Extraterrestrial Mining Robot

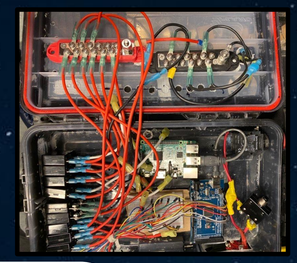
Academic Advisor: Dr. May-Win Thein Graduate Advisor: Zhanxi Feng
Mechanical Engineering: William Lauzon, Dennis Codling, Joseph Mroz, Nathan Stegman, Marc Akouri, Peter Hunt, Patrick Gillis, Zachary Rossi, Jonathon Amrein
Electrical Engineering: Patrick Conroy, Whitman Carroll
Computer Science: Jintong Han, Tao Zhang, Ran Chen

Background

- Multidisciplinary project requiring engineering, computer science, and business majors
- Must build a robot capable of autonomously mining, transporting and depositing material

Improvements

- First UNH Lunabot to implement a suspension system
- Wheels have large flanges for traction in extraterrestrial surface simulant
- Lighter mining system
- Compact design
- 3D printed dust-protection

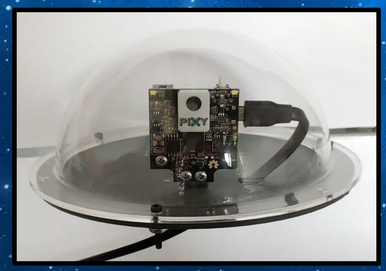


Results

- Meets all NASA requirements
- Remotely operated via wifi with partial autonomy
- Completed live testing in simulated arena

Outreach

- Conducted four STEM related activities with two local elementary schools
- Demonstrated basic scientific concepts for each activity
- Introduced the students to the LunaCats team, competition and robot



NASA Requirements

- Maneuver the robot from a starting position to a designated location where it will excavate and collect simulated lunar regolith
  - Must transport and deposit mined simulant into a designated bin
- All mining, transportation and depositing must be done within 15 minutes
- At beginning of competition the stored size must be smaller than 1m X 0.5m X 0.5m
- Submit all preliminary deliverables outlined by NASA before their deadlines

Testing

- Drivetrain
  - Suspension Testing: Supports the weight of the bot with a range of motion
  - Torque Testing: Ensured wheels reach the desired speed of 1 m/s and torque of 18 N-m
- Mining
  - Torque Testing: Initial Results not optimal - implemented 100:1 gear ratio
- Deposit
  - Torque Testing: Goal of achieving 12 N-m of torque was surpassed in initial testing

University of New Hampshire
College of Engineering and Physical Sciences