

# Ashkar Ibne Awal

U.S. Citizen | +1 470-306-8725 | Email: [aawal3@gatech.edu](mailto:aawal3@gatech.edu) | LinkedIn/Portfolio:



## EDUCATION

### GEORGIA INSTITUTE OF TECHNOLOGY

- Bachelor of Science in Aerospace Engineering: GPA: 3.81/4.0
- Master of Science in Aerospace Engineering

Atlanta, Georgia  
Graduation: *December 2022*  
Expected Graduation: *May 2024*

## WORK EXPERIENCE

### Blue Origin, LLC

Graduate Intern – New Glenn LSAI Autonomy

- Implementing Local Autonomy Architecture (LAA) control laws in MATLAB, Simulink and Stateflow

Kent, Washington  
*January, 2023 - Present*

### Bell Textron Inc.

Innovations Team Intern – Advanced Technologies

- Designed (CATIA) AI tank enabling x4 times more hydrogen storage, thermal analysis of internal expanding honeycomb mesh
- Designed Bell Hydrogen Lab's first hydrogen fuel cell iron bird (CATIA) for testing future electrification of rotorcraft
- Used MS Flows and Power Apps to integrate Bell Innovation projects with GovWin searches, and company-wide access capabilities

Fort Worth, Texas  
*May – August 2022*

### Undergraduate Teaching Assistant – Georgia Institute of Technology

AE 2220 - Aerospace Dynamics UTA

- Host recitations to review concepts learned in class, provide homework and project help to students

Atlanta, Georgia  
*January – May 2022*

## UNDERGRADUATE RESEARCH

### Dynamics and Control Systems Laboratory - Georgia Institute of Technology

Control and Operations Simulator of Multi-Spacecraft on Orbit Systems - COSMOS

- PCB design (Altium, Eagle) and assembly for Arduino thruster board, flyback diode boards, RPi 4 flight computer
- I2C protocol setup between motor controller and flight computer using MATLAB/Simulink
- Design, size (SolidWorks, AutoCAD) and manufacture (machine shop) sensor mounting boards under tight tolerances
- Learn GNC laws and cost-based optimization algorithms for object satellite object detection and avoidance

Atlanta, Georgia  
*August 2021 - Present*

## LEADERSHIP

### Ramblin' Rockets Club – Guidance Navigation and Controls (GNC)

- Controls team lead for first student-led, actively-controlled and guided vehicle at RRC
- Teach controls topics (dynamical equations, LQR, PID, state-space, Simulink) to new members

*September 2022 – Present*

### Design-Build-Fly – SAE Aero Design Competition (Advanced Class)

- XFOIL, AVL and OpenVSP to design, test airfoils and aircraft configurations for max payload, min drag and empty weight
- SolidWorks, Excel for FEA and Euler-Bernoulli beam deflection to size spar with <2.5in tip deflection at max wing loading
- Dual GPS + rangefinder ground target acquisition system, detect 2ft circle on ground with <6 ft error
- Design drop mechanism for smaller plane to reliably launch from main aircraft under various aerodynamic loads, orientations
- Mill, lathe, 3D printing, laser cutting, composite material (epoxy + carbon fiber) skills used for aircraft manufacture
- SAE Aero Design East Competition – Design report, Presentation, Mission Performance: 2<sup>nd</sup>, 3<sup>rd</sup>, 2<sup>nd</sup> (2022) | 1<sup>st</sup>, 1<sup>st</sup> (2021)

*August 2020 - Present*

## COURSES/PROJECTS

### Robotics and Autonomy – AE 4803

- Cart-pole (inverted pendulum) controller (MATLAB, Simulink, C++) using LQR (discrete and continuous time)
- Optimal control, trajectory optimization using Differential Dynamic Programming and Model Predictive Control algorithms

*Fall 2022*

### Dynamics and Controls Laboratory – AE 4610

- Controller design for linked motor, dual rotors, inverted pendulum dynamics
- Apply LQR, state-space modelling in MATLAB/Simulink to assess model performance on real machines

*Fall 2022*

### Space Systems Design – AE 4342

- Homesteading Mars Mission – NASA RASC-AL competition
- Human exploration architecture of Mars, enable astronauts to survive on Mars surface for  $\geq 7$  years with minimal support from Earth

*Fall 2022*

### Spacecraft Flight Dynamics – AE 4532

- Using orbital elements and ode45 (MATLAB) for orbit propagation, checking for projectile collisions and oblateness effects
- Implement Patched Conics, Hohmann, Bi-elliptic transfers and Gravity Assist methods to design interplanetary trajectories
- Attitude control for axisymmetric torque-free satellites using thrusters, gravity gradients, momentum exchange devices
- Develop Clohessy–Wiltshire equation solver for rendezvous and docking missions (MATLAB)

*Spring 2022*

### Space Flight Operations – AE 4361

- Ground tracking/Sky Plots: Use elevation masking, ground station geometry to check satellite visibility from ground station
- Design link budgets, communication systems and satellite formations for varying Earth coverage and data transfer requirements
- Design launch operations, rocket stages and human factors considerations for safe manned interplanetary missions

*Spring 2022*

### Advanced Aerodynamics – AE 6015

- Vortex Lattice Theory (MATLAB) applied to swept wings, matched experimental data (<2% error) by Weber & Brebner (1958)
- Estimating shock angle in ideal supersonic flows using tangent wedge/cone analysis (MATLAB)
- Improving above model with Bose-Einstein real gas model in hypersonic flows. Data matched with Whitmore (AIAA, 2007)

*Spring 2022*