

Visual Based Navigation for a Lunar Environment

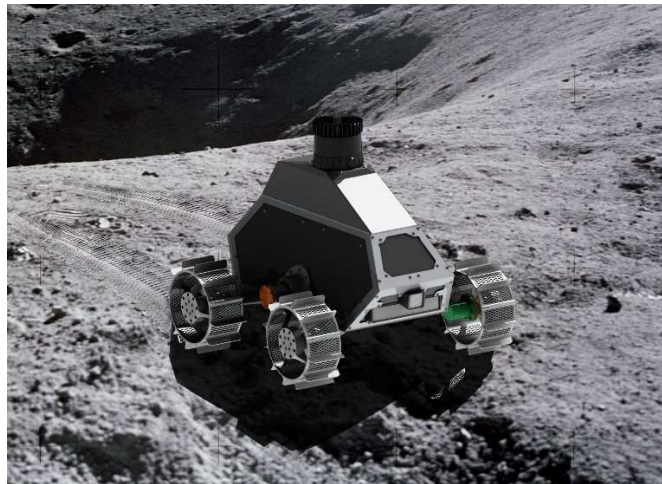
Justin Cyrus, CEO Lunar Outpost, (justin@lunaroutpost.com)

Company Background:

Lunar Outpost Inc. is an advanced technology company with a focus on developing technologies that have both terrestrial and space applications. Comprised of engineers with experience working on NASA, defense, and commercial programs, Lunar Outpost is engaged in contracts with the U.S. Air Force, NASA, local and state government organizations, and leading research institutions. Other current projects include a prototype life support system for Lockheed Martin's Lunar Habitat module; the Lunar Prospector (MAPP), a rover designed to map resources on the Lunar surface; the Bloomberg Mayor's Challenge; Denver's Smart Cities Initiative and more...

Description of Work to Be Done:

The work to be done is towards a Visual Based Navigation (VBN) stack in support of MAPP, Lunar Outpost's Mobile Autonomous Prospecting Platform designed to explore and map the Lunar and Martian surfaces. The VBN operates independently of the on-board LIDAR while also integrating into the autonomous navigation stack implemented by Lunar Outpost's team.



A Rendering of MAPP on the Lunar Surface

The students will be involved in every phase of the project 'from design through implementation'. During the design phase the students will interact with Lunar Outpost engineers to see what will provide value for operation on the lunar surface. From there the project overview will be created and the work divided into tasks.

As a final product, the software will intake data from the camera and process the data on-board an NVIDIA Jetson TX2 or Raspberry Pi. The three main functionalities will be: 1. Ability to autonomously navigate an environment, while avoiding obstacles, using only the camera. 2. Knowing where the robot is in relation to its environment, including starting points. 3. Being able to integrate into the preexisting navigation stack.

Justin Cyrus, the CEO of Lunar Outpost, will be managing this project on the Lunar Outpost side. Mr. Cyrus has extensive software development and project management experience and can help mentor the student team throughout this course.



MAPP being tested at Colorado School of Mines' Lunar Testbed Facility

Desired Skill Set for Students:

We understand that all the students in the group might not have the desired hard technical skill. As long as they have the ability to problem solve and the willingness to learn then our engineers can help teach some of these hard-technical skills.

- ROS
- C++
- Python
- Familiar with Linux
- Raspberry Pi /Arduino Experience

Preferred Team Size: 3-5 Students

Given the scope of this project a group of 5 students is preferred but 3 students could also excel given they are willing to problem solve and learn.

Internships at the End of The Course:

We are happy to consider offering internships at the end of the course. During the Summer Field Session, we had 3 out of the team of 5 continue on with us.

Location Where Work Should Be Performed:

We have offices in Golden and in Boulder, CO. The office in Golden, CO is located at 17700 S Golden Rd Unit 102 and has space for a student team. This office is less than a 5-minute drive from CSM campus and should provide a convenient location for the students to meet. We also provide free beverages and snacks to keep the team fueled throughout the day.