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| Rocket Tracks |
| Project Design Specifications |
| 2014 Capstone |

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# Marketing Requirements

The system will:

1. Be capable of tracking the PSAS launch vehicle throughout the duration of its boost stage of flight
2. Be portable / self-powered
3. Be able to withstand exposure to rain while powered down
4. Be operable in temperatures typical of Brothers, OR year-round.
5. Prevent single points of failure from causing injury or permanent damage to the unit or properly attached payloads
6. Allow manual control of manual axes
7. Interface with existing mechanical design and motor drivers
8. Support remote operation

# Engineering Requirements

## Performance

## Functionality

1. System should be able to switch between two modes (Manual and Automatic).
2. The system will use a PID control loop to adjust its position.
3. The system must be able to read the current position of each axis.
4. The system must be able to drive each axis.
5. In automatic mode the user must be able to specify the object to track.
6. When in manual mode a turn of \_\_\_\_ degrees will correspond to the arm moving \_\_\_ m.
7. The system must have the ability to interface with a PC over Ethernet during operation.

## Energy

1. The system will have an average power consumption of \_\_\_.
2. The system will be able to operate off of a single battery.
3. The system will operate from a 12-36V source that supplies a max current of \_\_\_.
4. The system must be operational for a minimum of \_\_\_ hours without needing to be recharged/battery replacement.

## Economic

1. The cost for developing the system should target $500 and should not exceed $1000.

## Health and Safety

1. The system will automatically shut off if a user is detected within \_\_\_ feet of its perimeter.
2. The system will include an emergency stop button that will be easily accessible.
3. The system should not produce enough heat to burn someone.

## Maintainability

1. The system must interface with the current motor drivers which have 2 axis, but support a third axis for future expansion.
2. The system should have a modular design such that failed components can be easily identified and replaced by a technician in under 15 minutes.

## Manufacturability

1. The system must be able to fit on a 4 layer PCB.
2. The PCB must comply with OSH Park’s design rules.
3. The PCB should have dimensions no greater than \_\_\_\_.
4. The system will utilize an STM32 family microprocessor.
5. All software development will be based on ChibiOS/RT.
6. The system will use a Sightline SLA1500 for automatic mode.
7. The system must interface to a unified payload connector consisting of an Ethernet link to sightline board, Ethernet pass-through for trackmaster equipment, and USB pass-through for digital camera.

## operability

1. The system must be able to operate in the temperature range of -31o to 105oF
2. The system must be covered to protect from water damage.
3. The system must be able to withstand vibrations caused by the movement of the mechanical structure.
4. The system must be able to withstand a drop of \_\_\_ ft.
5. The system must include ESD protection.

## Reliability

1. The system will have a reliability of 99% in 5 years.