3D Visualization Using Stereo Imagery

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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. Department of Defense, NASA, local and state government organizations, and leading research institutions. Other ongoing projects include development of the MAPP rover, a robotic prospector designed to map resources and carry payloads on the lunar surface; deployment of the Canary environmental monitoring system in the energy sector and municipalities across the continent; and contribution to the Mars Oxygen In-Situ Resource Utilization Experiment (MOXIE) onboard the Perseverance rover.

Description of Work to Be Done:

The goal of this project is to build upon the open-source 3D visualization platform, CesiumJS and to integrate Lunar Outpost's visualization telemetry into the platform. Students will be challenged to implement stereo imagery gathered by the Lunar Outpost's MAPP rover into Cesium to display 3D visualizations of the surrounding environment. This is a multidisciplinary project, and will require interaction with visualization telemetry, robotics systems, and Cesium framework.

Figure 1: Screenshot from Lunar Outpost's 3D visualization platform
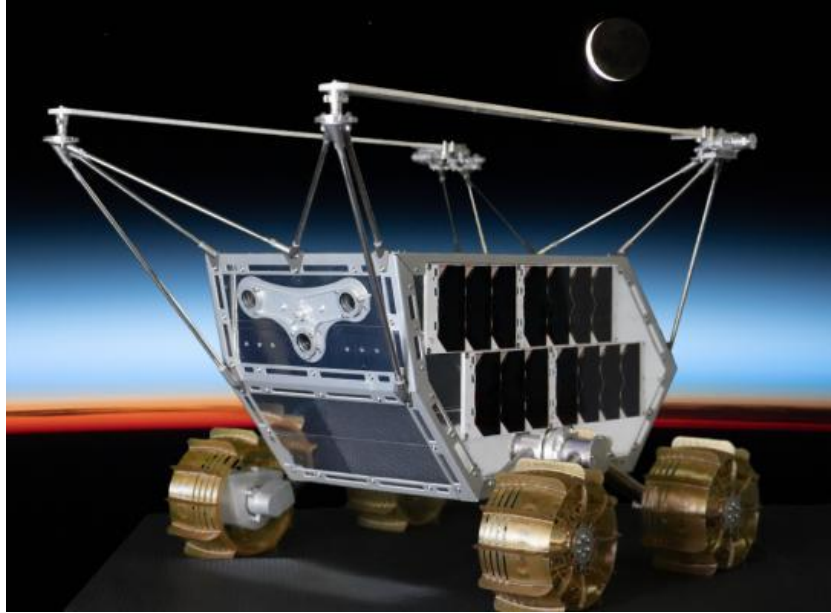
Figure 2: MAPP (Mobile Autonomous Prospecting Platform)

Students will focus their efforts into three specific areas:

1. Convert MAPP's high resolution stereo imagery into 3D tiles that can be utilized by Cesium.
2. Integrate 3D tiles at specific geological locations to display 3D visualizations of the surrounding environment.
3. Conform to Lunar Outpost standards to easily integrate into existing platforms for 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. From there, the project overview will be created, and the work divided into tasks. As a final product, the Field Session team will develop a 3D Lunar graphical interface utilizing telemetry data gathered from Lunar Outpost's MAPP rover.

Jeffrey Stenerson, Senior Software & Electrical Engineer and Jonathon McNabb, Software and Electrical Engineer at Lunar Outpost will be managing this project on the Lunar Outpost side. Both Mr. Stenerson and Mr. McNabb has extensive software development and project management experience and can help mentor the student team throughout this course.
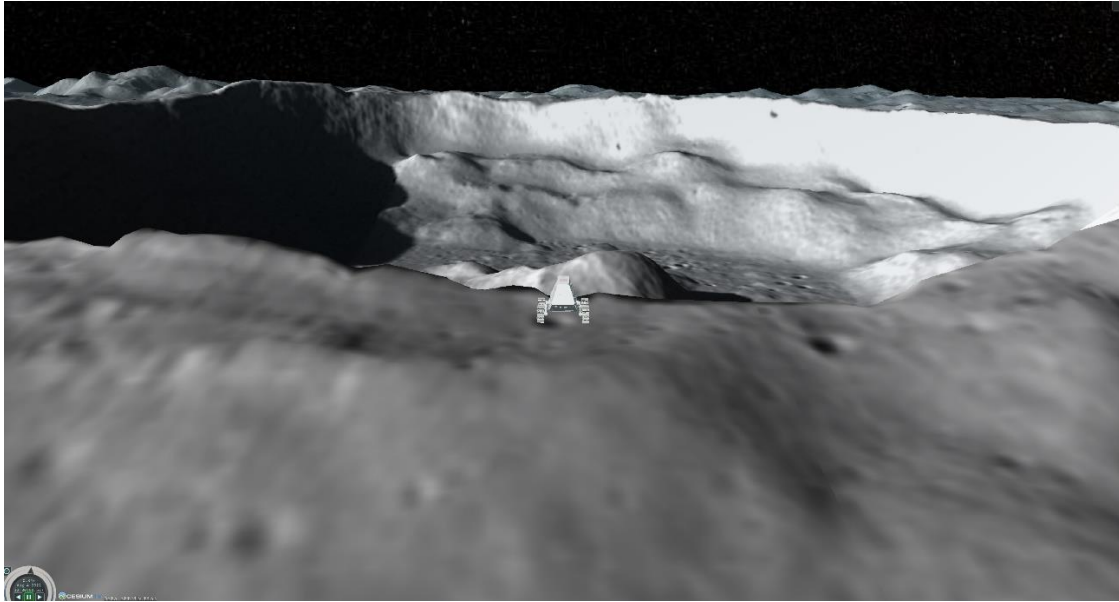
Figure 3: Screenshot from Lunar Outpost's 3D visualization platform

Desired Skills for Students:

1. Cesium
2. JavaScript
3. C++
4. ThreeJS
5. Python

We understand not all the students in the group might have the desired technical skills. However, if they can problem solve and have a willingness to learn, they can excel in this project with the help of our talented engineers.

Preferred Team Size: 4-5 students

Given the scope of this project a group of 4 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.

Location Where Work Would Be Performed:

We plan on a hybrid working environment spread between our offices and the Colorado School of Mines campus