Fazle Rabbi Zaki

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EDUCATION

University of Michigan Ann Arbor, MI
B.S.E. in Aerospace Engineering *Expected May 2026*
- Dean's Honor List: Fall 2025
- Coursework: Attitude Determination & Control Systems (grad), Engineering for Space Environment (grad), Automatic Control, Space System Design, Spacecraft Dynamics, Propulsion, Aerodynamics

TECHNICAL SKILLS

GNC/ADCS:	Rigid-body dynamics, quaternion kinematics, B-dot detumble, PID/LQR control, state estimation (TRIAD, EKF), momentum management, hardware-in-the-loop testing
Software:	Python (NumPy, SciPy, pandas), MATLAB/Simulink, C++, Git
CAD/Analysis:	SolidWorks, CATIA, STAR-CCM+ (CFD)
Embedded/Lab:	Arduino, Raspberry Pi, UART/I2C/SPI, oscilloscope, DAQ systems, multimeter, soldering

ENGINEERING PROJECTS

CubeSat ADCS Imaging Testbed Ann Arbor, MI
ADCS & Systems Lead | University of Michigan (Graduate-Level Course) *Aug 2025 – Dec 2025*
- Designed and integrated 1U-class CubeSat prototype (0.95 kg) with reaction wheel, torque rods, IMU, and Raspberry Pi camera modules for autonomous detumble-to-imaging operations
- Developed MATLAB EKF (angle + rate states) and TRIAD-based attitude estimation; evaluated sensor/actuator resolution limits and proposed 12-bit motor control to meet 0.001 rad/s rate step requirement
- Led systems engineering for 15-member team: derived Level-1 requirements, maintained mass/power/cost budgets, and delivered $3,000 total system cost vs $6,000 cap
- Designed Helmholtz coil HIL testbed producing $\geq 3\times$ Earth field strength (168 μT) with $\leq 10\%$ reproducibility; demonstrated spin stoppage in 50 s during functional test

Horizontal-Axis Wind Turbine Generator Ann Arbor, MI
Design Engineer | University of Michigan *Jan 2024 – Apr 2024*
- Designed and built self-yawing 1.54 m HAWT (three 0.80 m blades) on $110 budget; generated 6.453 V peak output during rooftop tests
- Verified structural integrity through five safety inspections, including 300 N lateral load test and high-wind disassembly, enabling rooftop deployment approval
- Instrumented and analyzed performance (TSR up to 7.2); diagnosed drivetrain losses and recommended 1:3 gearing to increase generator shaft speed

Titan Air Puck Ann Arbor, MI
Design Engineer | University of Michigan *Jan 2023 – Apr 2023*
- Modeled hexagonal lift platform in CATIA and validated with STAR-CCM+ CFD to optimize lift-to-power ratio, simulating 1.41 N lift at 1.51 W input
- Built and tested prototype at 269 g system mass (<800 g constraint); demonstrated 6.68 s minimum crossing time and lifted 80 g payload in competition
- Executed design trade studies on plenum/skirt geometry and materials to improve sealing and lift stability for Titan-environment concept

Low-Altitude Hovercraft Ann Arbor, MI
Design Engineer | University of Michigan *Jan 2023 – Apr 2023*
- Performed internal/external CFD in STAR-CCM+ on Milano geometry; predicted 4.22 N lift and $C_D = 1.09$ to size lift fan within 25 W power budget
- Managed mass budget to 490.62 g through iterative CAD and component trades while maintaining stability and payload integration
- Validated performance via benchtop and course testing; achieved 18.2 s straight-line run and retrieved 36 payloads in competition

ACTIVITIES

Michigan Aeronautical Science Association (MASA) Ann Arbor, MI
Avionics Subteam Member *Aug 2025 – Present*
- Integrating avionics subsystems for hybrid rocket targeting 30,000 ft apogee; contributing to cold-flow tests and HITL infrastructure for sensor/pyro telemetry verification
- Configuring ground support equipment and executing E-Box sensor checkout for propulsion testing at MCity facility