Abstract: Recent pushes to reduce wireless sensor node power consumption have targeted sensors detecting the signal of interest, e.g. acoustic, acceleration, rotation, and use the energy in the signal to trigger switches. Regardless of the sensing modality however, all wireless sensors include some form of data communication radio, which in many cases is constantly consuming power. We take inspiration from a very low sub-threshold current and low switching-energy NEMS switch to implement a near zero-power laterally actuated NEMS electrostatic RF wake-up switch to reduce passive power draw by the RF electronics. The switch is operated by holding a mechanical contact gap just outside of thermal fluctuations and an RF signal acts to physically close the switch. Focused ion beam is utilized to achieve sub-100 nm platinum contact gaps, allowing for below 3V operation and improved reliability. Preliminary results are presented from a custom vacuum probe station utilizing a switch position control loop for the contact-based switch operating off resonance.

Biography: Alexander Ruyack received a B.S. degree in Materials Science and Engineering from Cornell University in 2013. He is currently a graduate student in Electrical and Computer Engineer at Cornell University within the SonicMEMS lab. As a graduate student, he is focusing on a wide breadth of research pertaining to wireless sensor nodes including: vaporizable electronics, alkali metal-based power generation, zero power piezoelectric sensors, inertial sensors for high dynamic range applications and near zero power RF wake-up switches. He has worked previously on graphene and carbon nanotube growth and manipulation as well as nanoparticle and quantum dot synthesis and functionalization. He is also currently a Cornell NanoScale Science & Technology Facility Fellow and is working on block copolymer resists for nm scale periodic features.

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