

Sprint Report #1

TEAM OVERVIEW

Name

Moonrockers

Team Members

Alex Muchow

Project Title

NASA Robotic Mining Competition

CUSTOMER OVERVIEW

Customer Description

Moonrockers is a competitive team that participates in the NASA Robotic Mining Competition each year. The goal of this competition is for teams to build robots that could theoretically perform mining on Mars.

Customer Problem

Currently, the team uses telecommunications via a TCP server on a PCduino to control the robot from an xbox controller, but one of the major factors in scoring for this competition is autonomy. Autonomy has not been the focus of the team in the past, but as there is a currently functioning robot that will be iterated upon rather than rebuilt; the team has opted to focus on autonomy this year.

Customer Needs

- Camera sensor implemented into current design,
- Autonomy to be implemented using computer vision with the assistance of an AR tag,
- An override option to regain telecommunication control while the robot is running autonomously.

PROJECT OVERVIEW

Phase 1

The goal for Phase 1 will be to begin working with an ASUS Xtion camera sensor to be able to tell location within the competition pit. The current plan is to use an AR tag on the dumping station to base location in the pit off of.

Phase 2

The goal for Phase 2 will be implementing the start routine for the robot. The robot can start in one of two corners and facing any direction. The goal for this phase will be to get the robot to center itself in front of the AR tag from any possible starting configuration. This will give us a good starting point to begin the mining routine from.

Phase 3

The goal for Phase 3 will be implementing the decision logic based off of location obtained from the work in phase 1. This phase will include the robot making informed decisions based on where it is relative to the AR tag. This includes being able to tell if it is in the mining portion of the pit, rather than the dump station, or the obstacle section. It also includes being able to mine at the mining section.

Phase 4

The goal for Phase 4 will be to implement a manual control override into the program. This allows a user to take control if something would go wrong in competition.

PROJECT ENVIRONMENT

Project Boundaries

- This project will only be used by the Moonrockers team
- Source code will be kept on a private github repository
- Project will be written in C

Project Context

- This project will be coded to operated on a PCduino, with the potential of upgrading to an Odroid if more processing power is needed.
- This project will be using an ASUS Xtion camera sensor and an AR tag to make decisions.

PROJECT DELIVERABLES

Phase 1

- Code to interface with the ASUS Xtion sensor in order to compute location relative to the AR tag.
- Requirements Document for Phase 2

Phase 2

- Code for the robot to center itself at the AR tag in order to start the autonomous mining.
- Mission Statement
- Project Design Document
- Industrial Experience Report
- Requirements Document for Phase 3

Phase 3

- Code to get the robot to cross over the obstacle field, mine, and return to the dumping station, dump and repeat.
- Progress reports
- Requirements Document for Phase 4

Phase 4

- Code to allow a manual override in the autonomy code.

BACKLOG

Phase 1

- AR Tag designed
- ASUS Xtion location relative to AR tag
- Find a location to mount the camera sensor on the robot.

Phase 2

- Robot able to center itself at the AR tag from any start location
- Find a way to mount the AR tag at the dump station

Phase 3

- Robot successfully able to travel the distance from the dump station, over the obstacle course to the mining site, and travel back.
- Robot able to perform a mining routing
- Robot able to performing dumping at the AR tagged dumping station after navigating back

Phase 4

- Manual override

SPRINT REPORT

Work for this sprint included:

- Began attending Moonrockers Meetings
- Read through the competition rules
- Found a camera sensor that does not require external power to run.
- Wrote a Mission Statement
- Wrote a Software Contract
- Did research on computer vision based autonomy.
- Read through telecommunication code to understand how the robot is interfaced with.

Work that will be carried over into sprint 2:

- Design an AR tag
- Ordering the ASUS Xtion Sensor in order to begin coding