OSURC Mars Rover Team

- The OSU Robotics Club is a sponsored student organization at OSU with over 150 members working on numerous projects.
- The Mars Rover Team of the Robotics club has requested a system to control and monitor their mock mars rover from afar.
- This system's goal is to allow for fast prototyping of the actual rover and relieve pressure from the software side of the rover team.

ENGINEERING REQUIREMENTS

- Reliability/Robustness: Needs to reliably function in harsh environments where network connectivity is not guaranteed.
- Control: Software must allow for remote driver and control of the Rover.
- Video Feedback: Software must show video feeds from the Rover, with bandwidth adjustment and camera selection capabilities.
- System Status: Software must display Rover system status information.
- Navigation/Mapping: Software must provide GPS navigation, mapping, localization, and waypoint setting.
- Autonomy Control: Software must allow for users to enable and disable autonomy on the rover.
- Documentation: Team must provide thorough documentation to serve ground station developers in coming years.

Oregon State University

OSU ROBOTICS CLUB MARS ROVER GROUND STATION

Remote control and monitoring software for a competition-bound mock mars rover robot.

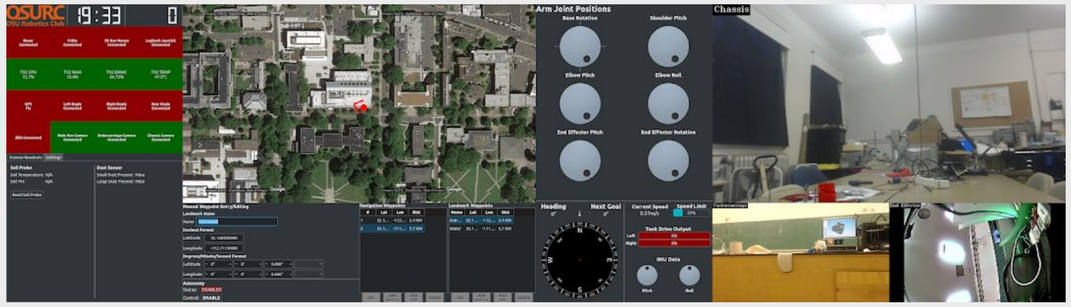

Figure 1: Screenshot of Ground Station Software

OVERVIEW

The OSU Robotics Club's Mars Rover team is developing a robot to compete in the Canadian International Rover Challenge, a robotics competition taking place in in August, 2018.

Competition tasks include astronaut assistance, equipment servicing, science/soil collection, extreme terrain traversal, and includes extra points for autonomous navigation. Teams must be able to remotely operate their Rover from a central ground station located up to a 1km away as well as have the ability to enable the autonomous navigation and self-driving mode.

The club's team of undergraduates builds the mechanical, electrical, and software components each year and has often requested capstone teams to help.

PROBLEM

While the OSURC Mars Rover team is developing the actual rover, it is the responsibility of our team to develop the ground station that will serve as the rover's base of operations.

The ground station is not only software but also consists of a computer, monitors, long-range radio, and additional input hardware such as joysticks that will serve as the primary point of contact between the Rover and the operating user.

The ground station software will be completely rewritten by our team for this year's competition and will serve as the foundation for years to come.

Due to the nature of competition it is vital that ground station software precisely fits the needs of the rover pilot.

SOLUTION

The Mars Rover team is utilizing the Robot Operating System (ROS) to facilitate communications between hardware on the Rover and the ground station. This allows for control and monitoring of the Rover via our software.

Our team is using Python 2.7 with the Qt framework via PyQt5 to display our data in a dual monitor full screen command station display setup.

Our video data streams select the best resolutions and quality settings automatically and can rotate between the possible video streams via Joystick control. Mapping is done with Google Static Images which are stitched together into a single cohesive map.

Additional feedback information such as system statuses and Rover arm states are displayed and updated frequently.

The software reads in joystick data and broadcasts it via ROS topics to allow the software to remotely drive the Rover and control its robotic arm.

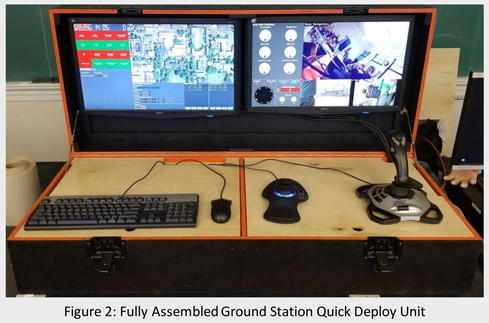

Figure 2: Fully Assembled Ground Station Quick Deploy Unit

PROJECT TEAM

Corwin Perren | Chris Pham | Ken Steinfeldt

perrenc@oregonstate.edu

phamchr@oregonstate.edu

steinfek@oregonstate.edu

PROJECT SPONSOR

OSURC
OSU Robotics Club

Contact: OSURCofficers@engr.oregonstate.edu

The OSU Robotics Club would like to thank their sponsors.

OSURC INTERNAL SPONSORS

College of Engineering
College of MIME
College of Business

OSURC EXTERNAL SPONSORS

Protocase
Boeing
Tattu
GitHub
Asana
Dominos