Colorado Space Grant Consortium

Student Positions

This fall semester, COSGC is recruiting only students with very specific experience. Check back spring semester 2021 for more entry-level projects.

Fall 2020 Positions

1. GLEE
2. STEAM
3. Ground Station
GLEE - The Great Lunar Expedition for Everyone

GLEE is a unique mission that involves global collaboration to perform science on the lunar surface. This fall semester students will further the work done from this past summer. Students will work with the diverse team and staff here at COSGC to make this ambitious mission a reality.

GLEE will use palm-sized packages called LunaSats. A LunaSat weighs ~5 grams, is ~0.17 x 4 x 4 cm in size and is flexible.

They are Arduino based and have an extensive sensor suite (accelerometer, temperature, magnetometer, capacitance, conductive and radiation) as well as communication and power systems. GLEE will fly 500 LunaSats in a 3U CubeSat sized spacecraft to the lunar surface and is scalable if launch conditions allow.

GLEE currently has a team with multiple backgrounds and involves students from engineering, science, space policy/law, business, marketing, media, education, and international relations. Great progress was made in all areas of the GLEE project this summer. The LunaSat team completed design of their 3rd revision of the board and are ready to build and test it this semester. The Science team completed many prototypes of the sensors and are ready to test them at the next level this semester. The Spacecraft team went through a major redesign and created a prototype of the deployment system. This semester the team will continue to revise their design and build a second, higher fidelity prototype. The Comms team completed their format and storyboards for the learning modules which will be recorded this semester. Fall semester will culminate in a presentation and demonstration to NASA in early December.

Current Position Openings:

- GLEE Electrical Engineer
- GLEE Communications Team Member
- GLEE Science Team Member
- GLEE Software Member
- Open to CU Boulder students

http://spacegrant.colorado.edu/boulderstudents/howtogetinvolved

Updated 09/03/2020 1:30 PM
<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>GLEE Electrical Engineer</th>
<th><strong>Position #:</strong></th>
<th>G01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project:</strong></td>
<td>GLEE</td>
<td><strong>Available Positions:</strong></td>
<td>2-3</td>
</tr>
</tbody>
</table>

**Description:** Students on the GLEE LunaSat subsystem will work on LunaSats (50 x 50 x 1.7mm embedded systems) for use in a mission to the Moon. Students will specifically be working on the design, prototyping, and testing of the embedded system to meet mission requirements.

Majors: Electrical Engineering  
Grade Level: Junior, Senior

**Minimum Requirements**
- Experience with board layout and schematic design in Altium

**Desired Skills**
- 1. Embedded systems
- 2. Populating boards with small components using a stencil, solder, and solder paste
- 3. Testing and troubleshooting PCB
- 4. Arduino

**Time Commitment:** 10-12 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour
### Job Title: GLEE Communications - EPO

<table>
<thead>
<tr>
<th>Position #:</th>
<th>G02</th>
</tr>
</thead>
</table>

### Project: GLEE

<table>
<thead>
<tr>
<th>Available Positions:</th>
<th>1</th>
</tr>
</thead>
</table>

### Description:

Students working with GLEE Communications and Public Outreach will work to engage students around the world to be involved with GLEE. This will include working with a team to create 10 Khan Academy style tutorial videos. These tutorials (45-60 min long) will be distributed online and used by students who are involved with the GLEE mission to learn about the hardware.

### Minimum Requirements

- Business, Communications, TAM, All Engineering
- Sophomore, Junior, Senior
- Interest in creating online tutorials on a technical subject

### Desired Skills

- Video editing (Final Cut Pro or Premiere Pro preferred) experience
- Scriptwriting experience

### Time Commitment:

10-12 hours/week

### Type of Position:

Biweekly/hourly paid: $15/hour

---

COSGC  
http://spacegrant.colorado.edu/boulderstudents/howtogetinvolved  
Updated 09/03/2020 1:30 PM
<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>GLEE Science Team Member</th>
<th><strong>Position #:</strong></th>
<th>G03</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project:</strong></td>
<td>GLEE</td>
<td><strong>Available Positions:</strong></td>
<td>1-2</td>
</tr>
</tbody>
</table>

**Description:** Members of the science team will research and develop scientific requirements and missions for GLEE. The science team also tests sensors to prove their effectiveness at conducting science on the Lunar surface. Members will be working with the GLEE Science Advisory Board (SAB) by participating in monthly briefings and reviews.

**Minimum Requirements**
- Astrophysical & Planetary Sciences, Physics, All Engineering
- Sophomore, Junior or senior
- Understanding of the scientific process
- Interest in Lunar science

**Desired Skills**
- Arduino experience
- Python experience
- MatLab experience
- Experience with data analysis
- Experience with mission requirement development
- Experience with science validation and verification

**Time Commitment:** 10-12 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour
<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>GLEE Software Member</th>
<th><strong>Position #:</strong></th>
<th>G04</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project:</strong></td>
<td>GLEE</td>
<td><strong>Available Positions:</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

**Description:** Students working as Software Engineers with GLEE will lead the development of embedded software, analysis, and a library which enables students to write their own LunaSat scripts. This will include LunaSat code documentation, verification and validation, and the development and testing of a delay-tolerant LoRA wireless network architecture. This will involve dynamically scaling sampling protocol with associated data relay, aggregation, and presentation.

**Minimum Requirements**
- Computer Science
- Junior, Senior
- Proven programming experience

**Desired Skills**
- Microprocessor programming - Experience working with Arduino ATmega architecture, extensive knowledge of C
- Anaconda numerical analysis suite
- Experience working in the network layer of the OSI model

**Time Commitment:** 10-12 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour
STEAM - Student Thermal Energetic Activity Model

Project Description:
The Student Thermal Energetic Activity Model (STEAM) is a multi-year experiment in collaboration with the Southwest Research Institute (SwRI) to search for signatures of nanoflares and open-field transient release of the solar wind, as well as reconnection based coronal heating mechanisms from the Sun in soft and hard x-ray. The experiment is going on one of four satellites that is part of a NASA SMall EXplorer (SMEX) class mission, PUNCH. The planned instrument delivery is 2022 and planned launch is 2023.

We are looking for someone who can work on STEAM for a minimum of 4 semesters and can work during the summer of 2021 (current sophomores or juniors)

People selected for interviews will be expected to present a 10-15 minute technical presentation related to skills needed for the position.

Any recommended skills not already known can be learned through employment.

US Citizenship is required for all STEAM positions.
<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>Avionics Team Member</th>
<th><strong>Position #:</strong></th>
<th>ST_01</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project:</strong></td>
<td>STEAM</td>
<td><strong>Available Positions:</strong></td>
<td>1</td>
</tr>
</tbody>
</table>

**Description:** The STEAM Avionics sub-team is responsible for developing the electrical and software interfaces with the commercial off the shelf x-ray spectrometers that will be used on STEAM. Students on this team help develop the electrical interfaces with the primary spacecraft. The tasks include FPGA code and testing, hardware integration into a custom PCB design, and testing and verifying hardware and design choices.

**Required Skills**
- Have previous project experience (e.g. prior Space Grant project, freshman projects, internships, etc.)
- Experience programming and integrating microcontrollers and computers into projects and payloads
- Electrical circuit design background (e.g. Current sensing resistors, Op-Amp, ADC, and comparator setups)
- General Programming Experience

**Recommended Skills**
- Code Development in Linux
- FPGA Experience
- VHDL/Verilog and Quartus/Vivado Experience (e.g. Testbench construction, implementing ADCs and other logic elements, and state machine and data packaging implementations)
- Altium PCB Software experience
- PCB Component Population experience
- Soldering, breadboarding, and prototyping experience
- Familiarity with Serial Interfaces: RS-232, RS-422, UART, SPI
- Familiarity with DC power conversion and regulation (e.g. Converters, Regulations, EMI Filters)

**Time Commitment:** 8 - 10 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour

- **We are looking for someone who can work on STEAM for a minimum of 4 semesters and can work during the summer of 2021 (current sophomores or juniors)**
- **People selected for interviews will be expected to present a 10-15 minute technical presentation related to skills needed for the position.**
- **Any recommended skills not already known can be learned through employment.**
- **US Citizenship is required for all STEAM positions.**
**Job Title:** Structures  
**Position #:** ST_02  
**Project:** STEAM  
**Available Positions:** 1

**Description:** The STEAM Mechanical sub-team is responsible for designing, analyzing, and manufacturing the structure of the instrument, working closely with Avionics and Science to ensure proper component integration. Additionally, this sub-team is responsible for developing an instrument level thermal design of STEAM, involving accurately modeling input and output heat transfer, and creating software models to justify the design. Finally, the Mechanical sub-team also works closely with PUNCH observatory engineers and mentors to ensure proper integration of STEAM into the larger satellite assembly, including designing within set standards for the instrument, and regularly delivering CAD and analysis models to the respective PUNCH teams.

**Required Skills**
- Have previous project experience (e.g. prior Space Grant project, freshman projects, internships, etc.)
- CAD experience (e.g. SolidWorks, Autodesk Inventor, NX, etc.)
- Familiarity with mechanical design/analysis through project or class experience
- Familiarity with heat transfer, or thermal design/analysis through project or class experience
- Basic machining experience (e.g. 3D printing)

**Recommended Skills:**
- Advanced machining experience (e.g. Metal shop, CNC)
- Familiarity with CAD drawings (Correct dimensioning and assembly view practices, GD&T, etc.)
- Finite difference or finite element thermal analysis (Thermal Desktop, ANSYS, SolidWorks Thermal, etc.)
- Finite Element Analysis (FEA) for physical loading/vibrational conditions (SolidWorks Simulation, ANSYS, etc.)

**Time Commitment:** 8 - 10 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour

- **We are looking for someone who can work on STEAM for a minimum of 4 semesters and can work during the summer of 2021 (current sophomores or juniors)**
- **People selected for interviews will be expected to present a 10-15 minute technical presentation related to skills needed for the position.**
- **Any recommended skills not already known can be learned through employment.**
- **US Citizenship is required for all STEAM positions.**
Ground Station

Colorado Space Grant has a working Ground Station that communicates with orbiting satellites. Later this year, the PolarCube satellite, built by COSGC students, will be launched into orbit. Final preparations are needed with our Ground Station to ensure it is ready for the communication passes with PolarCube as well as future satellites built by COSGC students. Below are several positions needed to support this activity this semester.

Current Position Openings:

- Electrical Engineer
- Computer Science #1
- Computer Science #2
- Open to CU Boulder students

COSGC  http://spacegrant.colorado.edu/boulderstudents/howtogetinvolved  Updated 09/03/2020 1:30 PM
<table>
<thead>
<tr>
<th>Job Title: Electrical Engineer</th>
<th>Position #: GS-01</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project: Ground Station</td>
<td>Available Positions: 1</td>
</tr>
</tbody>
</table>

**Description:** Students working in this position will:
- Help integrate polar cube software on ground station pc as a back up
- Potentially update polar cube code to work with a more modern version of gnu radio
- Adding functionality to the ground station.
- Developing gnu radio code that integrates with main c++ code allowing changes in settings and frequencies
- Create a maintenance schedule document for ground station
- Developing a troubleshooting manual for electrical components of ground station
- Help maintain ground station equipment
- Troubleshooting LNA
- Helping with research into ground station weather station
- Help develop training manual for new system and electronic schematics.

**Minimum Requirements**
- Electrical Engineering
- Sophomore, Junior, Senior
- Basic programming experience
- Willingness to get ham radio license

**Desired Skills**
- Knowledge of radio
- Experience with linux
- Experience with SDR/ GNU Radio

**Time Commitment:** 8-10 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour
<table>
<thead>
<tr>
<th><strong>Job Title:</strong> Computer Science #1</th>
<th><strong>Position #:</strong> GS-02</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Project:</strong> Ground Station</td>
<td><strong>Available Positions:</strong> 1</td>
</tr>
</tbody>
</table>

**Description:** Students working in this position will:

- Developing a GUI for the ground station integration software (GSIS)
- Developing auto social media posting of images and data from a variety of satellites
- Code for remote control of rotor
- Weather Station Interface with GSIS
- Help Develop training manual and installation manual for new system

**Minimum Requirements**

- All engineering
- Sophomore, Junior, Senior
- Programming experience in a web based UI language (One of the following Vue, Angular, React, ext)
- Knowledge of HTML, CSS, NodeJS
- Programming experience in C++

**Desired Skills**

- Basic knowledge of radio
- Experience designing web applications.

**Time Commitment:** 8-10 hours/week

**Type of Position:** Biweekly/hourly paid: $15/hour
Job Title: Computer Science #2

Position #: GS-03

Project: Ground Station

Available Positions: 1

Description: Students working in this position will:

- Developing interface between c++ code and the Gpredict software.
- Creation of log files
- Using hamlib to add rotor control
- Help develop interface/software with weather station depending on whether we buy a prebuilt or design our own.
- Help develop User Guide for new system

Minimum Requirements

- All engineering
- Sophomore, Junior, Senior
- Programming experience in C++ (libraries, header files, ext)

Desired Skills

- Experience with networking ports
- Experience with linux

Time Commitment: 8-10 hours/week

Type of Position: Biweekly/hourly paid: $15/hour
That concludes Fall 2020 postings. Please keep an eye out for updates as the semester progresses.