University of Portland Robotics Club

NASA Robotic Mining Competition

NASA Oregon Space Grant Student Symposium 2018
Donald P. Shiley School of Engineering
November 8th, 2018
Outline

RMC History
• Competition
• Team

Mars Rover
• Mechanical Systems
• Electrical Systems
• Computer Science

2018 Competition
• STEM Outreach
• Results

2019 Competition
• Rover Redesign
• Budget Plans
NASA's Robotic Mining Competition

Every May, 50 university/college teams work to “Design it,” “Build it,” and “Dig it”

Four ways to earn points:
1. Slide Presentation and Demonstration
2. STEM Outreach Project and Report
3. Systems Engineering Paper
4. Mining Competition
University of Portland’s Rover Evolution

2010 - 2011

2011 - 2012

2012 - 2013

2013 - 2014

2014 - 2015

2017 - 2018
Our Team

Robotics Club + Senior Capstone
Our Robot
Containment and Deposition System
Excavation System

Bucket Chain

- 20 Buckets
- Z-Axis Stepper Motor to raise and lower
- 280 ft-lb digging torque
- 35 cm maximum depth
Rocker-Bogie Suspension
Power System

• Lithium Polymer batteries
• 1x 14.8V battery
  • Powers drive and articulation motors
  • Powers z-axis stepper motors
  • Powers voltage regulators
• 1x 20V battery
  • Powers Excavation and Deposition motors
• 3x 5V regulators
  • Powering R-Pi and Arduinos
Control & Communication System

- Arduino Mega
- Sabertooth Motor Driver
- Stepper Motor Driver
- Drive & Articulation Motors
  - x 6 wheels
- Stepper Motors
- Excavation
- Deposition
Control & Communication System

Laptop (Manual Control) <-> Router <-> Raspberry PI 3B (ROS with Python) <-> Arduino Mega (C++)
STEM Outreach

• Dozens of weekly afterschool workshops at local elementary schools

• Seven-hour STEM camp on campus

• Over 200 students reached
2019 Team

Redesigned robot frame, bucket chain, deposition, electrical box, and navigation systems.
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Thank You!