Robotics Capstone Project:
Space and Extreme Environment Robotics

Course Information

- **Instructor:** Yashwanth Nakka (ynakka3@gatech.edu)
- **Course Prefix and Number:** AE 8741
- **Course Name:** Robotics Capstone Project — Space and Extreme Environment Robotics
- **Term:** Summer 2026

Course Description

This course provides academic credit for a significant robotics capstone project focused on space and extreme environment applications, conducted under the supervision of a Georgia Tech faculty advisor. Students will apply the knowledge and skills acquired throughout their degree program to real-world challenges in domains such as orbital servicing, planetary exploration, in-space assembly, deep-sea operations, and other environments characterized by microgravity, thermal extremes, radiation, communication delays, or limited human access. The course does not involve regular class meetings, assignments, or examinations. The scope, direction, and specific deliverables of the project are determined by the student in consultation with the project advisor.

Course Learning Outcomes

By enrolling in this course, students will:

1. Design and integrate complex robotics systems tailored for operation in space or extreme environments, addressing challenges such as microgravity dynamics, communication latency, thermal management, and autonomous decision-making.
2. Apply critical thinking and aerospace engineering principles to formulate and solve real-world problems in domains including orbital robotics, planetary surface exploration, in-situ resource utilization, and remote or hazardous operations.
3. Demonstrate effective project management and technical communication skills, including the ability to define milestones, manage hardware/software integration timelines, and document design trade studies.
4. Communicate project activity through interactions with their project advisor and final demonstrations, which may include simulation results, hardware prototypes, field tests, or mission-concept reviews.

Required Course Materials

No textbooks or materials are required. Resources, hardware, software, and simulation tools (e.g., ROS/ROS 2, Gazebo, MATLAB/Simulink, spacecraft dynamics simulators) relevant to the capstone project are determined in consultation with the project advisor.

Grading Policy

This course is typically graded on a Satisfactory (S) / Unsatisfactory (U) basis.

- A grade of **Satisfactory (S)** indicates that the student has made acceptable progress in their capstone project, met the agreed-upon milestones, and demonstrated professional-level competency in their final project deliverables.
- A grade of **Unsatisfactory (U)** indicates that the student did not meet the expectations for satisfactory performance during the term.

Attendance Policy

This course does not include scheduled class meetings. Students conduct independent project work under the supervision of a project advisor. The frequency and format of student–advisor contact (e.g., weekly stand-ups, lab meetings) are determined by mutual agreement.

Academic and Research Honesty/Integrity Statement

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review the Student Code of Conduct and the Academic Honor Code.

Students are expected to perform their capstone project work in an ethical and responsible manner, especially concerning data integrity and collaborative contributions.

Core IMPACTS

Not applicable.

Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Expectations of Advisors and Advisees

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The university articulates some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.