machine.

Tel Aviv University Center for Nanoscience personalized tissue implant, engineered from patient's own cells.

Oxford virus attacks carcinomas.

Scarlet Tech heat stress detector protects workers from heat exhaustion working at mines, construction sites.

\$500 CPAP air machines for sleep apnea, \$7 disposable filters, \$95 mask.

France EPFL material heals damaged cartilages with hydrogel.

Quip \$40 million invested electric toothbrushes, toothpaste, floss, whiteners, mouthwash, chewing gum.

USC polio vaccine that doesn't require refrigeration.

Africa leading causes of death AIDS, tuberculosis, malaria, maternal disorders, road injuries.

New York Stephen Siller Tunnel to Towers Foundation \$60 million on smart houses for disabled veterans.

Samsung investing \$22 billion until 2021 in Artificial Intelligence, 5G antenna, car electronics & biopharmaceuticals.

\$190 Halo shirt to reduce whiplash in sports.

BXQ-350 by Bexion Pharmaceuticals cancer medication from human protein: it supposedly does not affect healthy cells.

\$1,075 ioLight High Resolution Portable Microscope with app.

Lower quality microscopes less than \$100.

35,000 plant species investigated for medicine. Anti-cancer drugs like paclitaxel (Pacific yew) & camptothecin (Camptotheca trees).

Expensive Microsoft Surface Hub 2, 50-inch 4K HDTV touch display that acts like chalkboard. For hospitals to review ultrasounds, CT scans, tests. Information displayed on HoloLens goggles.

Google DeepMind & Moorfields Eye Hospital can diagnose 50 different eye diseases from 3D scan optical coherence tomography.

Google invested \$375 million in insurance company Oscar Health.

Glioblastoma brain tumors cause drop in number of circulating immune system T-cells. Duke Cancer Institute found abundant T-cells in bone marrow.

India InStem poly-Oxime gel deactivates several pesticides.

Elephant, manatee & hyrax 7 extra copies of LIF anti-cancer gene.

Google partnership with hearing aids manufacturer GN Hearing.

One Medical virtual visits \$200 million invested.

TraceLink for pharma supply chain \$93 million invested.

Hepatx liver regeneration, hepatocyte production.

\$100 Logitech MX Vertical mouse for wrist injuries.

Blood sequenced to spot non-human DNA from infections. Cancer patients will be able to track disease by DNA & RNA of single cells from tumor tissues sequenced daily.

Carle Illinois College of Medicine applies engineering principles to medicine, with analytics & problem-based learning.

\$15 rechargeable LED dog collar.

HP D300e Digital Dispenser BioPrinter prints antibiotics.

Yemen cholera predicted by rainfall forecast app because water overwhelms sewer system.

Tempus \$110 mil invested, cancer treatment based on tumor DNA.

University of Texas Southwestern Medical Center used CRISPR to successfully modify the DNA of muscular dystrophy dogs.

UCLA synthetic T immune cells.

USA military shark repellent copper sulfate & maleic acid. "Pregnant women are left to bleed to death because doctors don't bother monitoring blood loss. Women suffer strokes & seizures because negligent nurses fail to treat high blood pressure."

\$5 Scanwell Health urinary tract infection test.

Brazil University of Campinas & Sorocaba bandage from pineapple bromelain, natural anti-inflammatory enzyme & nano-cellulose.

Organic tampon subscription Athena Club \$3.75 million invested.

Mammoth Biosciences \$23 million invested by Apple CEO for CRISPR disease detection.

Bug spray: 1 quart warm water, 1 tsp Neem, 1/2 tsp Castile soap.

\$3,300 Formlabs Form 3b 3D printer for dentists.

University of Texas Medical Branch at Galveston Lung Cloning Lab.

Ebola in Congo is Zaire strain which has been successfully vaccinated against in the past.

Metamaterial lens endoscope for cancer.

Inhibiting KAT6A & KAT6B could cure cancer.

LemonBox allows Chinese consumers to buy its own-branded daily vitamin packs Made in U.S.A. Goal to expand into beauty, mother & baby, supplements.

Spinal cord neural stem cells for spine injuries.

Blindsight armband & app, designed to help the visually impaired by integrating machine learning with haptic feedback. Users can summon the smart assistant to help them by reading signs or identifying food in grocery store.

BARD1, BRCA1, BRCA2, PALB2, RAD51D — associated with high risk for triple-negative breast cancer.

Massachusetts Eye & Ear \$50 million invested for genetic hearing loss cure.

Bose hearing aid.

\$1,050 closed caption subtitle glasses London National Theater.

Brazil Memed electronic prescriptions used by 55,000 doctors, checks for allergies & drug interactions.

Nutrigene personalized vitamins using genetic test \$85 per month.

Bangladesh pneumonia treatment made from shampoo bottle.

Biotech & chemistry companies using fast quantum chips by 2021 to study molecules & develop new drugs.

AliveCor detects potassium overdose with electrocardiograms.

\$100 University of British Columbia ultrasound transducer. Tiny vibrating drums made of polymer resin, polyCMUT (polymer capacitive micro-machined ultrasound transducers).

\$400 Apple Watch 4 has ECG heart & fall sensor. Should be \$100.

\$7,000 to freeze stem cells from liposuctioned fat Forever Labs.

\$480 Elvie Pump cordless, rechargeable breast milk pump.

NYU trained Google deep learning A.I. algorithm to distinguish between 2 common types of lung cancers with 97% accuracy.

Human deciduous pulp stem cells (hDPSC) from baby teeth can regrow tissue of injured teeth.

Stanford skeletal stem cells for regenerating bones.

University of Texas LED lights identify species of mosquitoes.

Maven telemedicine for women \$27 million invested.

Swedish NoseFrida removes snot from nose.

Cincinnati Children's Hospital Medical Center human esophageal tissue grown from pluripotent stem cells.

Genomatica biotech chemical plastic bags, \$90 million invested.

Oxford University algorithms predict heart attacks from fat surrounding coronary arteries on CT scan.

J & J RNA gene-silencing Hepatitis B drug \$3.7 billion invested.

Park & Diamond folding bicycle helmet.

Tia women's health app & New York clinic.

MIT D.O.L.P.H.I.N. optical near-infrared senses tumor less than 1cm.

Uganda & Congo pneumonia plague Yersinia pestis bacteria fleas.

AI Impact Challenge \$25 million prize to fix healthcare, conservation, natural disasters, etc.

TUE Nightwatch epilepsy heart sensor arm bracelet.

Alertgy non-invasive blood sugar sensor low-power RF field on wrist, dielectric spectroscopy. Greedy dialysis companies wasted \$100 million campaigning against California referendum to limit profits to 15% more than cost of staff, medical supplies, facilities & information systems.

Durham University dogs trained to sniff out malaria infections.

Brazil PUC-Rio Gala cane tells blind people status of traffic signals.

England Darwin Tree of Life will DNA sequence all their 66,000 species of animals, plants, fungi, protozoa.

Scripps Institute antibodies made by llamas for flu vaccine.

Free-Form Progressive Lens personalized, customized eyeglasses. CAD app draws wider or narrower distance or reading vision areas, shape, reduces glare, enhances contrast & optional optician app.

Tufts frog limb regeneration with progesterone.

Netflix "Altered Carbon" scifi cartoon about cloning.

\$100 Xiaomi foldable stroller, 5-point seat belt, 1 button dual brake system.

\$0.03 Alibaba silicone sheet for blind phone users, 3 mini buttons (back & confirm).

Arizona State University repaired animal wounds with silk & gold nanomaterial activated by laser.

\$12 Nurse-1-1 online service to ask nurses questions.

IDseq free site sequences bacteria/virus DNA diagnose infections.

Duke University Hospital Sepsis Watch app.

2/3 of ovarian cancer patients given Olaparib survived 3+ years.

China cloned 200 different types of dogs.

Dutch experiment destroy mucous membrane in small intestine, cause new one, stabilised blood sugar levels of type 2 diabetes.

European XFEL laser studies biomolecule particles 1 micrometer.

German Centre for Ophthalmology Institute, "bright text on dark background could inhibit myopia. Simply invert text contrast in Accessibility settings app."

Google donated \$1 million First Responder Support Network PTSD.

Tuberculosis vaccine M72/AS01E GlaxoSmithKline 54% success.

Fat is converted to carbon dioxide & water during weight loss.

Brazil Alangium longiflorum 8-hydroxytubulosine (1) inhibitory effects at submicromolar levels against several human tumor cells. "Venetoclax could replace chemotherapy for blood cancers."

"Functional repair in culture of CFTR by CRISPR (Cas9) in intestinal stem cell organoids of Cystic Fibrosis patients." "Novartis gene therapy with \$8.7 billion AveXis deal."

Dolphin Alarm for kids falling in pool. "Helix Takes Clinical Genetic Testing Straight to Consumers."

FDA approved IDx-DR app "can detect form of diabetic eye disease by looking at photos of retina."

Dr. Panjabi 50,000 health workers can serve 34 million rural people.

Environmental Defense Fund (methane-tracking satellite) & Sightsavers (to eliminate trachoma eye disease in a generation.)

\$160 Xiaomi QBORN child safety seat. "PathSpot has built a device that can scan restaurant employees' hands & detect pathogens that cause food-borne illness." "Rove beetles produce a vesicating Pederin toxin with potential antitumor properties." "2D nanosilicates (or nanoclays) grow bone & cartilage tissue." "Chinese universities HIV test kit vending machines." "Norovirus inflames the stomach or intestines, causes pain, nausea, vomiting, & diarrhea. Contagious & kills tens of thousands of people each year. Genetech discovered tuft cells, in ilium & colon." "Peptide-

based biogenic dental product may cure cavities.” “Graphene skin patch measures glucose.” “Google Augmented Virtual Reality microscope detects cancer.”

Senegal scammers to be malaria-free 2030.

Japan Hitachi detects breast/colon cancer from urine sample 2020.”

Procter & Gamble (P&G) to acquire Merck KGAA’s consumer health unit for \$4.2 billion.

Ghana, Kenya, Malawi testing Malaria vaccine.

Video consultation service Doctor on Demand invested \$74 million.

Mad Camel prion disease.

Enzyme Telomerase could lead to drugs that slow or block the ageing process & treatments for cancer.

Mammoth Biosciences CRISPR search for disease detection.

Bill Gates donating \$12 million to develop universal flu vaccine.

“University of Hong Kong antibody BiIA-SG for HIV.” “Genome Project-write to create (not just edit) human cells

immune to all known viruses.” “Reducing enzyme BACE1 in mice” cured Alzheimer’s. “Crispr DETECTR can identify different types of the HPV virus. SHERLOCK detects viruses like Zika, dengue, & bacteria.”

Swiss Roche bought Flatiron Health, analyzing real-time oncology data to help cancer patients \$1.9 billion.

UC Davis sheep growing human organs for transplant.

Infections at hospitals reduced by copper-coated uniforms.

Mobile pesticide diagnosis device, GreenLite Screener.

Pancreatic Cancer Nivien Therapeutics.” When Hippo inactive, levels of proteins low & chemotherapy kills tumors more.” “UpWest Labs brings Israeli entrepreneurs to the U.S.”

C.A.T. Google phone Volatile Organic Compound (VOC) sensor.

Synthetic biologists invest “\$53 million for cancer therapy Senti.”

Daffodils help cure cancer? RNA Molecular Biology Laboratory.

Barbara Streisand cloned her dog \$50,000.

Rumor: Google Verily Health Insurance.

Nokia CHASE LifeTech first responder jacket.

Rubius Therapeutics developing red blood cell cancer therapies, invested \$100 million.

HP laptop, TV, & all-in-one desktop resistant to intense cleaning materials for medical workers.

EliteOne 800 Healthcare Edition desktop, 27-inch HP Healthcare Edition Clinical Review Display, EliteBook 840 Healthcare Edition laptop.

Precision Oncology Innovation Center for Molecular Imaging & Translational Medicine at Xiamen University BLN to selectively target specific tumors thanks to protein probes. Ligands can be affibodies, single-chain antibodies or nanobodies, genetically engineered nanovesicles displaying human epidermal growth factor (hEGF) or affibody ligands that target tumors.

Israel Lishtot TestDrop \$50 drinking water sensor.

Cloud DX Vitaliti “Senses ECG, heart rate, oxygen saturation, respiration, core body temperature & blood pressure.” “Light source to degrade black phosphorous (BP) hydrogel nanostructures containing drugs for cancer.”

Intermountain Healthcare, 450 hospitals manufacture generic drugs.

NTU Professor Chen Peng brown fat weight loss patch.  
Case Western Reserve anti-fungal against *Candida auris*.

Audi solar battery.

Belgium ViViDoctor teleconsultations, raised \$500,000.

Celgene bought cancer drugmaker Juno Therapeutics \$9 billion.

French Sanofi bought haemophilia Bioverativ \$11.6 billion.

Triclosan inhibits malaria enzyme.

Italy Berlesconi supports free dog vet insurance & no pet food tax.

Amazon healthcare, with Warren Buffet & JPMorgan Chase.

Bill Gates donated \$100 million for Alzheimer's.

*Bacteroides fragilis* & *E.coli* may cause colon cancer.

Empatica epilepsy sensing wristwatch. "Center for Human Reproduction NY, human eggs have been developed outside the body to full maturity." "Low doses of far ultraviolet C (far-UVC) light can destroy airborne flu viruses."

How to make Sony PlayStation joysticks easier for Muscular Dystrophy. <https://makezine.com/2018/02/10/modify-playstation-controller-muscular-dystrophy/>

Cashew nut shell oil might be antibiotic.

Harvard reprogrammable braille screen.

\$63 Xiaomi HiPee Smart Health Wizard "14 medical grade indicators for protein, glucose, pH, blood levels, white blood cells, liver & kidney dysfunction, diabetes."

\$170 Asus VivoWatch BP blood pressure sensor.

Amazon working with Seattle Fred Hutchinson Cancer Center. "Zebra Medical Vision \$30 million to create AI for radiologists." "Inspired by dogs, cats, cephalopods, fish, swans & chimps, humans could have more heart arteries, eyes with no blindspot, better ears, more efficient legs & lungs, reptile skin which reacts fast to block damaging ultraviolet rays."

Nanospears will attack cancer.

"Breathalyzer Predicts Cancer. ① Put sampler mask on. Embedded sensor ionizes VOC you exhale to register chemicals. ② Computer connected to mask analyzes whether you need further tests. Owlstone Medical of England. \$23.5 million funding. Testing: European hospitals Phase II clinical trials."

Swedish telehealth startup Kry \$66 million invested." "Volunteer firefighters & first responders free FirstNet service."

\$31 Xiaomi PetBit for dogs "calculates fitness like walking time, distance, & calories." "Rats with spinal cord injuries regain paws after gene therapy on damaged nerves, enzyme chondroitinase breaks down scar tissue." "Israel Shaare Zedek Medical Center, Bar-Ilan U nanodrops on pig corneas improved short-sightedness & long-sightedness."

Compound F6 for antibiotic-resistant MRSA.

\$250,000 womb transplant. "Precision antimicrobial for UTI." "Roche \$2.4 billion for Foundation Medicine tumor DNA test."

"CVS prescription \$5 deliveries nationwide in 1 or 2 days." "Sarepta positive results early trial of 3 patients with duchenne muscular dystrophy given gene therapy"

Brazil \$100 million invested Dr Consulta Healthcare for poor. "Keystone mosquito virus, Chesapeake Bay to Florida & Texas."

\$40 Community Microscope.

U of Alberta found 11 genes that spread metastasis cancer.

2 doses of Tuberculosis vaccine reduce Type 1 Diabetes. “Ovary freezing. Doctor would remove 1 ovary, slice piece from top tissue layer, freeze in liquid nitrogen. If she remained cancer-free for 2 years, re-implant the tissue.”

AARP donated \$60 million to for dementia medicine research.

FirstVet \$6 million invested pet advice telehealth service.

India Info Network Animal Productivity Health diet app for cows.

United Therapeutics 3-D printer to manufacture human lungs in detail, including all 23 branches of the airway, gas-exchanging alveoli, network of capillaries with stem cells 2030.

Vomaris Innovations electric bandage destroys germs.

Denmark Rigshospitalet artificial ovary can grow immature eggs into cell, women could become mothers after chemotherapy.

Chinese BioMind app correctly diagnosed 87% of tumors, compared to 66% by doctors.

Tibet Dr. Chen AI image recognition identifies parasite eggs.

AliveCor KardiaBand sensor for Apple Watch, detects dangerous levels of potassium in blood 94% accuracy, without needle.”

Uganda Matibabu diagnoses Malaria in 2 minutes.

\$100 ear thermometer Degree.

Benzophenones & polyphenols protect against viruses on clothing.

Connecticut pond phage OMKO1 fights drug-resistant bacteria. “Tradewind Bioscience attacks physiology of tumors.” “Genentech made antibodies that stuck to bacteria. By lowering BAM function the antibiotic worked.”

Mightier App “If heart rate reaches red zone, game pauses & plays animation to model deep breathing, calming exercise.” “Engineering silk to heal wounds, hold up our bones.”

McMaster University transparent patch you can put on your food to test for harmful pathogens such as salmonella or E.coli.

Microsoft donated \$25 million to AI for Disability Accessibility.

HTLV-1 virus causes Leukemia cancer in “Australia, southwestern Japan; Caribbean; Brazil, Peru, Colombia, French Guyana; Gabon; Iran & Romania.”

Single transplant of CRISPR liver cells could cure hemophilia B. UC “Evolution 2.0 contest until 2026. \$100,000 prize (\$5 million if patentable) to solve mystery of DNA.”

Rejuvenate Bio claims make animals “younger” adding new DNA.

“Nanopesticide insecticide, fungicide or herbicide. Contain “soft” nanoparticles (polymers, solid lipids) or “hard” materials like silica nanoparticles, carbon nanotubes or graphene oxides.”

\$25 First Alert SCO501CN-3ST smoke carbon monoxide alarm.

Apple Store bike helmet. “Lumos controllable lights for added safety & signaling. 38 rear LED’s light up red triangle or white turn signal.” “Self-repairing organ lab-grown stem cells.”

Lizard Prasinohaema have green blood that fights mosquitoes.

Tumor electrical resting potential (ERP) usually lower than healthy cells, takes less electrical stimulation to open their ion channels.

If kept open long enough, graphene ions can destroy cancer.”

.Small scrap of bad white fat tissue sucked out to automated bioreactor, chemical bath for 3 weeks.

Changes into brown fat tissue the body burns to stay warm.”

NVidia app “John Hopkins early detection of pancreatic cancer.”

Chikungunya mosquito virus, bad protein found. “Connon 3D-printed eye corneas utilize stem cells. Gel combination of alginate & collagen.”

“MIT compression wrap bandage tells you how tight it is with color-changing fibers.”

Apple, Google, Microsoft USB Human Interface Device standard for blind or low vision braille displays. “CancerAid self-reporting for patients integrated into Epic Systems health records at Cedars Sinai in Los Angeles & Apple HealthKit.”

FDA approved Mvasi, Bevacizumab-awwb, similar to Avastin (cancer)

Ourotech “Doctors can test cancer drugs by removing sample & growing in gel for a week.”

Olfaguard senses E.coli & Salmonella food poisoning.

Japan Fujitsu language translator for doctors.

“Pendar laser predicts heart attacks.”

Free GYANT app to diagnose Zika virus.

University of Michigan Micro-fluidic chip diagnoses cancer.

Tempus \$70 million invested for cancer by Groupon co-founder.

Broadcom Henry Samueli donated \$200 million alternative medicine.

Eligo Bioscience “biological nanobots made of DNA & proteins to cure bacteria, eligobiotics.”

FreeStyle Libre Flash Glucose Monitoring System.

PathVis app diagnoses Cholera.

Synlogic pill “gets rid of extra toxic ammonia.”

Ohio State genetic modification “Converts skin cells into endothelial cells, the main component of blood vessel regeneration.”

U of Birmingham “Bone growth by nano particles called vesicles.”

Quantum Dot Cadmium Telluride improves antibiotics.

Cardiologs invested \$6 million EKG diagnosis app.

Artificial kidney FDA approval 2020? UC San Francisco “Silicon nanopore filters with live kidney cells grown in bioreactor.”

Japan National Institute Advanced Industrial Science & Tech genetic modified chicken eggs make Interferon Beta 10x cheaper.

Rutgers University corn, genetic modified Methionine amino acid.

Destroy tropical mosquitoes in water, swamps.

Bug spray anti-larva BTI (Bacillus Thuringiensis Israel-ensis). Genetic modified CRISPR mosquitoes Oxitec 75% less in Malaysia.

Bio-Engineered bacteria Johns Hopkins Malaria Research Institute anti-malaria transgenic bacteria University of Maryland chemical fungus with scorpion venom. Mosquito traps & ovi-traps.

Bill Gates & others invested \$60 million Exicure “Drugs built of RNA, that silence mutated genes’ faulty proteins for psoriasis or cancer.” Albert Einstein College of Medicine BAX protein cancer cure.

Ro Rory tele-health app for menopause.

\$8 Tranexamic Acid reduces 3rd world pregnancy bleeding deaths.

Jaguar Land Rover considers ultraviolet LED to destroy bacteria.

Humacyte, Duke, Yale bioengineered blood vessels for kidney dialysis.

Amazon HIPAA compliant “healthcare voice skills for Alexa, like booking an appointment.”

Free Quirk Cognitive Behavioral Therapy app for Apple & Google.  
U of Michigan metastatic cancer wearable microfluidic filter.  
U of Michigan destroys airborne viruses with energetic charged air molecule fragment cold plasma or ionizers.  
Texas InformAI app analyzes sinus CT scans, NVidia V100 GPU desktop.  
Everlywell 35 in-home health diagnostic tests, \$50 million invested.  
Israel A.I.Doc app analyzes medical scans \$27 million invested.  
PathA.I. app analyzes cell samples for bacteria, virus, cancer, \$60 million invested.  
\$300 Israel TytoHome “handheld thermometer, stethoscope, otoscope, tongue depressor” Best Buy.  
Xi'an Jiaotong University samarium PMN-PT ultrasound.  
\$300 Mindseye Biomedical Spectra  
electrical impedance tomography.  
Walmart 100 veterinary clinics for dogs, cats, horses & livestock, free delivery \$35 minimum.  
Generic Truvada HIV prevention pill 2021.  
USA military TRAuma Care In a Rucksack (TRACIR) medical robot suit.  
Mosquito spray Metarhizium Pingshaense Crispr modified fungus, University of Maryland.  
\$22 Xiaomi Yeelight electric mosquito killer. “Firefighters Exposed to Smoke & Chemical Vapors That Can Cause Long-Term Health Damage.” [https://stallman.org/archives/2019-sep-dec.html#11\\_November\\_2019\\_%28Firefighting\\_hazards%29](https://stallman.org/archives/2019-sep-dec.html#11_November_2019_%28Firefighting_hazards%29)  
\$250 DNA test Massachusetts General Hospital & Brigham Women’s Hospital.  
Ebola monoclonal antibody Regeneron 30% death rate.  
Canada Terramera neem pesticide \$45 million invested.  
China Sinogene clones \$53,000 dogs, \$35,000 cats.  
SnapOnAir Duo charity pager, Semtech LoRa modem 1 km.  
University of Arizona norovirus sensor app.  
Japan AI Medical Service app detects gastric cancer \$43 million invested.  
Qisda invested \$33 million in BenQ Biotech hemodialyzers.  
Change:Water iThrone toilet uses no water, dehydrates waste with membrane, microbes feed on urine carbon to power fan.  
Massachusetts Eye & Ear platinum hearing implant.  
Georgia Tech LoCHAid low-cost, affordable hearing aid.  
MIT Harvard CRISPR RNA viruses such as Zika & Ebola.  
\$1,000 Gallant cryopreserve dog stem cells.  
California Modern Animal \$100 yearly for unlimited exams, 24/7 virtual care, in-app prescription & delivery, \$13 million invested.  
Stanford tactile display for the blind.  
Google bought FitBit \$2.1 billion.  
Brazil Portal Telemedicina.  
Scanwell Health at-home test for urinary tract infection.  
FirstVet video veterinarians \$20 million invested.  
Xiaomi electric toothbrush Soocas \$30 million invested.  
NY Cuomo investigating Facebook spying on private medical info.  
Senator Elizabeth Warren wants federal government to manufacture generic drugs.

CMU pulse oximetry heroin overdose monitor watch.  
PowerPoint subtitles for the deaf. Free LibreOffice is better.  
University of Arizona mosquito insecticide EOF-1 gene.  
Nanit Breathing Wear Band & Nanit Swaddle detects breathing.  
\$16 Universal Big Button TV Infrared Remote EasyMote DT-R08W Backlit for elderly on Amazon.  
Best Buy \$800 million for obsolete  
GreatCall JitterBug senior phone.  
Helite airbag vest for bicyclists.  
Uber customers with wheelchairs partnership with  
MV Transportation in 30 states & Canada.  
Apple adds closed captioning to Final Cut Pro app.  
BenQ FDA permit for portable color ultrasound scanner.  
Vitality app reads blood pressure using iPhone camera.  
\$2,000 Butterfly iQ ultrasound for iPhone \$250 million invested.  
Free "Weird City" episode 1 on YouTube, with Star Trek's LeVar Burton & talk therapy vending machine.  
Stanford to replace progressive lens with autofocus glasses.  
Apple employees all got standing desks. "Microsoft Xbox joystick for accessibility. 2 oversized A & B pads,  
d-pad, Xbox button & controls."  
Blood cancer test "isolates cancer cells using size-amplified acoustofluidics. CTC selectively bind to microbeads."  
\$2,000 Candid teeth aligners \$63 million invested.  
Walgreens virtual doctor's visits.  
McAlpine research group at University of Minnesota 3D-printed eyes made of 3 main functions: silver particles that act as conductive connector, semi-conductive material that turns light into electricity, & cathodes that direct electric current.  
\$230 Nima peanut allergy food tester.  
Amazon invested in Aiva voice command app that routes patients to doctors. "LiMiX Talking Hands glove & app translates Italian Sign Language (LIS, Lingua dei Segni Italiana) to voice."  
Gore-Tex artificial eye cornea 2026.  
Ikea, Milbat, Access Israel free ThisAbles 3D-printed disability  
add-ons for furniture. "Ford smart windows can help blind passengers see with Braille." "Amazon Perrigo over the counter health products Basic Care line."  
Washington U Erythromer synthetic blood lasts 2 days. "LOLA organic tampons \$24 million invested."  
Copper clothing repels germs.  
Built By Girls prize winner app White Water diagnoses bacteria with photo of water.  
Amazon skincare brand Belei.  
Kinova Robotics Jaco bot arm for wheelchairs.  
\$700 Dainese Smart Jacket vest airbag for motorcycles.  
AARP Social Connectedness Voice-Activated Technology charity of voice command speakers.  
U of California Berkley blood oxygen sensor, red & near-infrared OLED, organic photo-diodes,

printed on flexible substrate.

China Academy of Sciences fire alarm wallpaper, flame-resistant, nano sensor triggers siren warning lights.

Lenovo to manufacture exercise watches in India.

Portable refrigerator for vaccines “Arktek double-walled vessel with near-vacuum inbetween, held together with reinforced fiberglass.”

MIT Ampli construction set for medical diagnostics.

Emory & Tokyo Institute of Technology 1 million molecular alternatives to DNA.

University of Louisiana EEG predicts seizures.

\$100 Shine Assistant toilet cleaner, electrolyzed water.

\$100 Logitech Adaptive Gaming Kit for the disabled.

Stanford \$2 billion hospital with laundry robots. “Large-Scale Assessment of Smartwatch to Identify Atrial Fibrillation” [www.nejm.org/doi/full/10.1056/NEJMoa1901183](http://www.nejm.org/doi/full/10.1056/NEJMoa1901183)

Lucence Diagnostics cancer DNA test \$20 million invested.

Zeteo CAPS military dog hood acoustic absorption.

\$182 Japan Toshiba gastric, esophageal, lung, liver, biliary tract, pancreatic, bowel, ovarian, prostate, bladder, breast cancers, sarcoma, glioma diagnosis 2 hour blood test.

Leman Micro Devices V-Sensor blood pressure sensor without cuff.

\$1/day anti-HIV pill Cipla Quadrimune doesn’t require refrigeration.

Amazon Transcribe Medical.

RedEye toilet blood sensor.

Segway S-Pod electric wheelchair 2021.

Taiwan Heroic-Faith Medical Science diagnoses by lung sound spasm, pulmonary edema, fibrosis.

### **Robot:**

\$600+ iRobot Terra robot lawnmower.

\$9,000 France Pollen Robotics Reachy.

Ike robot trucks \$52 million invested.

\$340 \$170/year French Sencrop farm sensors (temperature, humidity, rain, wind) \$10 million invested.

Boston Dynamics robots \$37 million invested.

Self-driving Aurora \$530 million investment from Amazon.

Nuro autonomous delivery \$940 million invested by Japan Softbank Vision Fund.

\$70 Arduino Automatic Smart Plant Watering Kit 2.0.

Self-driving truck TuSimple \$95 million invested.

Johnson & Johnson purchased Auris Health lung cancer diagnostic surgical robots \$3.4 billion.

Facebook hiring engineers to build robot with hands & legs.

Good Ship IKEA robot clears trash from water.

Vincross 6-legged robot \$10 million invested by Lenovo.

Self-driving Tesla 2021.

South Korea Robot Science Museum will build itself in 2022.

BMW & Mercedes investing \$1.1 billion autonomous cars, ride-hailing, electric scooters, chargers.

Trexo wearable robots for the handicapped \$720,000 invested.

Qualcomm Robotics RB3 Platform Snapdragon 845 #10 nano. "Robots in agriculture, consumer, delivery, inspection, service, smart manufacturing/Industry 4.0, warehousing & logistics."

FedEx SameDay Bot climbs stairs, made by DEKA Dean Kamen Segway inventor.

Agility Robotics Digit for deliveries 2020.

ViaBot outdoor cleaning robot, obsolete Nvidia Jetson TX2 chip.

Sorting Robotics scans magic cards.

Rumor: Amazon L.A. robot grocery store 35,000 square feet.

\$500 Altan Robotics Giddel toilet cleaner.

Taiwan National Chiao Tung University robot farm vehicle produced by Yong San Yuan Farming Equipment Factory & Acer.

Intel drone deal with Minnesota & Kentucky inspections of bridges. "Chore robots clear table & do the dishes, but that's 10 years off."

Smart AG robot grain cart has \$1,000 NVidia AGX Xavier #12 nano ARM Cortex A76 chip.

RightHand Robotics RightPick2 warehouse robot \$23 million invested.

South Korea Woowa Bros food delivery \$320 million invested to develop autonomous robots.

Robot exoskeleton Roam \$12 million invested.

Audi invests \$16 billion in electric robot cars.

\$25 Raspberry Pi Model A+ robot farm. pH sensor DFRobot Analog pH Meter Pro, water temperature sensor DS18B20, TDS sensor Gravity Analog, analog to digital converter DFR0553, humidity Adafruit AM2302.

Google robot taxi Waymo One \$2.50 per mile.

Raspberry Pi Reef-Pi aquarium monitors pH, chemical, water levels, temperature, light, & electricity. Segway Loomo delivery robot.

Hyundai Elevate concept walking car.

General Motors Cruise Automation, DoorDash test food delivery.

Pepsi snackbot delivery at California colleges.

Genesis Robotics direct-drive motor.

Walmart testing Udelv robot delivery of groceries.

Nvidia lab Seattle working on kitchen robot arm.

Giant Food Stores robot assistants at 172 locations.

Stop & Shop robot cars deliver produce, meal kits, convenience items to Boston.

Amazon Robotic Tech Vest to avoid collisions.

Massage Robotics prototype.

Facebook testing Airbus solar drones in Australia.

Amazon Scout 6-wheeled delivery robot.

Autodesk shipping container contains 2 Panasonic TS-950 construction robots.

Ford robot grocery deliveries with Walmart.

University of Koblenz-Landau, Germany TIAGo robot cleans toilets.

HRP-5P robot lifts heavy objects.

\$140 ILife A4s robot vacuum.

China Geek Plus \$150 million invested warehouse robots.

Japan SoftBank may invest up to \$750 million in Zume robot pizza.

China robot tractors, pesticide applicators, rice transplanters.

India Mechanical Chef, rotating drum filled with spice canisters, 3 induction plates, little robotic protrusions that wield spatulas & volumetric cups. Robot can prepare 30 different vegetarian dishes.

Yanmar 2-Series robot tractors.

Year 2100 South Atlantic windmills generate 300 gigawatts offshore. Satellites analyze wind, 1,000s floating platforms maneuvered by robots slow hurricane wind speed by 100 mph, from category 5 to category 1.

\$50,000 safety electric inspection Gecko Robotics \$7 mil invested.

Nvidia Xavier ARM chip #12 nano released for robots, but not yet consumer products (Shield TV).

Chipotle Aluminaries Project invests in robot farms & food co's.

LG Cloi SuitBot robot supports injured legs.

Worcester Polytechnic Institute robot hunts poisonous lionfish.

Toyota invested \$500 million in Uber robot cars.

India GreyOrange Butler & Sorter robots lift heavy shelves, moves them around warehouses, conveyor belt that sorts, arranges parcels by weight & size.

\$20 Chinese CleanRobot vacuum cleaner.

Flippy the robot fries chicken at Dodger stadium.

Centauro horse robot for rescues by Italian Institute of Technology.

Canada Mecademic Meca500 6-axis industrial robot arm.

\$2,500 NASA JPL Open Source Rover wheeled robot powered by Raspberry Pi.

Seismic wearable robot suits to aid movement for disabled people.

USA Rockwell Automation will build smart robot manufacturing demonstration in Taiwan & cooperate with Industrial College to train 5,000 industrial automation experts over 2 years.

Walmart testing Alert Innovation Alphabot to pick grocery orders.

Boston Dynamics to build 1,000 units of SpotMini robots 2019 for construction & delivery.

Robot truck Kodiak Robotics \$40 million invested.

Volvo Nvidia Drive AGX Xavier ARM robot car 2021.

Italy U of Pisa robot hand, SoftHand 2, that operates with 2 motors.

\$950 iRobot Roomba i7+ robot vacuum empties garbage.

\$48,000 robot medical student simulator Gaumard Scientific.

Singapore GreyOrange \$140 million invested fully-automated robotics for warehouses.

Seismic Powered Clothing provides assistance to hips & lower back to support mobility, posture.

Amazon to open Go robot store in New York.

Japan Renesas bought Integrated Device Technology \$6 billion robot car chips.

\$800 overpriced Dyson 360 Eye robot vacuum.

Aeroponics robot farm that uses \$35 Raspberry Pi. [www.raspberrypi.org/magpi/little-green-tower/](http://www.raspberrypi.org/magpi/little-green-tower/) UiPath \$225 million invested for robotic office process automation. Diligent Robotics brings supplies from storage to patient rooms.

French robot delivery car Renault EZ-Pro 2030.

\$90 BioControle aquaponic hydroponic garden, Raspberry Pi 3.

Lunewave robot car radar sensor \$5 million invested by BMW.

Japan elder care robots help patients ambulate, robot service industry \$4 billion/year 2035.

Israel robot Sweeper harvests peppers & places them in basket.

ARM Cortex-A76AE Automotive Enhanced chip for robot cars.

Level 5 self-driving requires 1 billion lines programming code.

Aeva LIDAR sensor for robot cars.

Japan Advanced Industrial Science Technology Institute HRP-5P construction robot installs drywall.

Honda invested \$2.75 billion in General Motors robot cars.

Angus 1,000-pound robot lifts & moves large hydroponic boxes of leafy greens, butterhead, kale, basil, cilantro & chives. Iron Ox robot arm for harvesting.

Around \$5,000 Google Waymo LIDAR sensor for farm robots.

Congresswoman Ocasio-Cortez, “We should be excited by robots. But we live where if you don’t have a job you are left to die.”

Guardian LF1 Mark 3 lionfish vacuum robot, up to 400 feet, remote control app, 1 hour battery.

Comedy Central “Daily Show” democrat Andrew Yang about robots & welfare. <https://youtu.be/OFvJ8J5pK4A> \$10/month London Starship wheeled robot package delivery.

Pizza Hut robot mobile oven in Toyota Tundra, cooks in 7 minutes.

\$150 Ecovacs N79W robot vacuum.

Sony working on robot kitchen cooking arms.

Rumor: Amazon home robot with Netflix 2019.

Haidilao International Holding hotpot 5,000 restaurants replacing chefs & waiters with Japan Panasonic robots.

China Ecovacs Robotics Glassbot window cleaner.

Underwater robot arm, interchangeable bending, rotating, gripping modules from Wyss Institute, Harvard, Applied Sciences University of Rhode Island & Baruch College.

Swiss ABB \$150 million 75,000 sq-foot YuMi robot factory China. “Masterly robot boat shipping company 2020.”

\$200 Grow Duo robot farm.

RAPID irrigation robot 2020.

Robot chef restaurant Spyce Kitchen 7 different bowls \$7.50 each. IDA Intelligent Dairy Assistant tracks cows through collars.

Robot cars “Luminar Lidar unit, with a 120-degree field of view (enough to see what’s ahead of car, but you’d need a couple to get a 360-degree view.”

\$300,000 3D printed house built in 4 months by Branch Tech robot.

Apple Daisy recycling robot.

Sony & Carnegie Mellon University agreement on food prep, cooking & delivery robots. “Buffalo Automation of New York raised \$900,000 to help commercialize its AutoMate system - essentially a collection of sensors, cameras to help boats operate semi-autonomously.” “Amazon working on voice command robot on wheels.

Boston Dynamics working on robot butler.”

Delivery Robotics Marble \$15 million invested.

Zume robot pizza working on coffee, steamed bread & frozen yogurt trucks.

Korean LG bought ZKW robot car LED lighting \$1.3 billion.

Teradyne bought warehouse robot MIR for \$272 million.

\$10 Raspberry Pi Zero W slow chip + 5 volt USB LED light, & peristaltic pump = farm robot.

[www.hackster.io/hackerhouse/automated-indoor-gardener-a90907](http://www.hackster.io/hackerhouse/automated-indoor-gardener-a90907)

Israel Adasky robot car thermal camera.

Burger cooker Miso Robotics \$10 million invested.

Israel CommonSense Robotics \$20 million for online grocery.

Mini farm robot sprinkler “Arduino UNO board, temperature sensor, metal clips for reading the soil’s humidity, DC electric fan to blow air, DC motor water turbine, solar panel.” FAY Mini-Character LCD Shield, Solar Charger Kit for Android, 20 Volt generate Solar Cell, LM61CIZ Temperature Sensor, DC Motor, mini DC Fan. <https://makershare.com/projects/mini-smart-farm-project> “National Center for Nanoscience & Technology in China nanorobot delivers biochemical moieties that block blood supply of tumor.”

Amazon 6 more robot convenience retail stores 2018. “AiFi invested \$4 million automated robot food stores.”

MIT robot-assisted carpentry, custom furniture.

India sewer robot Genrobotics Bandicoot. “Toyota investing \$2.8 billion robot car apps.”

\$157 Xiaomi Xiaowa Robotic Vacuum Cleaner Youth Edition.

Arable’s Mark robot farm sensors.

British robot ARMAR-6 moves on wheel base, cameras grasp objects, can pass products to humans in Ocado warehouses.

Thai & Philippines New Kinpo Group assembly factory robots. “Within 5 years pizza delivered by autonomous cars” - Domino’s.

Iron Ox robot plants seeds, water, cares for individual plants. “Nuro raised \$92 million for robot delivery vehicles.”

German cucumber gathering green field experiment robot.

North Carolina drones for emergency supplies.

Samsung Exynos auto ARM chip for Audi cars. “Fanuc food & beverage manipulation robot.”

Innolux fired 10,000 people & replaced with robots.

Croatia Gideon Brothers warehouse robots \$765,000 invested.

Ford \$4 billion on robot cars by 2023.

\$575 Xiaomi Lefan AI massage chair.

Australia Baraja Lidar sensor for robot cars.

\$1,300 NVidia Jetson Xavier robot car ARM chip, 10 to 30 watts.

EPSRC soft robotics, “Wheelchair trousers in shops & hospitals 5 to 10 years. Peelable smart skins like octopus 10 to 20 years.”

DeepGreen underwater mining. “Tohoku University & National Institute of Tech, Hachinohe College Japan, snake-like robot with body of a fire hose.” “Self-driving robot delivery Starship Tech \$25 million invested.” “AI reduces time & costs manufacturing, CloudNC app cloud service hopes to automate programming CNC mills. \$10 million invested.” “Nano-metre sized robots to treat cancer in mice. Arizona State, National Center for Nanoscience Tech Chinese Academy.”

Starfish Prosthetics Foundation.

Lego prosthetic arm. <https://youtu.be/HlMDzlXA0eU>

Prosthetic ankle moves on its own, adapts to gait & surfaces.

TechCrunch.com “Prototype Prostheses Proffers Proper Proprioceptive Properties” for mechanical hands built by Swiss, Italian & Germans.

Robot delivery drone Matternet \$16 million invested by Boeing.  
\$122 Xiaomi Smart Toilet Youth Edition self-cleaning & heated.  
Kryon Systems business automation app \$40 million invested.  
French Exotec Solutions \$17.7 million invested robot warehouses. “Level 3 robot cars coming soon, don’t expect Level 4 or 5 automation until 2021.”  
Ethiopia “Robot tractor will ease struggle of many farmers. Sensors avoid obstacles, detect soil moisture. Instead of rote-learning one-size-fits-all syllabi, iPads have localized YaNetu app.” “Chowbotics \$11 million invested in salad robots.”  
Rutgers robot can find a vein, process blood, do basic analysis. “Indoor bike knits scarf in 5 minutes: Cyclo-Knitter.”  
AutoLab AI for manufacturing \$160 million invested.  
France EKIM pizza robot restaurant.  
“\$6 California Creator transparent restaurant robot doesn’t grind brisket & chuck steak into gourmet patty until you order it.  
Pays \$16/hour to read educational books while bot works.”  
Zume adds robotic arm to automated pizza kitchen.  
Robotics engineer Barbie.  
Nuro robot cars partnered with grocery Kroger same-day delivery.  
University of Hong Kong microbots deliver stem cells.  
Dubai Crop One Holdings robot farm.  
“National Taiwan University Hospital exoskeleton robots clinical tests for lower limb rehabilitation.”  
India Clearpath Robotics Husky “small car with crate holds 3 jugs of water, total 60 liters.”  
Altek artificial pancreas.  
Robo-farmhand Dot Power Platform.  
\$190 Xiaomi Smartmi Small Smart Toilet Seat.  
New Story hispanic charity 3-D prints 1 tiny home a day \$4,000. “Aerones drone can put out fires, perform search & rescue missions, clean sides of buildings or windmills.”  
Bear Flag Robotics to sell robot tractor.  
Swiss Spatial Timber Assemblies DFAB house robot. “Walmart developing drone shoppers summon with phone to guide them to a specific item.”  
Monarch surgical robot for lung cancer.  
China NCNT & Arizona State U robots few hundred nano-meters across that could block tumor blood supply. “Swedish Semcom autonomous snowplough.” “6 River Systems raised \$25 million for warehouse robots.” TerraClear robot removes rocks from farms.  
Antarctica indoor greenhouse “salad greens, cucumbers, radishes as temperatures outside below -4 Fahrenheit.”  
Aquaponic farms with fish fertilizer. “Depending on size, specific number of fish in tank. 800-gallon fish tank contains 300 Tilapia.”  
Australia AgriHack contest “reduce stored grain spoilage from moisture, measure weight of chickens.”  
Carrot robot farm by Case IH Bolthouse Farms.  
AAEON Vending Machine Kit, Intel UP board, Vending Machine Controller (VMC) & motor.”  
\$35 Raspberry Pi robot farm automatic watering. “Water pump DC 5V brushless. Soil moisture

sensor. Watering runs on Arduino which sends information through USB cable.”

Delta Electronics invested \$50 million robotics R&D center at Central Taiwan Science Park (CTSP) September 2020. “Xilinx FPGA chip has majority of robot car LiDAR market.”

Netflix “Next Gen” cartoon film about robots.

\$250 Xiaomi vacuum Xiaowa Small-Wall Sweeper robot.

BrambleBee robot farm.

United Technologies investing \$15 billion robots & U.S.A. factories.

Buffalo Automation robot boat.

Penny Restaurant robot waiter tested at Pizza Hut.

\$20 Australian Safety Rotor prevents drone accidents. “Tiny gold nanowire robots with biological coating, directed by ultrasound to attach to bacteria.” Biohybrid robotics combine biology with mechanics, so machines move more like humans. U of Tokyo Institute of Industrial Science grafted living muscle onto artificial metal fingerbone.”

GM Cruise robot cars \$2.25 billion invested from Japan Softbank.

“AliBaba G Plus wheeled robot delivers packages 9 miles per hour.”

Apacer Tech spectral horticulture illuminometers for China Sanan Sino-Science Photobiotech robot farms. “A.I. machine learning in healthcare, Bessemer Venture Partners \$10 million early-stage investment program.”

\$35,000 Tesla Model 3 “\$28,000 cost to build: \$18,000 materials & \$10,000 labor.”

“India Mahindra & Mahindra working on robot tractor.” “TickBot magnetic sensor follows metal wire on the ground. Dry ice is released, carbon dioxide causes ticks to grab piece of cloth treated with Pyrethrin pesticide.”

Target 50,000 stores have Google barcode scanners.

Samsung investing \$300 million robot cars.

Australia robot farm \$80,000 contest SparkLabs Cultiv8.

Google Waymo robot car uses Intel chip.

Tesla customized AMD robot car chip.

China Baidu invested \$1.5 billion robot cars.

Saudi Arabia robot Daisy finds water plumbing leaks.

British Tesco supermarket considering robot cashiers.

General Motors bought LIDAR laser sensor Strobe for robot cars.

Zume robot pizza \$50 million invested.

Iron Ox robot greenhouses.

Elroy drone carries 500 pounds 300 miles.

SCS Smart City Swiss thermal multispectral drone sees gases methane & carbon dioxide to detect people buried in mud slides or avalanches.

Indemnis Parachute for DJI Drone.

Israel SeeTree drones for precision agriculture, \$11 million invested.

Ion engine with no moving parts. Rows of long metal strands conduct 40,000 volts electricity to strip electrons off nitrogen atmosphere, push air molecules to back of plane creating wind. China JD.com tested drone delivery in Indonesia.

Bangkok drones spray water to reduce pollution.

Average drone carries 4 pounds, won’t deliver 20 pounds until 2025.

Latvia Aerones drone 120 lbs tethered to ground with hose, cleans buildings faster & higher than firefighter ladders.

Swiss LakeDiamond artificial diamond for laser beam to power drone solar panel.

\$36,000 Japanese drone Nileworks Nile-T18 sprays pesticides & fertilizer to rice field in 15 minutes.

Competes with SkymatiX Mitsubishi & Hitachi.

Flytrex & EASE drone food delivery service on golf courses.

Brazil iFood app tested delivery drones.

Uber food delivery drones 2021.

Puerto Rico drones lifting power lines into place.

Florida swamp drone licensed to spray mosquito pesticide. "Potholes could be repaired by asphalt-printing drones."

Bowery indoor farms \$90 million invested.

University of Tennessee Knoxville Lidar calculates optimal amount of brine anti-ice to spray on roads.

China JD.com working with Intel on automated retail stores & vending machines.

Postmates Serve delivers 50 pounds for 25 miles on a charge.

India Imago AI computer vision app to measure & boost crop yields.

\$25 Raspberry Pi 3A+ PoolBot app swimming pool automatic controller, total \$600. Measures electricity, pump speed, salt, heater, lights. Safety shuts off salt & heater. Temperature sensor, battery backup, valve controls, cooling fan, filter pressure gauge. <https://drew.beer/blog/blog/project-poolbot>

\$25 Raspberry Pi 3A+ farm irrigation system with 4 channel isolated relay module, jumper cables, 12 volt fan, drip pipe & connectors.

New York Vengo touchscreen vending machines \$7 million invested.

Samsung #8 nano Exynos Auto V9 ARM Cortex-A76 Mali G76 chip for Audi cars 2021.

Wilkinson Breadbot bakes 10 loaves per hour.

Whill electric wheelchair with autonomous driving system.

Inubox automatically cleaned indoor dog toilet.

PurrSong LavvieBot smart cat litter box cleans itself & refills litter.

\$1,000 Foldimate laundry folder 2020.

Nvidia Drive AutoPilot app Level 2 automated driving on AGX Xavier #12 nano ARM chip.

Samsung Gems mobility assisting exoskeleton.

Amazon invested in French Balyo self-driving forklifts.

Free FarmNet app for receiving LoRA sensors on Raspberry Pi.

Open Bionics \$6 million invested for artificial limbs.

Pensa Systems UAV can check inventory at grocery stores.

HyperScience app for automatic data entry \$30 million invested.

Automation Anywhere \$300 million from Japan SoftBank.

Standard Cognition \$40 million invested automatic store checkout.

Lidar sensor AEye \$40 million invested.

\$360 Venii N1 returns to charger station, mop scraped & sprayed.

Taco Bell ordering kiosks in all 6,000 restaurants.

Autogrow OpenMinder plant root zone monitor HAT for \$35 Raspberry Pi that manages water, pH,

& nutrient usage in hydroponic farming.

Saudi Arabia King Abdullah University of Science & Technology stretchable sensor for measuring micrometer-level changes in plant growth & PlantCopter temperature, humidity sensor.

Bloom Automation harvest system segments plants into flower, branch, & leaf, with neural network machine learning app.

Cambridge University Sawyer bot picks outer leaves off lettuce.

Ike self-driving trucks.

VClean Life laundry vending machines, takes 24 hours \$3 per item.

Advantech buys \$16 mil Japan factory automation Omron Nohgata.

India Pepsi \$5 million digitising farm supply chain with agronomists using tablets to manage crops, receive advice, monitor yields.

Precision farms Taranis got \$20 million for crop monitoring.

Mercedes Cargo Recognition Organization System for delivery cars. China Lenovo cashier-less store sells ramen noodles.

Walmart Kepler Intelligent Retail Lab Levittown tests artificial intelligence shelf inventory monitoring.

Uniqlo partnership with Daifuku to automate Japanese clothing warehouses, invested \$887 million. Engineers use Autodesk Revit app to plan 3D factory construction, Inventor app to design equipment for production lines, Factory Design modules to conduct production line balance analysis. Computational Fluid Dynamics analyzes flow conditions to boost cleanliness & positive pressure effect, prevent overheating & air pollution in chip clean rooms.

\$250 SwitchDoc Labs Smart Garden System for Raspberry Pi 3B+. Grove environmental monitoring plant watering system with soil moisture, sunlight, air quality, temperature, & humidity sensors. Grove connector board, SI1145 sunlight/IR/UV, Sensitive Grove air quality sensor, Grove ultrasonic water level, Capacitive soil moisture, HDC1080 indoor temperature humidity sensor, 4-channel, 16-bit ADC, 8-pixel RGBW strip, Grove OLED 128x64 display, 8x20 cm Grove cables, 1x50 cm Grove cable, USB PowerControl NE solid state relay, USB activated pump, Hose (200mm) with clip, 3D printed ultrasonic holder SGS stand.

Myomo MyoPro myoelectric arm orthosis wearable device restores functionality in arm & hand neuromuscular disease.

China Fujian Sanan Sino-Science Photobiotech, San'an Optoelectronics, Institute of Botany, Apacer inspects LED lighting farms including spectral illuminometers, illuminance sensors & calibration in spectral formula. LED plant light market \$52 million, \$633 million in 2022. "Hiwin & Mitsubishi integrated solution for factory automation."

XpertSea \$10 million invested fish aquaculture.

\$125 Rachio Smart Sprinkler Controllers watering schedules for sprinklers. Adjusts to rain, has Alexa voice commands.

German Robo-logistics Magazino invested \$25 million warehouses.

Alaska snow road maintenance with Microsoft & Fathym.

Taiwan 135 companies farming with red & blue LED lights.

Colorado Grownetics farm app \$1 million invested.

Sensors track water, height of plants.

Israel Prospera A.I. app to understand crop data.

Granular \$24 million invested farm app, millions of data points.  
Agrilyst sensor data for indoor farms, \$1.5 million invested.  
StrongLED automated factories 2020. “Samsung indoor smart garden Plantbox. Small refrigerator-like greenhouse, seed capsule, app.”  
Ikea Little Sun LED lamps Zimbabwe, Ethiopia, Senegal, Ghana, etc. Little Sun Diamond solar phone charger & flashlight. “Harvesting water from desert air with fog harps & electricity.”  
Microsoft cashierless store app.  
Sam’s Club smaller stores 1,000 items & automatic cashiers.  
Perceptin \$10,000 self-driving small car 12 miles per hour. “Ultraviolet near-infrared scans plants for stress, pests, infections.”  
Axios raised \$250 million to automate mundane jobs.  
China RT-Mart supermarket has apps from Alibaba.  
Indonesia Your Simple Garden company “grow fruits or vegetable using aeroponic & aquaponic.”  
“Billionaire Larry Ellison hydroponic farm company Sensei.”  
Brazil University of Campinas camera recognizes papaya ripeness.  
\$250 Rachio smart sprinkler \$20 million invested. “Grocer Kroger with UK online Ocado digital ordering & delivery in USA. Ocado builds automated warehouses.”  
\$100 Elgato Eve Aqua automatic remote controlled hose.  
\$200 Grow Vegetable sensor & irrigation \$2.5 million invested. Standard Cognition automatic store checkout, \$5 million invested.  
Preferred Networks cleaning robot, Nvidia ARM chip.  
NanoStore robot convenience store, Nvidia T4 GPU.  
Israel Innoviz solid-state LIDAR sensor \$132 million invested.  
Linear Lab Hunstable Electric Turbine motor \$4.5 million invested.  
FarmWise prototype farm robot built by Roush, removes weeds without herbicide, 2020.  
Sofar Ocean Technologies water robot \$7 million invested. “Built Robotics construction excavator drives itself.”  
Boston Dynamic Handle robot on wheels & legs loads pallets.  
\$8,000 AbleChair standing wheelchair.  
\$300 Xiaomi Mijia sweeping robot 1S.  
Brain Corp AutoDelivery store robot 2020.  
\$130 Bloomengine small automatic farm.  
\$5,000 UC Berkeley Blue 7 degrees-of-freedom robot arm.  
Amazon acquired warehouse robots Canvas Technology.  
MIT RoCycle recycling robot.  
Israel SeeTree app senses Asian citrus psyllid insect.  
Lucidyne wood categorization app detects knots, fire scars, pitch pockets & seams with Nvidia GPU.  
Norway Saga Robotics Thorvald reduces strawberry mildew with ultraviolet light, can be rented in 2020.  
Samsung LM301H LED (5000K, CRI80) farm light.  
Google Assistant voice command sprinklers Rachio, Rain Bird, LeakSmart, Flo Moen.  
Farm sensor \$35 Raspberry Pi 3B+, DHT11 Temperature Humidity, SparkFun Soil Moisture, Photo Resistor.

Ghana vaccine delivery to 2,000 rural clinics by Zipline drones.  
UPenn dental plaque cleaning tiny robots.  
Amazon 110 warehouses fully automated 2030.  
\$10 Abafia Soil Testing Kit for moisture, light, pH.  
\$150 Programmable-Air slow vacuum pump desktop for robots.  
Dutch NXP Rapid IoT prototyping kit farm sensor.  
\$500 iRobot Braava Jet m6 mop & duster.  
Xerox PARC chiplet micro-assembly printer for large obsolete desktops, LED, solar.  
RCTake-off Euromair construction drone sprays bamboo with clay, sand, rice husks.  
Amazon Xanthus Sort Bot & Tote Mover.  
German Infarm indoor farms \$100 million invested.  
Dishcraft robot dish washer. Aigamo robot rice farm removes weeds.  
MIT QCRI neural network, PizzaGAN makes pizza.  
Palm tree indoor farm [www.raspberrypi.org/magpi/smart-palm-tree-greenhouse/](http://www.raspberrypi.org/magpi/smart-palm-tree-greenhouse/)  
May Mobility wheelchair robot vehicle.  
Harvard elastomer muscle metalens for artificial eyes.  
Robotic Chicken Feeder <https://youtu.be/IaYjGdEZq18>  
Samsung Bot Chef robot hand.  
FarmWise robot weed remover \$14.5 million invested.  
Raspberry MudPi robot farm. [www.mudpi.app](http://www.mudpi.app)  
Picnic robot assembles 300 12" pizzas per hour.  
Kentucky "Immaculate barns where each horse has spacious windowed stall, personal fan, fly spray system." [www.businessinsider.com/claiborne-farm-lexington-kentucky-tour-horse-racing-photos](http://www.businessinsider.com/claiborne-farm-lexington-kentucky-tour-horse-racing-photos) Standard Cognition bought DeepMagic cashier-less stores.  
IBM Mayflower Autonomous Ship.  
Japan Nissan Leaf electric car battery 40 kWh can power small house control system connected to distribution board.  
Cheeseborg "Google make me a grilled cheese."  
Swiss ABB industrial mine electric vehicle charger.  
University of Edinburgh Trimbot prunes roses.  
Volocopter utility drone carries 440 pounds.  
India driver's ed test Hams A.I. camera.  
Amazon \$40 million Boston robot office, 200 jobs.  
John Deere VoloDrone crop duster.  
\$7,000 Ghost Locomotion robot car upgrade kit \$63.7 million invested.  
German Toposens car 3D ultrasound sensor.  
OffWorld mining the moon with robots.  
Picnic robot pizza \$5 million invested.  
Japan Sony A.I. robot chef division, "Food requires study of molecular structures."  
Internet of Trees traps for mediterranean fruit fly.  
USC robot furniture assembly simulator.  
Pyka crop spraying drone \$11 million invested.  
Charmin toilet paper refill wheeled robot.

Roomba with arms 2025.

**Tiny Houses:**

\$2,000 Pod Full heated bed water cooling 55 to 115 degrees.

\$2,100 Czech Magenta tiny house.

\$4,500 Xiaomi Master Tong Gaoya Whole House Set 25 furniture pieces.

\$4,850 Outdoor Living Today SR812 Santa Rosa 96 Square Foot Backyard Structure tiny house, Walmart free shipping.

\$5,000 My Modern Cabin Kit 12 feet by 9 feet.

\$7,200 Amazon tiny houses

[www.citylab.com/perspective/2019/08/tiny-house-order-amazon-kit-diy-how-much-cost-zoning/596350/](http://www.citylab.com/perspective/2019/08/tiny-house-order-amazon-kit-diy-how-much-cost-zoning/596350/)

\$8,000 A-frame cabin. [www.fieldmag.com/articles/how-to-build-diy-aframe-cabin-video](http://www.fieldmag.com/articles/how-to-build-diy-aframe-cabin-video)

\$8,000 tiny houses & \$5 insulin Bill Maher “SCAMerica” <https://youtu.be/R1elBgwBu2g>

\$23,000 Estonia Igluhut tiny house.

\$100,000 robot-built tiny houses by Yves Béhar Plant Prefab,

solar pitched roofs, wood paneling, concrete & stucco.

Less than \$6 million Arkup 1,600 square foot houseboat for category 4 hurricanes up to 155 mph.

Google Building Raincoat in Toronto protects sidewalks from wind, rain, snow. Ground anchors, made from ETFE (Ethylene Tetrafluoroethylene). “Salesforce founder Marc Benioff pledged to shelter or house all San Francisco homeless people in 5 years.”

\$2 billion Amazon charity Bezos Day 1 Fund for homeless children.

Jeff Bezos donated \$98 million to 2019 Day 1 Families Fund for the homeless.

Facebook donated \$1 billion to build 20,000 California houses.

Microsoft donated \$500 million to Seattle affordable housing.

Cisco \$50 million donation for the homeless.

Amazon housekeeping \$150.

Google invested \$4.5 million Dandelion geothermal heating.

2.5 trillion square feet new buildings constructed worldwide by year 2060 for 10 billion people.

Prefab housing company Cover, Cove Tool analyzes local building energy codes for energy efficiency, Envelope helps make sense of zoning codes, Camino for analog construction permit process.

Rice University cement mix 80% fly ash, 5% sodium activator, silica nanoparticles, calcium oxide.

Alaska, after earthquake cleared away broken roads to be melted down & recycled. Dug out water-saturated sediments, trucked in earthwork base, large rocks, finer gravel & asphalt.

University of Houston stress localization silicone polymer coating repels ice from any surface.

IKEA rice straw from India farmers to use as raw material. “Activists Petition Cupcake Kingdom To Address Adorable Housing Crisis.

I’m not going to sugar-coat this problem, said prominent ice cream social justice activist Mahatma Candy, presenting the petition 25,000 frosting signatures to Judge Fudge, Cupcake Kingdom’s Minister of Gingerbread Housing & Bonbon Development” the Onion. “Surviving Mars: Green Planet” terraforming (increase oxygen, plant trees in desert) videogame.

U of Exeter added graphene to concrete.

Marines 3D-print concrete barracks in 40 hours.

EPA awarded \$12,000 to UC Riverside study of “hemp-crete co-solvent enhanced lignocellulosic fractionation pulping with tetrahydrofuran & diluted sulfuric acid.”

U of Exeter added graphene to concrete.

Power Curbers & Power Pavers 5700-C concrete pouring machine. Curbs, gutters, sidewalks, walls, irrigation ditch, bridge walkways.

“Plant fibres add durability to buildings, toys, furniture, cars.”

\$1.2 trillion Homes for All Act by congresswoman Ilhan Omar would build 12 million houses & apartments.

Carpentry Compiler converts 3D models to building instructions.

Rochester Institute of Technology Shelter 2.0 metal & wood tiny house free blueprints.

Prefabricated apartments take 1 week. Factory OS pays \$30/hour.

Philippines CUBO laminated bamboo tiny houses.

Hempcrete house in 6 meter container \$6,000 shipping.

Arbitat Compact Cooler efficient air conditioner.

\$4,000 Hydraloop water recycler.

#### Other:

Amazon, LaGuardia Community College, City University of New York, SUNY cloud computing certificate.

New “Twilight Zone” CBS All Access.

Immigrants with masters degrees or PhD get priority in United States H-1B visa system. I would only allow scientists.

France & Belgium comic book market \$580 million, USA \$1 billion.

Facebook Express Wi-Fi, free basic internet in scam country Ghana, Morocco & Laos.

General Motors may invest \$2.7 billion in Brazil 2024.

\$2,500 China Kaiyun electric pickup, 40 miles per hour limit in USA, Germany, Italy.

China forgave \$78 million loan to Cameroon, which is \$10 billion in debt. Cameroon exports bauxite, iron, gold.

New York The Grid NYCEDC UrbanTech, New Lab, Urban Future Lab.

Adobe art app may license ARM chip blueprints.

Amazon 250 million square feet warehouses.

SUNY Poly IBM AI Hardware Center.

Google 20 engineers from Intel, Qualcomm, Nvidia India chip office.

\$100 CPR V5000 Call Blocker for landlines with 5,000 robocall scam numbers.

SquareTrade bought phone repair service iCracked.

\$10 strict “Chinese Parents” game for Microsoft laptops.

Nintendo Switch “Super Mario Maker 2” & “Legend of Zelda:

Link’s Awakening”.

Indonesia Intudo Ventures \$50 million investment fund.

Amazon accepts Western Union PayCode cash in Chile, Colombia, Hong Kong, Indonesia, Kenya, Malaysia, Peru, Philippines, Taiwan & Thailand.

Amazon has online stores for Brazil, India, Mexico, Turkey.

Samsung retail stores in New York, Los Angeles & Houston.

\$150 OGarden Smart LED.

\$200 (\$100 if mass produced) Litho joystick.

Canada CRTC says telecommunications industry misled consumers with unacceptable sales practices.

Sony hiring 320 camera imaging sensor engineers.

\$15/month Spectrum TV Essentials for iPads. 60 channels.

Truth-In-Billing, Remedies, User Empowerment Over Fees Act would make TV services advertise honestly.

Wafer-scale processor chip built over entire silicon wafer, SI-IF (Silicon Interconnect Fabric) 40,000 copper I/O pins. 40 GPU chips in 1 wafer use a lot of electricity.

Rumor: Nintendo Switch may get a few Microsoft XBox games & online subscription service.

Rumor: Apple Mac laptops will switch from x86 to A.R.M. chip 2021.

\$50 China Alcatel Audio Station speakers attach to 10" touchscreen.

HAX investing \$250,000 in tech companies for people over age 65.

FCC Connect America Fund \$67 million to 207 rural internet carriers.

Israel Aspectiva voice command natural language processing app acquired by Walmart.

Nintendo "Pokemon Sword & Shield" on Gameboy Switch.

Less than \$35,000 Tesla 2022.

FTC investigating tech monopolies.

AndroidCentral.com purchased for \$60 million by AnandTech.com

Office Depot business customers, Alibaba.com 150,000 suppliers.

Taiwan HTC may license brand to Micromax, Lava, or Karbonn for \$400 India phones.

€370 French Tech Visa from 10,000 companies.

China JD.com JoyBuy store on Google Express.

Cuba Etecsa 3G GSM phone service 600 megabytes of internet \$7, but average Cuban salary \$30 per month.

University of Berkeley micrometer mechanical switches nano-electro-mechanical (NEM) relays use 50 millivolts.

\$40 Reeven RC-1001 Brontes desktop fan.

India "Darshan Diversion" videogame, play as a woman attempting to enter Hindu temple.

Better music quality on \$35 Raspberry Pi 4 with \$9 Apple USB-C to music 3.5 mm cable & \$7 UGreen USB C to USB A Male Converter.

Amazon Staten Island fulfillment center joined Retail, Wholesale Department Store Union.

Connect America Fund expanding broadband internet service to rural communities \$67 million.

Warsaw University of Technology Comixify app converts TV shows to comic books.

Indonesia e-commerce Tokopedia \$1.1 billion invested by Japan SoftBank & Alibaba.

\$80 Xiaomi GamePad 2.0 joystick.

Microsoft news app Hummingbird.

Taiwan Asus CEO resigned, company will focus on videogames.

Intel & ESL investing \$100 million videogame tournaments.

India Vivo phone assembly factory 170 acres \$560 million, 5,000 jobs, 50 million phones per year.

Mom Project for female knowledge workers \$8 million invested.

Taiwan Chung Yo Materials invested \$9.75 million for metal powder 3D printing, gas atomization manufacturing equipment, 718, 713, Mar-247, AlSi10Mg, CoCrMo, Ti64 metals.

Charter Communications TV monopoly \$174 million settlement for false advertising in New York. Tunisia/Nigeria/Kenya InstaDeep works with electricity, manufacturing, mobility & transportation companies on A.I. optimization tasks with #12 nano obsolete Nvidia DGX-1 GPU graphics chip, \$7 million invested.

India Moglix \$23 million invested business to business distribution. Elon Musk SpaceX wants \$500 million for more satellites.

USB-C cables, controller Power Delivery chips from ASMedia, Etron, Weltrend Semiconductor, On-Bright Electronics, Richtek, Fitipower Integrated, Leadtrend, Genesys Logic.

AOI camera for chips & screens based on machine vision determines whether they have defects.

Nigeria largest port Apapa, Lagos is slow, corrupt bureaucracy.

20-foot shipping container from New York to Haifa, Israel \$1,730, Cape Town, South Africa \$2,550, Lagos, Nigeria \$5,000.

\$5,000 Skizee Woodsrunner powered by 4-stroke engine, track similar to snowmobile.

China LED car headlights by Elec-Tech International, Lattice Power, Jing Ke LED Lighting.

Pegatron outsourcing seeking new assembly factories Indonesia & Vietnam.

Ireland Amazon servers heat homes in Tallaght.

Indonesia should get oceanic bottom sensors connected to cables to detect tectonic & non-tectonic induced tsunamis.

Rutgers University & Oregon State University heating patches use pulsed-light sintering to fuse silver nanowires with polyester.

Amazon rental service for satellite data AWS Ground Station.

Kenya SimbaPay app sends money to China stores, \$4 billion/year.

Canada tax credit 15% off online news subscriptions.

Amazon AWS Textract OCR (Optical Character Recognition) app scans paper to digital document.

Qualcomm investing \$100 million in Artificial Intelligence chips. "Console Wars" TV show about Nintendo.

Finland Necunos Mobile Linux KDE Plasma free apps phone with obsolete Dutch NXP i.MX6 chip & Vivante GPU 2019.

Microsoft Surface laptop 2020 could have AMD Picasso #12 nano.

Chinese Huawei 100 retail stores India 2019.

AOT mini-LED backlight BLU for LCD TV 0.3mm by 0.6mm, 20,000 mini-LED's per screen summer 2019.

\$30 TaoTronics LED Eye-caring desk lamp.

Easyship with 50 couriers, Amazon, Shopify, lets online stores deliver to 3rd world.

Japan Imagica Group & Olm Digital automatic colorization of cartoon anime 2020.

1,200 Indian assembly factory workers fired by Xiaomi & Oppo reacted violently. Bangladesh workers \$0.60 cents/hour,

China factory workers \$3.70/hour.

Australia Competition & Consumer Commission free book about scams [www.accc.gov.au/system/files/LittleBlackBook.pdf](http://www.accc.gov.au/system/files/LittleBlackBook.pdf)

Valve Steam laptop app store takes 30% of sales, 25% for game's earnings beyond \$10 million, 20% if surpasses \$50 million.

India OnePlus R&D facility for development of Artificial Intelligence & machine learning.

\$540 Intel NUC8i3CYSM #10 nano desktop at Walmart.

Epic Games Microsoft laptop game store takes 12% fee from sales.

German ZF car external airbags.

Windstream Kinetic Google TV recorder desktop.

USA should build artificial islands in Pacific Ocean with radar missile sensors.

Japan NEC acquired Danish KMD Holding I.T. for \$1.2 billion.

Brazil tax, high import costs & flooded roads pose problems for Amazon competing with Mercado Libre's 12 million vendors & Magazine Luiza 900 stores.

Credit card e-Ink screen card verification value to reduce fraud.

SELFRAF lab system electrically separates diamonds.

\$365 Xiaomi Mijia Youth Edition TV LED projector.

India Amazon retail stores with Hindi videos to explain ordering process, cash on delivery.

China Meizu may get \$15 million investment.

Wistron \$430 million investment in India.

\$2/pound air ship to Africa from China.

Osaka University thermoelectric generation FlexTEG.

Kinpo Electronics expands factories in Thailand & Philippines.

\$100 POW Audio Mo portable speaker that folds.

38% of Samsungs have Qualcomm chips.

\$200 Nuvyyo Tablo Quad DVR records 4 TV antenna ATSC channels, 8 terabytes maximum, \$5/month ad skipper. Free Kodi TV app better on \$25 Raspberry Pi 3A+ with Hauppauge USB TV antenna.

\$300 Nemeio keyboard, each button is e-Ink screen.

Valeo XtraVue Trailer safety camera behind car that appears on a display in front of driver.

Nvidia GeForce RTX 2060 Max-Q #12 nano game chip in 40 expensive laptops. For example, Samsung laptop Jet Blade fans & penta-pipe cooling system.

\$30,000 Harley Davidson LiveWire electric motorcycle.

\$45,000 Atlis electric pickup truck 2020.

Austria Ams TCS3701 RGB light proximity sensor for OLED.

Google Assistant Connect E Ink display, prototype appliance voice commands. "Hey, Google, be my French (or Arabic, Chinese, Czech, Danish, Dutch, Finnish, German, Greek, Hindi, Hungarian, Indonesian, Italian, Japanese, Korean, Polish, Portuguese, Romanian, Russian, Slovak, Spanish, Swedish, Thai, Turkish, Ukrainian, Vietnamese) interpreter."

\$265 Lapscreen thin (4 mm) 12 inch IPS, USB-C HDMI portable TV. Compared to less than \$100 for 32 inch Chinese TV.

\$295 Japan NTT Card Keitai KY-01L 2. 75" E Ink black & white slow phone, Qualcomm #28 nano ARM a7, 47 grams. Should be \$50."

TiVo apps for \$35 Google Amazon Fire TV, Roku, Apple TV desktops. "Women Techmakers in 60 Seconds" on YouTube.

\$400 FSP Hydro PTM+ 850 Watts water cooled desktop power supply, should be \$100.

California judge found Mobile Telephony Surcharge unconstitutional. “(Silicon) Valley of the Boom” National Geographic documentary.

Verizon testing online videogame subscription service on \$150 NVidia Shield TV obsolete #20 nano, \$40 Xbox 1 joystick.

Qualcomm said Apple demanded \$1 billion before using 5G antenna.

Qatar Investment Authority \$45 billion in USA.

Alibaba A100 for digitizing businesses.

West Virginia & Minnesota sued Frontier internet for substandard service, misuse of taxpayer money, corruption, failing to upgrade obsolete cables.

Spotify added 160,000 Indian songs.

AliBaba \$150,000 finance small business point of sale Pay Later.

VW invested \$800 million in Tennessee electric car factory.

Cars can't go on ice unless 15" thick.

Samsung A.I. offices in Switzerland & Germany.

NBC Universal online streaming service 2020.

Tesla Model 3 given as prize for finding security flaw.

Bringg delivery logistics \$25 million invested.

Google.org Fellowship employees full-time pro bono work 6 months.

\$500 Tesla Wall Connector NEMA 14-50 plug 40 amps (9.6kW).

Steve Carell Netflix show “Space Force.”

Flutterwave Visa payment app for Africa GetBarter.

Indonesia Bukalapak.com store 2 million orders per day, 50 million customers out of 261 million people, \$50 million invested.

Amazon helped 50,000 small to medium businesses sell \$500,000.

India Reliance Industries online shopping 1.2 million retailers in Gujarat, 10,000 physical stores, 280 million phone subscribers.

Indonesia Warung Pintar \$27 million invested.

Boomers spend \$20 billion/year on tech.

French Wynd store app, inventory, orders, \$82 million invested.

Hulu.com TV price lowered to \$6/month.

Africa programmer outsourcer Andela \$100 million invested. Desktop Metal 3D printers \$160 million invested.

Spain Sherpa.AI voice command app \$15 million invested.

Samsung replacing plastic packaging with recycled paper.

Centrifuges create gravity.

Apple spent \$60 billion with 9,000 U.S.A. component suppliers 2018. “Fortnite” popular Google game compatible with Xbox 1 joystick, 60 Hz frames per second.

Amazon funds computer science classes in 130 New York City high schools, some \$10,000 scholarships.

Amazon Prime app 17,400 movies, Netflix 3,800, Hulu 2,300, HBO 800 movies.

Verbit voice transcription service \$23 million invested.

Israel 2031 all 1.5 million cars will be electric, all trucks electric or compressed natural gas.

Amazon invests \$230 million logistics center in Nashville 5,000 jobs.

\$10 Chinese DamonPS2 Google app for PlayStation 2 games (based on free PCSX2 app). China working on Sony PlayStation 3 (RPCS3) Google app.

\$4/month Netflix for 3rd world iPads.

Comcast paid \$700,000 in refunds for 20,000 Massachusetts customers because of deceptive advertising.

\$35/month HDHomeRun Premium TV 45 channel subscription.

Airtable programming app for non-techies \$100 million invested.

\$90 USB-C headphones 49101 Changer.

MotherCoders, Google & Women.NYC free,

9-week tech training program for moms.

NVidia quarterly videogame GPU chip revenue \$1.7 billion.

O-Wind Turbine 25 cm sphere with geometric vents that sits on fixed axis & spins when wind hits it from any direction.

India Reliance Brands partners with Williams Sonoma stores 2020.

\$11/month Criterion online movie subscription.

Virginia promised Amazon 25,000 computer science graduates, spending \$375 million on George Mason University & Virginia Tech campus, \$50 million STEM education in public schools.

Bloomberg donated \$1.8 billion to Johns Hopkins University.

Indonesia \$100 billion online economy 2025, Thailand \$43 billion, Vietnam \$33 billion.

South Korea Coupang e-commerce \$2 billion invested by SoftBank.

Philippines IKEA store 2020.

Vietnam \$14 million invested by 500 Startups in multiple companies.

UPS Network Planning Tools app avoids weather delays.

Land Rover 2020 Range Rover Evoque has hybrid rear view mirror with TV showing what is behind car.

Taiwan Acer laptops is largest gaming brand in Thailand, Australia, New Zealand, Vietnam, Singapore & India.

New York Drive Clean Rebate \$2,000 off electric car purchases & 200 150kWatt fast chargers.

Amazon sold 180 million items Thanksgiving week.

Most common African languages besides Arabic are Swahili, Hausa, Yoruba, Oromo, Zulu.

Amazon brand server chips for rent “A1 instances AWS Nitro System, lightweight hypervisor” ARM Cortex A76 with free Ubuntu 18.10 apps.

Samsung investing \$40 million in Niantic for Google games.

China silkworm with spider genes makes strong spider silk.

Sun spacecraft heat shield thick foam core 97% air between 2 layers carbon-carbon composite.

Weighs 160 pounds, but keeps at 85 degrees F, even as shield reaches 2,500 degrees.

Microsoft broadband access for 110,000 people in rural Ohio.

Taiwan Acer peripherals used in gaming, including mice, headphones, chairs, subsidiary named Gadget Technology.

AMD game GPU desktop chip customers get free videogame from Ubisoft, Rebellion, or Stardock. Sony sold 500 million PlayStations.

\$84 billion value of global office furniture market 2021. “I’m most excited about trend of no office

chairs anymore,” designer Olivares.” Workspaces don’t rely on office chairs. Sofas & lounge chairs.” IKEA Ubik personalized ergonomic chair for gamers.

Indonesia Merah Putih internet satellite.

Alibaba Netpreneur prize \$10 million competition for African tech. “General Magic: The Movie” documentary 1989 iPad prototype.

Carmaker factories like FCA, Ford, General Motors could be hired to build or assemble cars designed by Apple, Uber, Waymo/Google. 50% parts outsourced from Tier 1 suppliers like Bosch, Continental, Denso, Delphi, Magna-Steyr.

Google Android Auto stereo cars Volkswagen, Audi, Kia, others.

Morocco natural resources phosphates, zinc, manganese & iron.

Star Trek Patrick Stewart narrates Holocaust videogame “My Memory of Us.”

Magnesite stores carbon dioxide pollution.

NASA \$2 million contest to 3D print homes on Mars.

Technische Universität Wien hydrophobic water-repel organic dyes.

SkimReaper detects ATM card scams.

Taiwan & China developing mini LED for backlighting displays 2019.

Chinese luxury shoppers account for \$73 billion in annual spending, 1/3 of global luxury market.

Cartoon TV show “Star Wars Resistance.”

Google AI cooling system for servers with thousands of sensors.

BBC Arabic “4Tech” science show.

U.S. Steel invests \$750 million at steel factory in Indiana.

Amazon Alexa Fund Fellowship at 18 universities, MIT, Dartmouth & Cambridge for voice command research.

Puzzle game Monument Valley movie 2019.

New York Public Library Instagram stories for classic novels.

30,000 parts in a car. 10 years from now 10,000 parts could be 3D printed, material-efficient, lighter car.

Apple authorized Simply Mac to do screen repairs.

HP Omen Mineframe Headset active earcup cooling by thermoelectric magnets.

SoftBank investing \$3 billion food delivery.

Hugh Laurie (Dr. House) stars in HBO “Avenue 5” outer space comedy from “Veep” creator Armando Iannucci.

Kenya Shofco aerial water network overhead pipes, wood poles that connect to 10 water kiosks won \$2 million Hilton humanitarian prize.

Warren Buffett Berkshire Hathaway \$300 million in India Paytm.

FCC Connect America Fund Phase II internet to 700,000 homes.

Taiwan Foxconn Group \$100 million agreement with University of Wisconsin-Madison engineer research.

\$65 overpriced Tesla wireless phone charger.

Nintendo “Dragalia Lost” Google game. “Rick & Morty” cartoon co-creator 2-season TV order with Hulu for “Solar Opposites” about aliens living in America.

U of Texas at Austin \$60 million very fast supercomputer 2019.

\$1,000 Lenovo Yoga Book C930 with Intel chip & E-Ink touchscreen. Should have been \$500.

Epistar mini-LED 25-mircon in diameter for use in packaging RGB fine-pitch displays. “Curiosity of Jeff Goldblum” National Geographic TV.

Discovery TV channel considering \$5/month online subscription. China dictator said annual Latin America trade \$500 billion by 2028.

USA military “do not buy” app list to boycott Russia & China.

Milky Way galaxy 100 billion stars & planets. Many galaxies exist.

Nintendo sold 20 million Gameboy Switches.

Mars optimistic estimates to get 80% of Earth’s atmospheric pressure would require melting both ice poles, mine entire planet’s surface, heat every loose rock & keep it heated indefinitely.

JITX chip engineer automated app.

Qualcomm thermal simulation app, heat flow through phones.

\$230 Gapuino GAP8 RISC-V slow charity desktop. Should be less than \$30.

German Siemens bought Dutch Mendix app for low-code programming \$700 million.

Allbirds sandals made of sugarcane plastic grown in Brazil.

Amazon to stop using Oracle business apps by 2020.

Google joins with Unity for videogame ads.

Forest fire forecasting app Esri.

Nigeria logistics Kobo360 app \$1.2 million invested. Connects truckers to companies with freight. “Average driver \$3,500/month. Will expand to Togo, Ghana, Cote D’Ivoire & Senegal.”

Nickelodeon “Meet the Voxels” cartoon about each family member in a game franchise. Animated by videogame programming app.

Korean LG dress code no longer requires ties.

India Google MX Player app 40 original Hindi shows, 100 thousand hours of Bollywood.

Videogame Minecraft movie delayed until 2020.

Hypothetical Sony PlayStation Google phone, joystick attachment, PlayStation classics, HDMI TV cable.

NewTV subscription online service 2020 \$1 billion invested by AliBaba & Hollywood in original TV 10-minute shows.

GraphicsFuzz game chip testing company acquired by Google.

Saudi Arabia government invests \$2 billion in Tesla.

Sand grains composed of quartz, silicon dioxide, silica.

NASA can prevent volcanoes by drilling 10 kilometers & piping water under pressure \$3.5 billion.

Microsoft xCloud subscription streams Xbox 3,000 games to iPads.

Armenia \$100 million to support tech startups with Taiwan.

Freight trucking Shipwell \$10 million invested.

\$100 Xiaomi Delmar wireless furniture cleaner.

Less than \$100 Seasonic 650 watt Focus Plus Gold PSU desktop power supply.

U of Melbourne A.I. School of Math & Stats app predicts landslides based on radar.

Walmart orders 30 more Tesla Semi trucks.

Turkey expensive Vestel 65” Selette OLED TV.

BMW voice commands for air conditioning, lighting, or radio.

Jack Ma retiring from Alibaba to education charity with \$40 billion.

HP Metal Jet printer binder-jet spreads layers of metal powder & sprays it with a binding agent to solidify, then placed in furnace.

T-Mobile bought \$7 billion 5G antennas from Finland Nokia & Sweden Ericsson.

Hulu.com licensed Discovery TV channel, TLC & Animal Planet.

Adaptable Deployable Entry Placement Technology (ADEPT) heat shield stores like a folded umbrella inside small rocket, opening in outer space to protect ship as it enters Mars atmosphere.

Georgia Institute of Technology algorithm app programs new videogames automatically.

Videogame "Alan Wake" getting TV series.

Conan O'Brien 25 years of TV online.

iHeartMedia acquired HowStuffWorks educational material \$55 mil.

Dish AirTV box records TV channels 2 to 13 on Google or Apple.

Nintendo "Yoshi's Crafted World, New Super Mario Bros U Deluxe, Kirby's Extra Epic Yarn, Animal Crossing" for GameBoy Switch. Golden Gate Ventures \$100 million investment fund for Indonesia.

\$7 gigabyte average price for Africa phone service too expensive.

ChargePoint 2.5 million electric car charging spots by 2025.

French telecom Orange to invest in West Africa Main One Cable company Nigeria, Ghana, Senegal 2019.

Google Android Auto in 2021 cars from Renault, Nissan, Mitsubishi.

\$70 Logitech K600 TV wireless keyboard.

Google donated \$1 million for Hurricane Florence relief.

\$35 Amazon Alexa voice command cable Echo Input for speakers.

Swiss WayRay \$80 million invested for hologram projector in cars.

\$220 Dutch NXP i.MX 8M Development Kit for Amazon Alexa Voice Service. Slow ARM Cortex a53 desktop worth \$20.

\$50 Amazon Echo Auto car voice commands.

Taiwan IPC components Sinbon small cable factory Hungary.

India Amazon investing \$200 million for 49% of More retail stores. Apple iPhone buys parts from Skyworks Solutions, Broadcom, Murata, NXP Semiconductors, Cypress Semiconductor, Samsung, Texas Instruments, STMicroelectronics, Micron & Toshiba.

Amazon Alexa Presentation Language, APL, for building voice-based apps that also include images.

uBreakiFix & Google offer free repairs for Pixel phones damaged during Hurricane Florence.

SiriusXM acquired Pandora music app \$3.5 billion.

Microsoft A.I. for Humanitarian Action charity \$40 million for disaster response, children, refugees & human rights.

Apple partners with Salesforce business apps.

Qualcomm new Taiwan offices for R&D on multimedia, sensors, compression, object recognition, A.I.

Amazon 4-Star store in Manhattan, all books rated 4 stars & above.

Iridium with Amazon Web Services for satellite CloudConnect.

Microsoft "Minecraft: Dungeons" game.

Columbia School of Engineering paint coating passive daytime radiative cooling.

Vietnam VinFast car factory August.

Amazon minimum wage \$15/hour.

Xilinx Versal Prime FPGA desktop ARM Cortex a72 #7 nano.  
Google acquired customer service automation Onward.  
Nintendo future focus, “Mario, Zelda, Pokemon.”  
Rumor: \$300 Nintendo Switch with brighter screen.  
Microsoft Azure cloud servers used by Taiwan TSMC #7 nano chip factory to virtually design Indian RISC-V system-on-chip (SoC).  
Banco de México & Amazon may CoDi app payment QR codes.  
Microsoft invested in fibre optic internet Egypt, Kenya, Nigeria, South Africa, Angola.  
Nvidia 2070 Max Q laptop GPU game #12 nano chip, 80 watts.  
Google Rewarded Products video ads in apps.  
Japan SoftBank Innovation Fund investing \$2 billion Argentina, Brazil, Chile, Colombia, Mexico.  
“The Orville” sci-fi comic book.  
Senator Elizabeth Warren wants Apple app store monopoly to be separate company.  
Nvidia bought Israel Mellanox \$7 billion server chip. I would rather buy #7 nano chip factory to make consumer touchscreens for videogames (ARM Cortex a76).  
www.bullets.tech summarizes science news.  
Ford Explorer 2020 has Michelin Selfseal tires.  
Amazon River 4,300 miles divide north & South America with no bridges/road. January rain increases crossing to 30 miles wide.  
Automation Hero app \$14 million invested.  
British Carphone Warehouse fined \$35 million mis-selling insurance.  
\$220 Nvidia GeForce GTX 1660 desktop game chip #12 nano, 120 watts. I would buy \$500 Nvidia Shield Ampere Tegra ARM Cortex a76 #7 nano, 8” microLED, 3 watts, less than 1 pound. Nvidia chooses not to update consumer Shield ARM CPU in obsolete #20 nano Nintendo GameBoy Switch & \$140 Nvidia Shield TV box.  
Microsoft Xbox Live app for Google & Apple, Game Stack streams videogames from servers. Microsoft should make Google app similar to free Xenia that emulates Xbox without expensive server (Windows 10 for Intel & AMD laptops can already).  
Rumor: Samsung considers acquiring Dutch NXP, Infineon, or Xilinx.  
Mexico America Movil (billionaire Carlos Slim) bought Brazilian Nextel \$905 million. “Simpsons” season 30, episode 17 “E My Sports” Bart behaves better with videogames.  
OneWeb satellite internet \$1.25 billion invested.  
Cowboy game Red Dead Redemption 2 sold \$725 million first week.  
\$5 USB-C cable to Apple Lightning adapter lets you recharge iPhone with overpriced \$800 iPad Pro. iPad Pro has #7 nano ARM Cortex a76 chip they compare to Xbox, but it will not let you install RetroArch Nintendo games. 11” LCD screen with thin borders worse than OLED or MicroLED. Apple sold 400 million iPads & 100 million Macs.  
\$800 Puppy Cube 720p LED (laser is better) projector TV with sensor to use wall as touchscreen.  
Amazon Smile charity website donated \$100 million in 5 years.  
Basic cable TV box \$150, rents for \$5/month. Could be replaced by various ARM Cortex a55 #28 nano Google Kodi slow desktops \$20 with no monthly fee.  
eBay 177 million customers, Amazon 300 million people.

Canada arrested 30 Indian scam callers.

Dutch MetaMeta \$1,800/km roads harvest flood water Bangladesh. \$220 Chinese & 3e Audio Texas Instruments TPA3250 slow chip music amplifier competes with \$1,000 products.

<https://spectrum.ieee.org/consumer-electronics/audiovideo/build-your-own-professional-grade-audio-amp-on-the-sort-of-cheap>

Nintendo “Dr. Mario World” for Google & Apple.

Not Depressing News [www.NotDepressing.com](http://www.NotDepressing.com)

12,750,000 manufacturing jobs in United States.

Star Trek Fleet Command game for Google & Apple.

Elon Musk may make electric bicycle.

Sears to sell home improvement business to Service.com.

Amazon AWS server rent 10% cheaper with AMD compared to Intel.

Photomath \$6 million invested math solving app.

Federal court ruled Qualcomm must license 5G antenna modem patents to competing chipmakers (Intel, Samsung, Apple).

Kenya & Ethiopia M-Pesa app 23 million subscribers can send money via Western Union.

Material Impact \$100 million invested.

Microsoft partnering with Native (American) Network for internet.

CW “4400” SciFi.

Nigeria University of Ibadan teaches science in Yoruba language.

Fortune Magazine sold to Thai businessman \$150 million.

India Netflix “Upstarts” about fictional entrepreneurs.

Spotify app pays musicians \$5,000 per 1 million listeners.

Alibaba Singles Day (11/11) \$31 billion in sales, Xiaomi \$575 million, JD.com \$23 billion.

Elon Musk Boring Company to dig tunnels for water transport, sewage, electrical.

Israel Audioburst app turns free podcasts into personalized news.

Apple bought part of Dialog power management chip company \$600 million, 300 engineers, offices in Britain, Italy & Germany.

Oppo Hyper Boost Mobile Acceleration Tech app speeds up games.

Google TV Netflix voice command, “Hey Google, play Stranger Things on Netflix on (obsolete \$140 NVidia) Shield.”

\$80 Gamevice attachable gaming controller via USB-C cable, should be \$30.

Amazon “Shark Tank” online store. All Shark Tank companies get \$15,000 Amazon Web Services (AWS) server credit.

MIT new A.I. college \$1 billion.

Epistar Yen-Rich Technology 250-micron mini LED TV 2020.

Amazon \$10 million investment in Closed Loop Fund, improve municipal recycling programs.

China mirror satellite 2021 will reflect sunlight on a city at night.

\$1,000 Samsung Galaxy Book2 12” OLED, Qualcomm 850 #10 nano, Microsoft Windows 10 apps. Slower than AMD/Intel, should be \$300.

\$400 Square Terminal store credit card machine 2.6% fee + 10 cents for each transaction.

Dell (Alienware) says its gaming business is \$3 billion.

\$500,000 invested University of Maine Advanced Structures & Composites Center 3D printing boats.

Synthetic wood polymer resin, chitosan shells, freeze-dried & heated to 200 degrees Celsius. Quebracho wood is strongest.

Nigeria spends \$1.6 billion per year on diesel electric generators.

YouTube invests \$20 million in educational videos.

Trump met with Google, Microsoft, Amazon & IBM to hire temporary workers, leaves of absence for government projects.

Dyson electric car factory 2021 Singapore.

Red Hat Linux charity with NVidia on artificial intelligence apps.

Taiwan Innolux Active Matrix mini LED-backlit 65" TV second quarter 2019.

\$35 to \$200 Motorola iFixit parts, batteries, screens, & digitizers.

Walmart free 2 day shipping, items sold by third-party Marketplace.

Amazon Business Prime subscription \$180 per year for 3 users, free 1 day shipping on orders over \$35.

\$200,000 Workhorse Group SureFly helicopter 2021, safety features of electric power to make emergency landing, ballistic parachute.

Apple CEO Tim Cook endorsed federal privacy law.

Airtel Africa, subsidiary of India Bharti Airtel, \$1.25 billion invested by Japan SoftBank & Singapore Singtel.

Fibre optic speeds 100 times faster by twisting light into spirals.

AT&T testing Google Android TV set-top cable box for DirecTV. "Star Trek Lower Decks" cartoon.

Amazon invested \$50 million German heating & AC company Tado.

Apple News app 90 million readers.

Amazon offered Brazil & Peru millions of dollars in \$30 Kindles for .amazon internet address.

China Wingtech buys Dutch chip manufacturer Nexperia \$3.6 billion. Better Utilization of Investments Leading to Development (BUILD) Act \$60 billion American investment in Africa infrastructure.

Tap has 34,000 water Refill Stations across 30 countries.

Epic Games, popular Fortnite videogame, \$1.25 billion invested.

South Africa Naspers invests \$314 million in tech over 3 years.

CBS comedy by "Crazy Rich Asians" "Emperor of Malibu" about families from Shanghai & America 2019.

India average apartment rent \$50/month.

Swiss Power Coders app 3 month programming class for refugees. Bulgaria Human in the Loop employs refugees to provide image annotation services to computer vision companies.

Beautify Silicon Valley hires homeless \$15/hour to pick up litter.

UPS electric bike 400 pound delivery system.

Quantum network cables will simulate quantum physics of molecules or materials, measure gravity waves.

Caltech optical gyroscope size of grain of rice.

Cubans buy \$2.4 billion foreign products per year because dictator limits businesses.

Zimbabwe bond note zollar was supposed to be \$1 USA dollar but is worth less than 10 cents.

Continental car A-Pillar flexible OLED screen for blind spot.

Africa Jumia employs 100,000 people on commission. "Microsoft Windows will have 64-bit app

compatibility on ARM Qualcomm \$600 laptops in May.” This enables more modern games. Droplet Universal App “lets any app run on any operating system (Google, Microsoft, Apple).” China Oppo Phone R&D “5G antenna NYU, artificial intelligence, materials & image processing.” Edovo prison iPads \$9 million invested.

Amazon spends \$22 billion/year on R&D.

Free app charity Linux laptops System76 Colorado factory.

Apple sci-fi TV Isaac Asimov “Foundation”.

Thuraya X5-Touch Google satellite phone.

Cadence Tensilica Vision Q6 DSP Digital Signal Processor for music.

Japan 16 million tons rare earth elements underwater. “\$400 million TED Audacious Project charity among 7 recipients.

Dutch Tocano inkless printing \$1 million invested.

Bolt Threads lab-grown leather.

Netflix 125 million subscribers.

Queen of England likes Nintendo Wii games.

Amazon TV series William Gibson’s sci-fi “The Peripheral.”

India 12 million kirana stores.

Facebook licensing A.R.M. chips for servers & voice speakers.

Nest Power Project donated 1 million thermostats.

Amazon Alexa Blueprints voice command programming.

AT&T \$15 online TV subscription.

Oil Shell Ox folding truck India. “Nigerian Prince” movie about scammers.

\$130 million to bring Antarctica iceberg to South African desert.

Indonesia \$4 million invested “Warung Pintar — \$5,000 smart kiosk store — street vendors cash register, free Wi-Fi, LCD TV, chargers.”

CO2 Supercritical oil extractor manufactured by Vitalis.

Digital India government to promote AI, 3D printing, \$477 million.

Samsung Washing Machine with Bixby voice commands.

UPS outfitted 2,500 employees with scanning devices &

\$8 Bluetooth headphones that issue one-word directions. “Israeli Delek Drilling supplies Egypt with \$15 billion of natural gas.”

Amazon sells \$3 billion ads per year.

Toyota magnet halves rare earth metals needed in electric cars. “Japan SoftBank \$100 Billion Vision Investment Fund could get more money from Middle East.” “Qualcomm partnered with Arrow Electronics desktop chip for TV DragonBoard 820c. Compatible with 96Boards standard.”

\$47 Japan Oton Glass converts writing to audio.

Amazon TV Iain Banks consider Phlebas “space opera about post-singularity, post-scarcity cooperative galactic civilization devoted to games, leisure, & artistic pursuits.”

Microsoft paid Xiaomi to put apps on Google phones. “Tesla workplace charging offers businesses free Tesla wall connectors & installation.” “Rice University transforms the top layer of a polymer film (polyimide) into 3D graphene foam using laser. “Ford SYNC 3 voice command system – Sygic’s Driving Assistant.”

Facebook charity Infra Project antennas for 3rd world.

Snow MeltMat “driveways—thin layer of snow takes 2 days to melt, but the blanket could melt it in a few hours.”

\$10 OneCast App “Xbox One game streaming to Apple Mac laptops.”

Perfect Day \$25 million invested.

Toyota magnet for electric motors uses less neodymium.

Everlight Electronics mini-LED screen backlighting.

India Reliance Digital TV 500 channels free 5 years pay \$30 upfront.

Microsoft Soundscape helps the visually impaired navigate cities.

Lego bricks made from sugar plastic.

Chinese Smartisan & 360 Mobiles may merge.

Nigeria paying parents \$40/year to send children to school.

Swedish appliance Electrolux will put off \$250 million investment in Springfield, Tenn after Trump tariffs on aluminum & steel.

“We will consider stock listings in Hong Kong for Alibaba subsidiaries but we have not decided yet.”

Chinese Oppo & Xiaomi buying mini-LED backlight screens from Taiwan, summer.

Walmart minimum wage \$11/hour.

Zeroqode Bubble programming templates.

IBM fired 10,000 people in 2018.

National Renewable Energy Laboratory process for acrylonitrile Carbon Fiber from corn stalks & wheat straw.

Ford \$11 billion invested electric cars by 2022.

Amazon free shipping on some items under \$10.

Apple hiring 20,000 Americans 2018. Apple paid \$38 billion tax moving \$250 billion foreign profits to U.S.A.

China JD.com store invested \$50 million Vietnam Tiki. “Large-Area Fluidic Windows (LaWin) fluid suspension of

iron particles. Absorbs & distributes heat.” “Inventing Tomorrow” documentary high school students at

Intel International Science & Engineering Fair.

Apple donating to schools for 100,000 girls in Lebanon, Afghanistan, Nigeria, Pakistan, & Turkey.

Ralph Lauren “parka with heat-conducting ink.”

Tesla Elon Musk could be paid maximum \$70 billion stock for

10 more years work.

Microsoft Ink to Code app turns drawings to HTML5 app interfaces.

Japan Fujitsu sold mobile phone unit to Polaris Capital \$400 million. Apple monopoly app store \$38 billion in 2017, Google \$20 billion.

British Bodle \$7 million invested “low-power reflective display.”

“Tesla in talks with Chile lithium Sociedad Química y Minera de Chile (SQM) to invest.”

Exxon invested \$35 billion in America.

Samsung 2018 stock dividend \$20 from \$50 billion profit.

Japan FujiFilm bought Xerox \$6.1 billion, fired 10,000.

Samsung India hired 1,000 engineers.

Nintendo Mario Kart Tour for Apple & Google.

Tamatem translates games to Arabic, \$2.5 million invested.

Corrupt Nigeria “Integrity Idol TV in search of honest government.”

Taiwan innolux mini-LED screen 2019.

Epistar mini-LED for backlighting.

Wileyfox phones went bankrupt. “Wood treated in sodium hydroxide & sodium sulfite, then hot-pressed 200 degrees is stronger.”

Raspberry Shake earthquake detector.

“Shipping with Amazon” delivery trucks in L.A.

Active Textile is DesignTex, furniture company Steelcase, & MIT Self-Assembly Lab.

Emily Calandrelli “Ada Lace” books for female scientists.

Bloomberg, “Icebreaker ship hulls bend edge of ice sheet down, snapping with pressure distributed across its surface.”

England fiber optic internet for all 65 million people by 2033.

5.4 million Americans will cut Cable TV cord in 2018, 20% by 2022.

Google 2nd quarter 2018 revenue \$32.6 billion.

NVidia #12 nano desktop game chip GTX 1160.

Verizon to partner with either Apple or Google for 5G phone antenna TV provider 2019.

Asus, Denon & Marantz, Philips, Pioneer fined \$130 million by Europe for monopoly pricing.

Rumor: Samsung to launch Galaxy R & P, cancel J series.

\$600 Looking Glass Hologram 9” TV.

First Graphene flame resistant coating.

Qualcomm paid \$2 billion to end failed acquisition of Dutch NXP.

European eucalyptus, American cowhide, PVD brass.

Free “Women Invent the Future” science fiction book.

Spotify free music app 180 million users.

Microsoft buys GitHub \$7 billion, host apps 28 million programmers.

Walmart sold 80% of Brazil business to private equity Advent.

Apple will let developers convert iOS iPad apps to macOS laptops.

Sharp bought Toshiba’s PC laptop business \$35 million.

Lextar small-volume production mini LED backlights.

Nintendo GameBoy Switch “Pokémon Let’s Go” game.

MSI App Player Google games on MSI Microsoft laptops. “The Hybrid, Israel government brings tech to Arab population. Gaza Sky Geeks, Google provides seed investments.” “Philippines arrested 500 in online stock fraud.”

Yale silicon Brillouin laser, light & sound amplify optics.

Quantum Computing Research Act. “\$500 GoBoat is electric, folds away & only weighs 26 kilograms.”

75 Nigerian email scammers arrested for targeting businesses.

NASA Psyche mission 2022 to metal-rich asteroid 16 Psyche, estimated \$10,000 quadrillion platinum.

Alibaba invests \$15.6 billion for logistics Cainiao Network Tech. “Nintendo Super Smash Bros. Ultimate on the Switch.”

Americans \$36 billion video games per year.

Globalfoundries chip factory fired 900 employees 2018.

Google AI Research Center in Ghana.

Netflix online game service, TV remote control as joystick. “Nigeria machine learning early detection of birth asphyxia.” “Cybercrime cost Africa \$3.5 billion.”

India telemarketers fined \$7.6 million for tricking elderly Americans into buying fake tech-support. “Samsung Q Fund invests in unconventional AI startups.”

Linux free app charity programmer Linus Torvalds wants to buy Qualcomm 850 laptop, 5 to 12 Watts.

“Amazon automates ordering & communication with manufacturers based on product popularity.”

Samsung 100% renewable energy use 2020. “South Africa internet for all citizens 2030.”

Chinese Huawei Google phone app has Windows 10 Microsoft apps via cloud server.

Leave No Girl Behind helps African mothers access education.

Broadcom fired 1,100 workers 2018.

Apple making cartoon in Ireland.

\$15 Xiaomi Mi Travel U-Shaped Pillow.

Apple hired Oprah for online TV. “Nigeria \$8 billion steel factory will open after 40 year delay.”

\$264 Xiaomi HIMO electric bicycle. “Wheelesy wheelbarrow loads from the ground.”

MIT Synthetic Blubber Fat Suit for cold water. “Engineer.AI paid service programs app for you.”

Merck OLED Center in Shanghai.

Celluveyor omnidirectional conveyor belt moves in any direction.

Fired Amazon workers can appeal to jury of co-workers. “U.S. Treasury would block firms with 25% Chinese ownership from buying U.S. companies in industrially significant technology.”

Advent \$3.25 billion for General Electric power generation unit.

AMD donated 1,000 desktop Ryzen Vega chips to programmers.

Amazon bought online pharmacy delivery service PillPack \$1 billion.

Amazon leasing \$10,000 delivery vans to drivers.

Showtime “Halo” videogame TV show 2019.

Doctrine \$11.6 million invested for law search engine.

Taiwan HTC fired 1,500 employees.

Volkswagen invests \$1.15 billion in India.

Zebra Technologies bought rugged tablet Xplore \$90 million.

Kenya Google balloons deliver internet access to rural areas.

Paladin New York app helps lawyer teams sign up for pro bono.

Steam Windows videogame store has 25,000 games.

Team Fortress 2 has 50 million players. Counter-Strike Global Offensive, Player Unknown Battleground, Unturned have 25 million players.

\$500,000 factory can extract metals from obsolete cathode-ray tube TV. Contains 450 grams copper, 227g aluminum, 5.5g gold.

\$100 million New Voices Fund invests in minority companies.

Amazon may expand Brazil online store. “Amazon service for Vietnam E-commerce Association.”

Samsung partnered with uBreakiFix for 300 repair centers.

“2017 Amazon 500% increase international orders for Indian products. Home décor handicraft, tapestries, dinnerware,

copper mugs, art supplies.” “Former chairman of Qualcomm trying to buy company with Japanese

SoftBank.”

Rumor: Broadcom may buy Taiwan MediaTek or another chip company for \$17 billion. Google investing “ThriveAgric middle-class Nigerian agriculture.” “KLA-Tencor acquired Orbotech for \$3.4 billion.” “Korea LG supplies OLED to Toyota, Volkswagen, GM & Mercedes.” “Girls Make Games Google design challenge.”

Motorola Brazil Moto Mod with digital TV antenna.

China “10,000+ chambers will be built across Tibetan plateau to produce rainfall over 620,000 square miles. Chambers burn solid fuel to produce silver iodide for clouds.”

Wild Type cloned meat \$3.5 million invested.

Microsoft focuses on servers & artificial intelligence.

2.3 billion gamers spend \$138 billion. \$106 billion/year on apps.

“Guatamelan went from videogame counterfeiter to owner of \$700 million DuoLingo translation app.”

Tyson Meat invested in lab grown chicken Israel Future Meat Tech.

Thai Chorean Pokphand store invests \$150 million India.

\$8/month Hispanic Univision TV subscription.

\$100+ Samsung JBL Google Sound Bar large speaker Link Bar.

Built-in Google TV apps & music.

Google Maps, Voice Assistant, App Store in Volvo Sensus touchscreen next-generation cars. “\$50 billion investment required per year to get universal electricity in sub-Saharan Africa by 2030.”

Microsoft Project Ink Analysis app for touchscreen plastic pen. Microsoft app store charges programmers 5%.

\$60/month overpriced “Square for Restaurants app point-of-sale handles menu, floor layouts, employee schedule, performance tracking to tip splitting.”

\$3 Panera delivery fee 43 States.

Qualcomm selling off server division.

China installed 2,000 earthquake sensors.

Amazon Experience Centers in Lennar smart home showrooms.

Steam Link app for Google & Apple enables Microsoft Windows games wirelessly on iPads.

Chinese Petfull \$20 dog water fountain & \$75 dog food dispenser.

India “ReNew Power largest renewable energy producer IPO.”

France Canal+ cable TV box replaced with Apple TV desktop.

Netflix 5 million Indian subscribers.

Crossbar licensed embedded Resistive RAM #14 nano to Microsemi.

Japan \$2 billion company “In this business, Okanohara said, if you’re not doing something that seems crazy to some people, you’ll never do anything interesting.”

\$22,000 Seakeeper gyro flywheel keeps boats steady.

Amazon “Seller Central apps to handle pricing, inventory, ads.” “Uizard computer vision AI turns design mockups into apps.”

Saudi Arabia 70% of electricity for air conditioning.

Sony \$2.3 billion for EMI largest music publisher.

IBM “hired 1,800 new people in France for A.I. apps.”

Samsung 2020 “1,000 A.I. engineers.” “Call for Code \$200,000 app contest, natural disaster prevention,

response, or recovery.”

French development agency (AFD) \$76 million for African startups. “Amazon Choice are items buyers were satisfied with.”

“370 Apple employees attended OLED trade show.”

Alibaba invested \$1.4 billion logistics China Courier ZTO.

De Beers Lightbox artificial diamond 50% cheaper.

China Tianqi Lithium \$4 billion invested Chile Sociedad Química y Minera (SQM) mine.”

Signify EyeComfort LED lightbulbs.

“CLEARink reflective screens use 10% electricity of LCD, summer”

Costco minimum wage \$14.

“Apple advertising online business over \$1 billion/year.”

Taiwan Asus investing \$50 million in Japan & China entrepreneurs. ARRIS Google TV cable box.

Paraffin oil prevents icy roads.

Mexico City Amazon 1 million square-foot warehouse.

Trump wisely banned China from buying Lattice Semi.

India Mahindra partnered with Ford.

American Navy uses \$30 Xbox joysticks.

China store JD.com investing \$500 million Thailand.

\$500 Nest Secure alarm.

Google bought part of HTC Taiwan \$1 billion.

East Ventures \$30 million investment Indonesia.

HP Enterprise fired 5,000 people 2018.

Samsung donated \$1.1 million to Mexico earthquake.

Mercedes \$1 billion investment electric car factory Alabama.

India Tata Motors Google Android Auto stereo.

South-East Asia Sea Garena app store IPO, 40 million customers.

Target stores minimum wage \$15 by 2020.

NY Corning Gorilla Glass car windshields.

India “Founded by former physician, GlowRoad housewives & stay-at-home mothers can start retail business from home.”

LG TV with built-in Comcast CableCard box.

Trump Department of Education \$200 million computer science.

Bill Gates switched to Google phone.

India \$2.5 billion to provide electricity to 300 million poorest homes.

Dyson electric car 2020.

Comcast Xfinity Instant Internet TV \$18/month.

Amazon 5,000 employees working on voice commands.

IBM 130,000 India employees, 100,000 Americans.

Amazon “Snow Crash, Lazarus, Ringworld” sci-fi TV 2020.

JDI screens needs \$1.75 billion & JOLED \$900 million. Japan OLED factories may get Chinese investors.

\$60 Taiwan MSI Force GC30 joystick for Microsoft & Google.

\$160 Google Pixel Buds wireless earphones & translator.

\$2/month satellite TV China StarTimes, 10 million subscribers in 30 3rd world countries.

Female engineer Ada-Fruit bought bankrupt RadioShack.

Toys R Us investing \$50 million India 65 stores.

Microsoft bought 15 years electricity from Ireland G.E. windmills.

“Massive ocean wind turbines 3 million sq km would make 18 terawatts electricity per year for the world.”

Singapore Vertex Venture \$210 million invested India & Israel.

Alibaba \$15 billion R&D voice commands & quantum chips.

Qualcomm fined \$750 million by Taiwan for antenna monopoly.

Indonesia Synnex \$20 million computer warehouse.

Google \$1 billion tech job training for Americans.

Taiwan’s largest laptop company Acer I.P.O. in the future.

Apple & Samsung 35% USA market share each.

Popular game Call of Duty Mobile for Google & Apple was programmed by Chinese Tencent.

\$50 HiFive1 Revision B FE310-G002 (obsolete 32-bit E31 with no TV cable) RISC-V slow desktop.

Qualcomm QCS407 & CSRA6640 DDFA Digital Amplifier top of the line voice command speaker chip is overpriced.

I would pay a little more for similar Qualcomm 632 #14 nano touchscreen or Google TV box with more features.

Google Stadia online videogame subscription for slow computers (\$30 Chromecast), 4K video, 60 frames per second, HDR, surround sound, Vulkan, Unreal Engine, AMD servers.

Google Stadia Controller joystick, white & orange, black & white, or mint green.

Free with ads Nintendo Wii game “NyxQuest Kindred Spirits” for Google & Apple.

Google fined \$1.7 billion by Europe, must offer choice of web browser & search apps. Apple not yet punished for monopoly app store.

\$5/month Discovery documentary online service 2020.

Bengali sci-fi is “kalpabigyan.”

Chinese Huawei optical communication module factory Cambridge, England.

New Taipei City, Taiwan Google hiring 100+ people.

Rumor: free with ads Amazon TV news app.

\$60 Sega Genesis Mini desktop, “Ecco the Dolphin, Castlevania, Space Harrier II, Dr. Robotnik’s Mean Bean Machine, ToeJam & Earl, Sonic” or free RetroArch app.

Boundless \$750 immigration lawyers \$7.8 million invested.

Senegal Dakar Network Angels invests \$25,000 in French African companies.

Microsoft donated 500 patents to LOT Network.

Walmart Voice Order, Google Assistant app.

\$10 Intel WiFi 6 AX200 M.2 wireless antenna.

Amazon Project Kuiper 3,250 internet satellites 2023.

Philippines Western Union Coins app for money transfers.

GrubMarket food delivery \$25 million invested.

CVS \$8 same day delivery by Shipt.

Africa Boomplay music service \$20 million invested.

Saturday Night Live criticized too much drama in videogames <https://youtu.be/nEDKVNoE2ws>  
British Veratrak pharmaceutical blockchain tracker \$1 million invested.

\$650 F(x)tec Pro 1 Qualcomm 835 #10 nano, 6" OLED, physical keyboard, Google or Sailfish Linux.  
Should have been 6.5" & #7 nano.

Gizmodo.com & The Onion comedy bought by Great Hill Partners.

AMD #12 nano Ryzen 5 Pro 3500U, 15 Watt, Vega GPU laptop chip, summer, HP, Lenovo.

Xbox "Halo Infinite" cost \$500 million to program.

Trint speech to text app \$4.5 million invested.

DHL Africa eShop ships 200 U.S. store products to Botswana, Cameroon, Congo DRC, Cote d'Ivoire, Gabon, Gambia, Ghana, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Africa, Tanzania, Uganda, Zambia (not 35 other African countries). "FCC Rural Digital Opportunity Fund connects 4 million rural homes to high-speed internet \$20.4 billion subsidy over 10 years to companies through auction." "Logic World" chip blueprint videogame.

Hulu.com TV bought back AT&T 9% stock \$1.4 billion.

China & Taiwan Suwa Investment Holdings \$700 million invested Japan Display factory.

Sony PlayStation 5 desktop late 2020, #7 nano AMD Zen2 Navi, 8K HDTV resolution, ray tracing, faster flash memory, 3D audio, compatible with PlayStation 4 games.

Packaging & testing by Advanced Semiconductor Engineering & Siliconware Precision Industries, Taiwan TSMC factory.

Leapwork office automation app \$10 million invested, competes with Tricentis, MicroFocus, UiPath, BluePrism.

Geniatech APC810 desktop, NXP i.MX 8M ARM a53, ATSC TV antenna.

Bangladesh ShopUp app for sellers on Facebook \$1.5 million invested by Sequoia Surge.

Netflix "Mama K's Team 4" Zambia sci-fi cartoon.

Chuwi Minibook/iLife NG08 8" touchscreen laptop, slow #14 nano Intel Celeron N4000.

\$90 FriendlyElec Octa-Core 64-bit All-in-One Android System, 9" touchscreen desktop, no battery, Samsung S5P6818 #28 nano ARM Cortex-A53, obsolete Mali-400MP GPU.

GlobalFoundries sold New York #40 nano chip factory to Arizona ON Semiconductor \$430 million. Voiceflow voice app programming \$3.5 million invested.

French STMicro LIS2DTW12 Micro-Electro-Mechanical System accelerometer & absolute thermometer.

\$445 Xiaomi 55-inch Full Screen TV.

Chinese Rockchip RK3588 ARM Cortex-A76, #8 nano (Samsung factory?), 8K TV 60 fps decoder AVS3, AV1, H.266 (VVC) summer 2020.

Ford invested \$500 million in Rivian to build electric pickup truck.

\$375 Brazil Samsung Galaxy M30, 6.4" OLED, Samsung Exynos 7904 #14 nano ARM Cortex a73, Mali-G71 MP2 GPU chip.

Italy GlobalWafers 8-inch silicon wafer factory 25% Europe market share.

Lowe's Generation T trade skills jobs. [www.wearegenerationt.com](http://www.wearegenerationt.com)

Google Loon balloon antennas \$125 million invested by Japan SoftBank.

Amazon Prime subscription may switch to free 1 day shipping 2020.

\$600 Topjoy Falcon 8" touchscreen IPS laptop, #14 nano Intel Core m3-8100Y.

\$90 Walabot DIY Plus senses metal or wooden studs, pips, wires.

\$480 Google Pixel 3a XL, 6" OLED, Dragontrail glass, #10 nano Qualcomm 670, Clearly White, Just Black, Purple-ish.

Competes with \$300 Chinese phones.

\$300 Morus Zero Countertop Dryer, vacuum dehydration, UV light, January.

Amazon Delivery Service Partner Program gives \$10,000 & 3 months of former employee's last gross salary.

British Agile Analog digital-to-analog converter, voltage current reference, temperature sensor automated blueprints \$5 million invested.

Samsung Exynos 9609 #10 nano ARM Cortex a73 (a76 is better) Mali G72 MP3 GPU.

\$10 "The Video Game Machine" programming game.

\$10,000 Usain Bolt Nano small electric car 2020.

\$800+ One Mix 3S fastest 8.5" touchscreen laptop, #14 nano Intel Core i5-8200Y 5 watts, Intel UHD Graphics 615, 16 gigs RAM, micro-HDMI TV cable, 1.5 pounds, 8,500 mAh battery.

Saturday Night Live song by Professor Processor & Mr. Microchip [www.youtube.com/watch?v=YOLAQE6qU5I](http://www.youtube.com/watch?v=YOLAQE6qU5I)  
Marvell bought Avera Semi chip design \$650 million.

Bangladesh 163 million people, 11 million middle income according to Deligram store.

IBM Watson Decision Platform for Agriculture.

\$700 Acer Swift 3, 14" IPS laptop, #12 nano AMD Ryzen 7 3700u Radeon RX Vega 10, 15 watts, 3.2 pounds.

Proprietary H.266 Versatile Video Coding compression app competes with free AV1 TV.

Texas Lynas & Blue Line rare earth metal processing factory.

Taiwan Asus ZenScreen Touch 15" low quality touchscreen, 7,800 amp battery, USBC HDMI cable.

\$200 Reflo Air PCB chip reflow.

Indonesia Kedai Sayur vegetable store delivery \$1.5 million invested.

Samsung USB-C Power Delivery controller SE8A or MM101 100 watts.

Intel #10 nano 15 watt Twin River laptop prototype, 2 x 12" touchscreens, vapor chamber cooler, lycra case.

Intel NUC Compute Element upgradable laptops or desktops Core i5 U chip summer 2020.

Marvell sold wi-fi & bluetooth division to NXP \$1.76 billion.

Amazon Textract server OCR app scans documents.

\$500 (should be \$225) Moto Z4 6.4" OLED, #11 nano Qualcomm 675, optional projector.

\$15 Atto Arduino very slow smallest desktop Arizona Microchip Technology Inc ATmega32U4 8-bit AVR, micro-USB, 0.7 gram, 0.45".

\$300 Qualcomm ARM Google Chrome OS & Windows 10 laptops 2021.

German Infineon car chips bought Cypress Semiconductor

\$10 billion.

Netflix "Magic The Gathering" cartoon.

Earth's moon has silicon, rare earths, titanium, aluminum, helium & platinum.

General Motors Michelin airless tires 2024.

BlueStacks Inside converts Google games (ARM) to Windows 10 (Intel/AMD) Steam app store for % of revenue & integration fee.

Free Google apps on laptops with virtual machine emulators, Android x86.

\$70 Geniatech A683 ATSC 3.0 USB TV tuner, USA channels 2 to 13, Windows 10, Mac laptops, Ubuntu or Google.

Google donated \$1.1 million to Junior Achievement Brazil 2,000 scholarships online IT support professional certificate.

Brazil Google Change the Game training 500 women programmers. Xbox Project Scarlett AMD #7 nano, faster flash memory, late 2020.

Senegal Quicarry & Paps deliver from international online stores.

\$300 desktop UP Xtreme Intel i5 Whiskey Lake #14 nano, 12 to 60 volt power input. "Dune: The Sisterhood" sci-fi 2020.

Swedish Norrsken Foundation investing \$25,000 in Rwanda companies.

Comcast hands free gaze remote control app.

Taiwan Realtek RTD1311 chip has AV1 Video Decoder.

\$243 Vnogn K530-5Gen-F3 desktop, #14 nano 15 watt Intel Core i3-5005U.

International Organization for Migration reducing slavery at Malaysia Samsung.

\$330 Amazon Fire TV 43" Edition, costs \$100 to make.

Vodacom sold Business Africa unit to Angola Internet Technologies. Nigeria, Zambia, Ivory Coast to Synergy Communications & Vodafone Ghana.

DeepGreen ocean mining cobalt, copper, nickel, manganese, rare earth metals \$150 million invested.

Netflix Always Fresh TV certification program.

BET+ Black Entertainment Television online subscription.

Sony investing \$185 million in tech startups.

News.Hoxly.com

China Huawei investing \$793 million in Poland by 2024.

\$65 JBL Flip 4 speaker eBay.

Mexico Grow with Google classes, Digital Garage, Primer, Women Will, Google IT Support Professional Certificate, International Youth Foundation, 100 Google Station Wi-Fi, Google My Business, Smart Campaign ads, Rappi food delivery, transfer money BBVA, Soumaya Museum.

GPD Win Max #14 nano AMD Ryzen Embedded Radeon Vega GPU small laptop early 2020.

\$387 NVisen Mini PC desktop #14 nano Intel Core i7-8565U, 8 gigs RAM [https://m.banggood.com/NVISEN-Mini-Pc-Intel-Core-I7-8565U-Intel-UHD-Graphics-620-Quad-Core-8GB-DDR4-128GB-256GB-SSD-Eight-Threads-2DDR4-M\\_2-SSD-Add-SATA-HDD-4K-Double-Display-Mini-Computer-p-1526267.html](https://m.banggood.com/NVISEN-Mini-Pc-Intel-Core-I7-8565U-Intel-UHD-Graphics-620-Quad-Core-8GB-DDR4-128GB-256GB-SSD-Eight-Threads-2DDR4-M_2-SSD-Add-SATA-HDD-4K-Double-Display-Mini-Computer-p-1526267.html)

\$200 Nintendo Switch Lite, 5.5" low quality screen, crippled apps no Android, 3 hour battery, September. Better to buy #10 nano Qualcomm phone same price.

Amazon \$700 million training 100,000 programmers.

BP3901 earthquake detector.

Philippines, Taiwan AcBel Polytech power supplies.

Egypt Trella trucking app \$600,000 invested.

Chinese "cell phones, laptops, video game consoles, certain toys, computer monitors, some footwear clothing" USA import tax December 15.

Rumor: \$700+ China Oppo OnePlus7T 5G, Qualcomm 855+ late 2019.

\$140 China Realme 5, #11 nano slow Qualcomm 665, bad screen, for India.

South Africa Kweza retail store supply delivery \$100,000 invested.

Intel Frost Canyon NUC desktop 2020 #14 nano Comet Lake U, Intel UHD GPU, not good as Xe

GPU.

\$600 Taiwan Asus ZenBook 14 UM431DA laptop, #12 nano AMD Ryzen 5 3500U Radeon Vega GPU, 15 watts, 3 pounds.

Asurion bought uBreakiFix repair stores.

\$515 China Oppo Reno2, #8 nano Qualcomm 730G, 6.5" OLED, India. Should have been \$400.

Samsung Exynos 980 #8 nano ARM Cortex A77 CPU, Mali G76 GPU, 5G antenna.

\$87 Nokia Power Earbuds wireless Bluetooth 5, IPX7 water resistant.

\$100 Audio Technica ATH-CK3TW wireless earphones.

\$150 China Hisense A5, 5.8" E-Ink black & white, #14 nano Qualcomm 660.

\$300 Peakago 7" IPS touchscreen laptop, #14 nano obsolete Intel Atom x5-Z8350.

Israel Trigo grocery check-out cameras \$22 million invested.

[www.Arc.dev](http://www.Arc.dev) Arc for hiring foreign remote programmers.

Indonesia Shipper e-commerce logistics for Tokopedia, Shopee, Bukalapak, Lazada.com \$5 million invested.

Cree LED invested \$1 billion silicon carbide factory NY Marcy Nanocenter.

Trump, "Small number of social media platforms acquiring immense power over what we can see."

\$1,000 China OnePlus Google TV 55" Quantum Dot 4K, #28 nano Taiwan MediaTek MT5670 Mali G51, Q1 50 watt speakers.

SUNY Polytechnic Institute \$6 million National Science Foundation grant chip workforce certification.

Broadcom BCM7218X desktop chip AV1 hardware HDR video decoding, Vulkan 1.1.

Brazil Madeira Madeira home goods store \$110 million invested by SoftBank.

\$800 OneMix 3Pro 8" IPS laptop, #14 nano Comet Lake-Y Intel Core i5-10210Y, 7 watts.

USA TV channel "Masters of Doom" about game programming.

Dog nose-activated touchscreens.

[www.wired.com/story/the-tech-helping-dogs-learn-to-communicate-with-humans](http://www.wired.com/story/the-tech-helping-dogs-learn-to-communicate-with-humans)

ShopPremiumOutlets.com 300,000 products.

\$1,000 Microsoft Surface Pro X 13", 1.75 lbs, Microsoft Qualcomm SQ1 #7 nano ARM chip, 7 watts, competes with faster Surface Neo #10 nano Intel Lakefield.

Microsoft Surface Duo 10" folding Google phone #7 nano Qualcomm 855 early 2021.

\$250 overpriced Microsoft Surface Earbuds voice commands for Office apps.

\$14 Xiaomi EraClean ultrasonic cleaner.

Intel The Element upgradeable desktops 2020.

Steam Remote Play Together app to remote control multiplayer games on Microsoft desktop.

India Reliance credit card cashier machine 1.3% fee, \$0.25 delivery.

Mexico Zubale telecommute \$4 million invested.

Nigeria police stole from tech workers.

<https://techcrunch.com/2019/10/16/nigerias-stoprobbingus-campaign-could-spur-tech-advocacy-group-ceos-say>

Make more land next to San Francisco. [www.lesswrong.com/posts/vKErZy7TFhjxtBuG/make-more-land](http://www.lesswrong.com/posts/vKErZy7TFhjxtBuG/make-more-land)

Minnesota SkyWater obsolete #90 nano chip factory researching MEMS, silicon photonics, carbon nanotube superconductors.

Weibu Windows 10" laptop Qualcomm 8cx #7 nano 2020. "Claws of the Red Dragon" movie about Chinese Huawei untrustworthy.

Ethiopia to sell 2 wireless licences to multinational phone companies April 2020.

\$100 PrinCube portable printer.

Amazon delivers to Stage Stores, GNC, Health Mart.

Fabric automated fulfillment centers \$110 million invested.

\$430 Anker Cosmos Max 1080p 900 lumen projector TV.

\$340 China HiSense A6L 5.75" EInk phone, #14 nano Qualcom SnapDragon 660.

Motorola APX Next police walkie-talkie touchscreen with voice commands.

\$1,500 overpriced Samsung Galaxy Book Flex 15" Quantum Dot screen, Intel #10 nano Icelake, NVidia MX250 #12 nano.

\$1,000+ Samsung Galaxy Book S 13" touchscreen laptop, Intel Lakefield #10 nano.

Duke A.I. identifies 200 types of birds.

Brazil Pitzi phone insurance 1 million customers.

Adobe Awesome Audio automatically cleans up music.

Kenya Lori Systems trucking app \$30 million invested by China.

\$69 Verizon Stream Google TV box doesn't support cable TV nor Netflix.

Convoy trucking freight app \$400 million invested.

\$1,500 Motorola Razr folding 6.2" OLED, #10 nano Qualcom 710. Should have been 8 inches.

NASA said Mars magnetic shield dipole closed electric circuit would reduce radiation in atmosphere.

\$340 Peakago Pro 7" laptop, Intel Pentium N4200 #14 nano, 8 gigs RAM.

\$35 Amazon Fire TV Blaster for infrared remote controls.

Uganda Samasource AI training data provider \$14.8 million invested.

Rumor: Amazon streaming game service 2020.

\$800 Intel NUCI Oi7FNKP6 10 Frost Canyon desktop, #14 nano Intel i7 Comet Lake, 8 gigs RAM.

\$40,000 Tesla Cybertruck tows 14,000 lbs or 3,500 lb cargo, optional 15 mile per day solar roof.

Tesla Cyberquad electric ATV.

Spanish VTex order & inventory management; front-end customer experience, \$140 million invested.

\$70/year Nigeria, Ghana, Gambia, Sierra Leone uLesson homeschool textbooks on SD card, headphones for Google phones, \$3 million invested. Competes with free Wikiversity & WikiBooks.

Less than \$100 China Lenovo Leez P515 desktop, obsolete 32 bit #28 nano Texas Instruments Sitara

AM5708, PowerVR SGX544 bad GPU, Vivante GC320.

Rossum Cognitive Data Capture document OCR scanner \$4.5 million invested.

Less than \$1,000 Amazon ARM Cortex a76 server desktop #7 nano, Neoverse N1, 32 CPU cores.

Amazon cloud \$35 billion/year.

Japan Panasonic sold image sensor, laser, MOSFET, motor driver unit to Taiwan Nuvoton \$250 million.

Immunant C2Rust converts C++ to faster Rust apps.

\$500+ Intel Austin Beach rugged metal case NUC Compute Element Chandler Bay desktop, BKCM8i7CB8N Core i7-8565U, 8 gigs LPDDR3 RAM.

\$100 Amazon piano keyboard + \$2.15/hour server DeepComposer.

Yallvend, AuthMe, BiiLabs vending machines for cigarettes with age verification.

Rumor: Apple laptop mini LED backlight 2020, Taiwan Zhen Ding Tech.

Taiwan Unimicron Uniflex FlexiblePCB ultra-thin mini LED backlight, mass transfer.  
Microsoft Project Verona Windows 10 Rust language.

Tesla laser windshield wipers.

Amazon CodeGuru finds programming mistakes.

Vietnam VinFast electric cars in USA 2021 \$2 billion invested.

Google gave \$1 million to Injaz training digital skills in Arabic.

Rumor: Apple internet satellites.

SpaceX Starlink Terminal satellite internet antenna.

Dutch Airbliss+ anti-air pollution mask.

Taiwan Apex PCB factory Thailand.

### References Bibliography:

<https://www.raspberrypi.org/feed/> <https://www.aclu.org/taxonomy/channel-term/1/feed>

<http://gpuopen.com/feed/>

<http://feeds.feedburner.com/armdevices?format=xml> <http://mobilesemi.blogspot.com/feeds/posts/default>

<http://feeds.feedburner.com/cnx-software/blog?format=xml> <http://boingboing.net/feed> <http://atomicsupermen.world/feed>

<http://feeds.feedburner.com/Gizchinacom?format=xml> <http://semiaccurate.com/feed/>

<http://anandtech.com/rss/>

<http://www.fudzilla.com/?format=feed> <http://semiengineering.com/feed/>

<http://www.fark.com/fark.rss> <http://feeds.reuters.com/reuters/oddlyEnoughNews?format=xml>

<http://www.reddit.com/r/nottheonion/.rss> <http://www.phdcomics.com/gradfeed.php>

<http://media.nxp.com/corporate.rss?c=254228&Rule=Cat=new...> <http://blog.nxp.com/feed>

<http://www.engadget.com/rss.xml> <http://feeds.feedburner.com/IeeeSpectrumFullText> <http://static.fsf.org/fsforg/rss>

<https://stallman.org/rss/rss.xml>

<http://freegamer.blogspot.com/feeds/posts/default> <http://www.phoronix.com/phoronix-rss.php>

<http://feedity.com/futuretimeline-net/VVFXVFDV.rss> <http://www.vivantecorp.com/index.php/en/media-article/news.f...> <https://9to5google.com/feed>

<http://www.xda-developers.com/feed/> <http://www.androidauthority.com/feed> <http://www.androidpolice.com/feed>

<https://news.ycombinator.com/rss>

<http://www.tomshardware.com/feeds/rss2/all.xml> <https://phoneradar.com/feed/> <http://www.umpcportal.com/feed>

<http://feeds.feedburner.com/Liliputing?format=xml> <https://www.eff.org/rss/pressrelease> <http://makezine.com/feed>

<https://www.microLED-info.com/rss.xml> <http://news.mit.edu/rss/topic/nanotech> <http://news.mit.edu/rss/topic/electrical-engineering>

<http://feeds.feedburner.com/IntoMobile?format=xml> <http://feeds.feedburner.com/NanotechwebTechUp>

<http://www.mondo2000.com/feed/>

<http://gliden64.blogspot.com/feeds/posts/default>

<http://www.lakka.tv/articles/feed.xml> <http://www.jeffq.com/blog/feed/> <https://github.com/Kloen/citra-android/commits/master.atom> <http://www.reddit.com/r/EmulationOnAndroid+minipcs.rss> <https://dolphin-emu.org/blog/feeds/> <http://www.oLED-display.net/feed/> <http://feeds.feedburner.com/KhronosorgNews>

<http://feeds.feedburner.com/oLED-info>

<https://www.reddit.com/r/pigrow.rss> <http://www.pocketables.com/feed> <http://www.popsci.com/full-feed/science> <http://www.cringely.com/feed/>

<http://bloggingthemonkey.blogspot.com/feeds/posts/default> <http://feeds.feedburner.com/reason/AllArticles>

[http://www.reddit.com/r/Raspberry\\_pi\\_projects+Purei.rss](http://www.reddit.com/r/Raspberry_pi_projects+Purei.rss) <https://retropie.org.uk/feed/> <https://www.calbox.com/>

http://www.libretro.com/index.php/feed/ https://androidpctv.com/feed/ http://www.sammobile.com/feed/  
https://www.antifraudnews.com/feed/  
http://feeds.feedburner.com/AllDiscovermagazineContent?fo... https://www.quantamagazine.org/feed  
http://www.cancelLEDscifi.com/feed/  
http://www.digitimes.com/rss/daily.xml http://feeds.arstechnica.com/arstechnica/index http://feeds.feedburner.com/  
https://www.techdirt.com/techdirt\_rss.xml http://www.extremetech.com/feed http://www.theverge.com/rss/full.xml  
https://osmc.tv/rss  
http://www.picopros.com/rss.xml http://feeds.feedburner.com/picoprojector-info?format=xml http://rss.slashdot.org/  
http://xbmc.org/feed/  
http://www.wired.com/feed/ http://xenia.jp/feed.xml  
Thank you teachers 9 to 5 Google, Anand Tech, Android Authority, Android PC TV, Android Police, Anti Fraud News, ARM Devices, Ars Technica, Blogging the Monkey, Boing Boing, Cancelled SciFi, Citra Android, CNX Software, Cringely, Digi Times, Discover Magazine, Dolphin Emu, EFF, Engadget, Extreme Tech, FDroid, Free Gamer, FSF, FUDzilla, Future Timeline, Giz China, GlideN64, GPU Open, IEEE Spectrum, Into Mobile, Jeff Q, Khronos OpenGL Vulkan, Kodi TV, Lakka, Lib Retro, Liliputing, Make Zine, MicroLED Info, Mobile Semi, Mondo 2000, Nano Tech Web Update, OLED Info, OSMC TV, Phone Radar, Phoronix, Pi Grow, Pico Projector Info, Pico Pros, Pocketables, Pop Sci, Quanta Magazine, Raspberry Pi, Reason, Recal Box, Retro Pie, Richard Stallman, Sam Mobile, Semi Accurate, Semi Engineering, SlashDot, Tech Crunch, Tech Dirt, The Verge, Toms Hardware, UMPC Portal, Vivante, Wired, XDA Developers, Xenia.

RSS OPML (list of websites file):

```
<?xml version="1.0" encoding="UTF-8"?> <opml version="1.0"> <head> <title>Subscriptions - RSS</title> </head> <body> <outline type="rss" xmlUrl="http://rss.slashdot.org/Slashdot/slashdot"/> <outline type="rss" xmlUrl="https://www.raspberrypi.org/feed/"> <outline type="rss" xmlUrl="https://www.aclu.org/taxonomy/term/1/feed"/> <outline type="rss" xmlUrl="http://gpuopen.com/feed/"> <outline type="rss" xmlUrl="http://feeds.feedburner.com/armdevices?format=xml"/> <outline type="rss" xmlUrl="http://mobilesemi.blogspot.com/feeds/feeds?format=xml"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/cnx-software/blog?format=xml"/> <outline type="rss" xmlUrl="http://boingboing.net/feed"/> <outline type="rss" xmlUrl="http://atomicsupermen.wordpress.com/atom/atom?format=atom"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/Gizchinacom?format=xml"/> <outline type="rss" xmlUrl="http://semiaccurate.com/feed"/> <outline type="rss" xmlUrl="http://anandtech.com/rss"/> <outline type="rss" xmlUrl="http://www.fudzilla.com/?format=feed"/> <outline type="rss" xmlUrl="http://www.fark.com/fark.rss"/> <outline type="rss" xmlUrl="http://feeds.reuters.com/reuters/oddlyEnoughNews?format=xml"/> <outline type="rss" xmlUrl="http://www.clickhole.com/feeds/rss"/> <outline type="rss" xmlUrl="http://www.reddit.com/feeds/reddithome?format=xml"/> <outline type="rss" xmlUrl="http://www.phdcomics.com/gradfeed.php"/> <outline type="rss" xmlUrl="http://www.comics.com/rss.php"/> <outline type="rss" xmlUrl="https://xkcd.com/rss.xml"/> <outline type="rss" xmlUrl="http://media.nxp.com/corporate.rss?c=254228&Rule=Cat=news~subcat=ALL"/> <outline type="rss" xmlUrl="http://blog.nxp.com/feed"/> <outline type="rss" xmlUrl="http://www.engadget.com/rss.xml"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/IeeeSpectrumFullText"/> <outline type="rss" xmlUrl="http://static.fsf.org/fsforg/rss/news.xml"/> <outline type="rss" xmlUrl="https://stallman.org/rss/rss.xml"/> <outline type="rss" xmlUrl="http://freegamer.blogspot.com/feeds/posts/default"/> <outline type="rss" xmlUrl="http://www.phoronix.com/phoronix-rss.php"/> <outline type="rss" xmlUrl="http://feedity.com/futuretim...
```

```
net/VVFXVFDV.rss"/> <outline type="rss" xmlUrl="http://www.vivantecorp.com/index.php/en/media-article/news.feed?type=rss"/> <outline type="rss" xmlUrl="https://9to5google.com/feed"/> <outline type="rss" xmlUrl="http://www.xda-developers.com/feed"/> <outline type="rss" xmlUrl="http://www.androidauthor.com/feed"/> <outline type="rss" xmlUrl="http://www.androidpolice.com/feed"/> <outline type="rss" xmlUrl="https://news.ycombinator.com/rss"/> <outline type="rss" xmlUrl="http://www.tomshardware.com/feeds/rss2/all.xml"/> <outline type="rss" xmlUrl="https://phoneradar.com/feed"/> <outline type="rss" xmlUrl="http://www.umpcportal.com/feed"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/Liliputing?format=xml"/> <outline type="rss" xmlUrl="https://www.eff.org/rss/pressrelease"/> <outline type="rss" xmlUrl="http://makezine.com/feed"/> <outline type="rss" xmlUrl="https://www.microled-info.com/rss.xml"/> <outline type="rss" xmlUrl="http://news.mit.edu/rss/topic/nanotech"/> <outline type="rss" xmlUrl="http://news.mit.edu/rss/topic/electrical-engineering"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/IntoMobile?format=xml"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/NanotechwebTechUpdate"/> <outline type="rss" xmlUrl="http://www.mondo2000.com/feed"/> <outline type="rss" xmlUrl="http://gliden64.blogspot.com/feeds/posts/default.xml"/> <outline type="rss" xmlUrl="http://www.lakka.tv/articles/feed.xml"/> <outline type="rss" xmlUrl="http://www.jeffgeerling.com/feed.xml"/> <outline type="rss" xmlUrl="https://github.com/Kloen/citra-android/commits/master.atom"/> <outline type="rss" xmlUrl="http://www.reddit.com/r/EmulationOnAndroid+minipc/rss"/> <outline type="rss" xmlUrl="https://dolphin-emu.org/blog/feeds"/> <outline type="rss" xmlUrl="http://www.oled-display.net/feed"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/KhronosorgNews"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/oled-info"/> <outline type="rss" xmlUrl="https://www.reddit.com/r/pigrow/rss"/> <outline type="rss" xmlUrl="http://www.pocketables.com/feed"/> <outline type="rss" xmlUrl="http://www.popsci.com/feed/science"/> <outline type="rss" xmlUrl="http://www.cringely.com/feed"/> <outline type="rss" xmlUrl="http://bloggingthemonkey.blogspot.com/feeds/posts/default"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/retropie.org.uk/feed"/> <outline type="rss" xmlUrl="https://www.recalbox.com/rss"/> <outline type="rss" xmlUrl="http://www.libretro.com/index.php/feed"/> <outline type="rss" xmlUrl="https://androidpctv.com/feed"/> <outline type="rss" xmlUrl="http://www.sammobile.com/feed"/> <outline type="rss" xmlUrl="https://www.antifraudnews.com/feed"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/quantamagazine.org/feed"/> <outline type="rss" xmlUrl="http://www.cnet.com/rss/digital.xml"/> <outline type="rss" xmlUrl="http://www.arstechnica.com/arstechnica/index"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/extremetech/com/feed"/> <outline type="rss" xmlUrl="https://www.techdirt.com/techdirt_rss.xml"/> <outline type="rss" xmlUrl="http://www.extremetech.com/feed"/> <outline type="rss" xmlUrl="http://www.theverge.com/rss/full.xml"/> <outline type="rss" xmlUrl="https://osmc.tv/rss"/> <outline type="rss" xmlUrl="http://www.picopros.com/rss.xml"/> <outline type="rss" xmlUrl="http://feeds.feedburner.com/picoprojector-info?format=xml"/> <outline type="rss" xmlUrl="http://xbmc.org/feed"/> <outline type="rss" xmlUrl="http://www.wired.com/feed"/> <outline type="rss" xmlUrl="http://xenia.jp/feed.xml"/> </body> </opml>
```

</opml>