Computer Science & Computer Engineering

# Robotic Mining Competition Rover


Andrew Burroughs — Computer Science Senior
Calvin Franz — Computer Science Senior
Z. Gunner Lawless — Computer Engineering Senior
Jett McCullough — Computer Science Senior
Carson Molder — Computer Engineering Senior


## Objective

**Team Goal**: Create robot that can mine rocks on the moon.
**Our Goal**: Develop software that enables full autonomy of all robotic functions.

## Autonomy

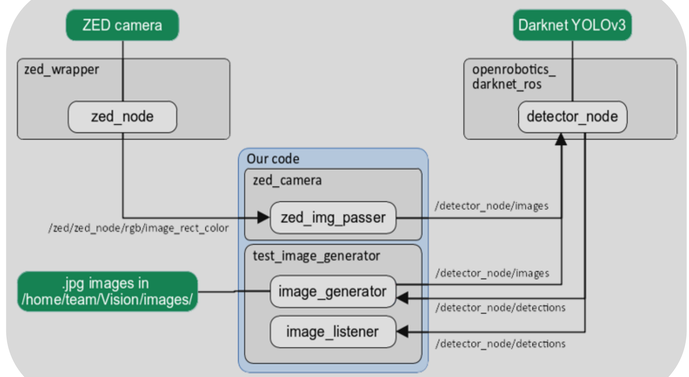
**Vision**
- Train YOLO network using rock and pit image dataset
- Enable communication between ZED camera and trained YOLO network utilizing ROS2 node architecture.
- Provide positional data on detected objects

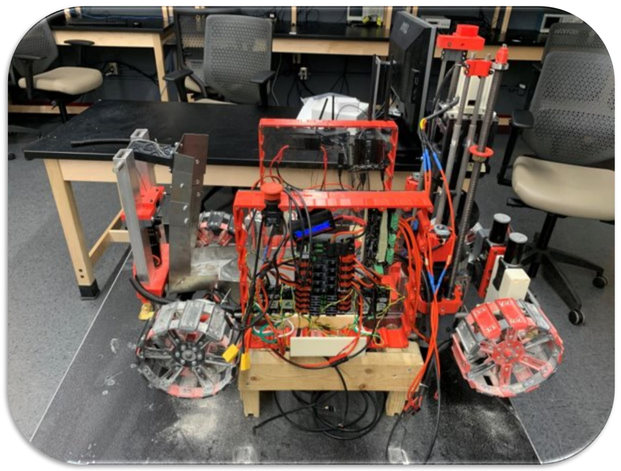
**Navigation**
- Map object position data onto 2d matrix representing the field
- Map path to desired object using path-finding algorithm
- Track position within matrix in real-time
- Map path to depository bin following excavation

**Excavation**
- Position rover relative to excavation target
- Run excavation procedure

## Technologies

- Jetson Nano
- Nvidia GeForce RTX 2080 Ti
- Darknet – YOLO
- Robot Operating System 2 (ROS2)
- ZED Camera – ZED SDK
- Git
- Docker



## Development

**ROS2 Upgrade**
- ROS2 enables the creation of multiple nodes in a process
- Reuse old ROS code and modify it to work with ROS2

**YOLO Dataset**
- Labeled images of rocks
- Formatted to YOLO VOC
- Ready-to-use to train Darknet for rock detection

**Dockerfiles**
- Compose necessary installations into single image.
- Enable easier installation and run-time process.

**Documentation**
- Getting Started Guide
- ROS2 Node Guides
- Useful References

**Design Document**
- Report on complete design of the Rover including all mechanical, logistical, and computational functionality and design.

UNIVERSITY OF ARKANSAS

ARKANSAS RAZORBOTZ