



Motivation

To implement distributed engineering, by collaborating with Florida Institute of Technology, by dividing tasks and working effectively.



June 2nd 2017 at Oakland University (Rochester, MI)



- COE Goals:
 - Platform Design
 - Hardware Integration
 - Localization
- FIT Goals:
 - Perception
 - Object/Color Detection
 - Motion Planning

Goal

Design and develop an autonomous ground vehicle capable of collision avoidance, line detection, and waypoint navigation to perform in the Intelligent Ground Vehicle Competition in June 2017.

Project Scope



Vehicle Dimension Constraints:

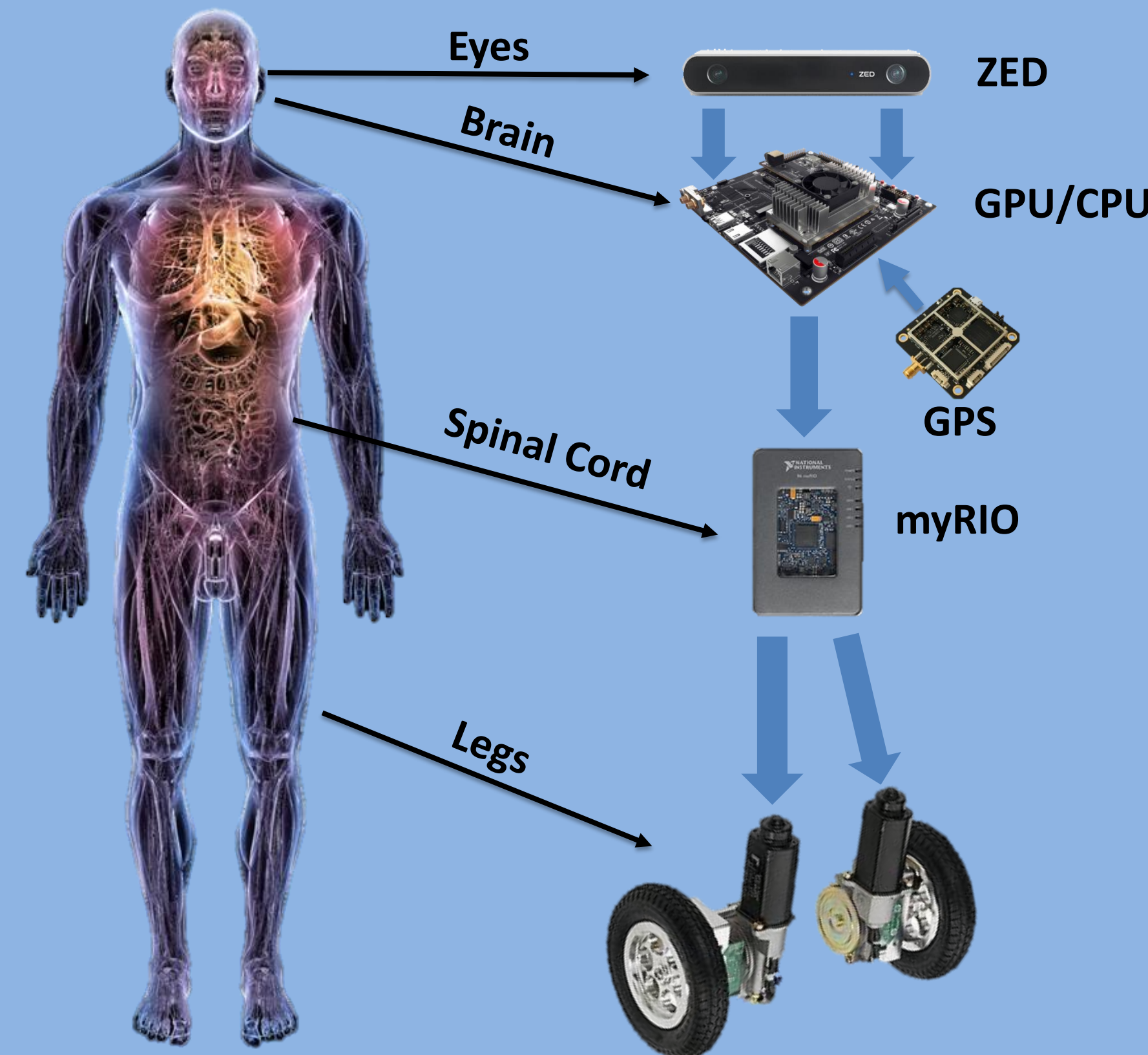
- 3ft < Length < 7ft
- 2ft < Width < 4ft
- Max Height - 6ft

Other Constraints:

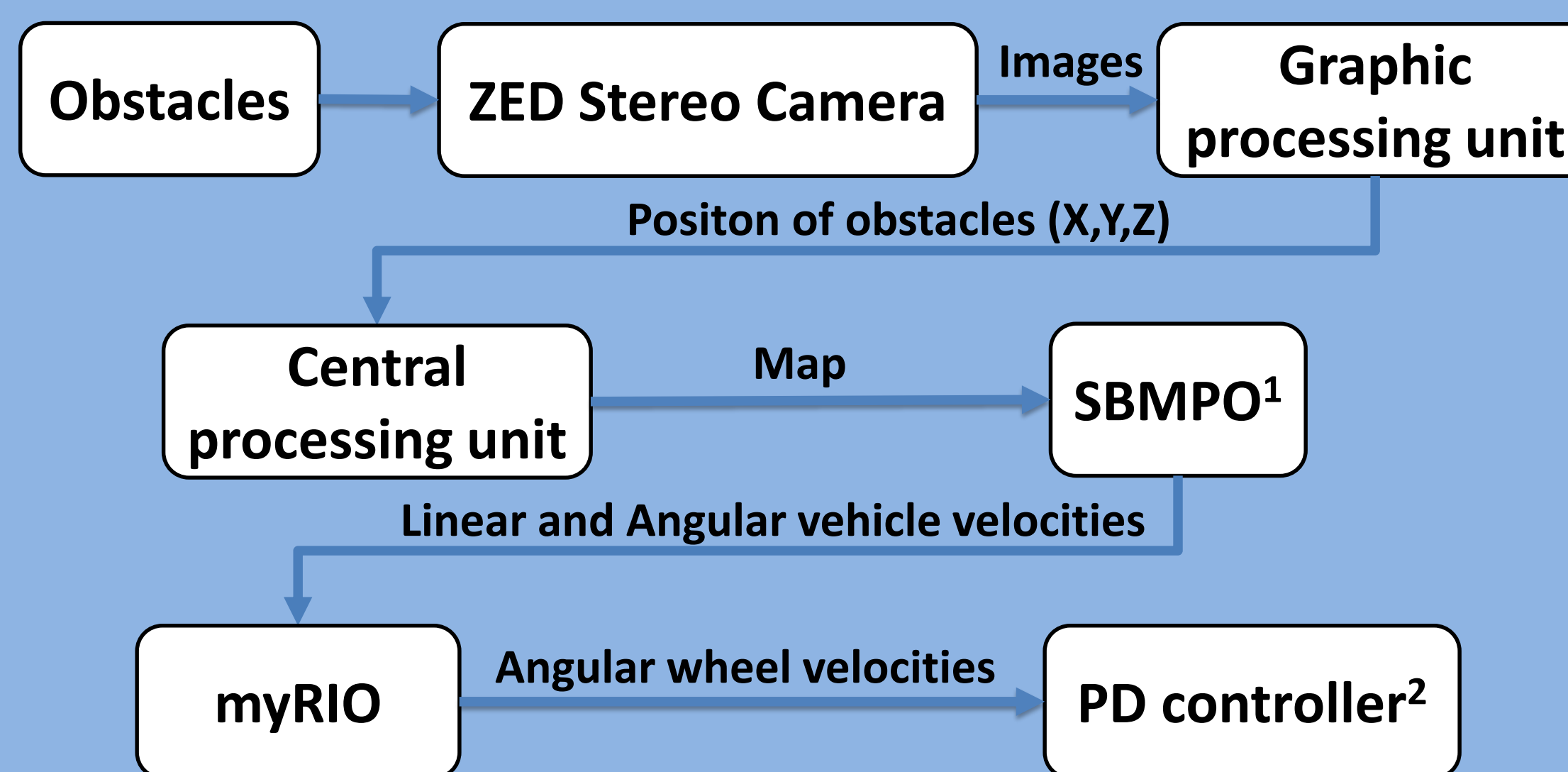
- 1 mph ≤ Speed ≤ 5mph
- Payload: 20lb - 18" x 8" x 8"
- Waypoint diameter is 2 meters
- Wireless and hardwire E-stop

Autonomous System Operation

Similar to a human, an autonomous robot needs eyes, a brain, and neural pathways to operate autonomously.

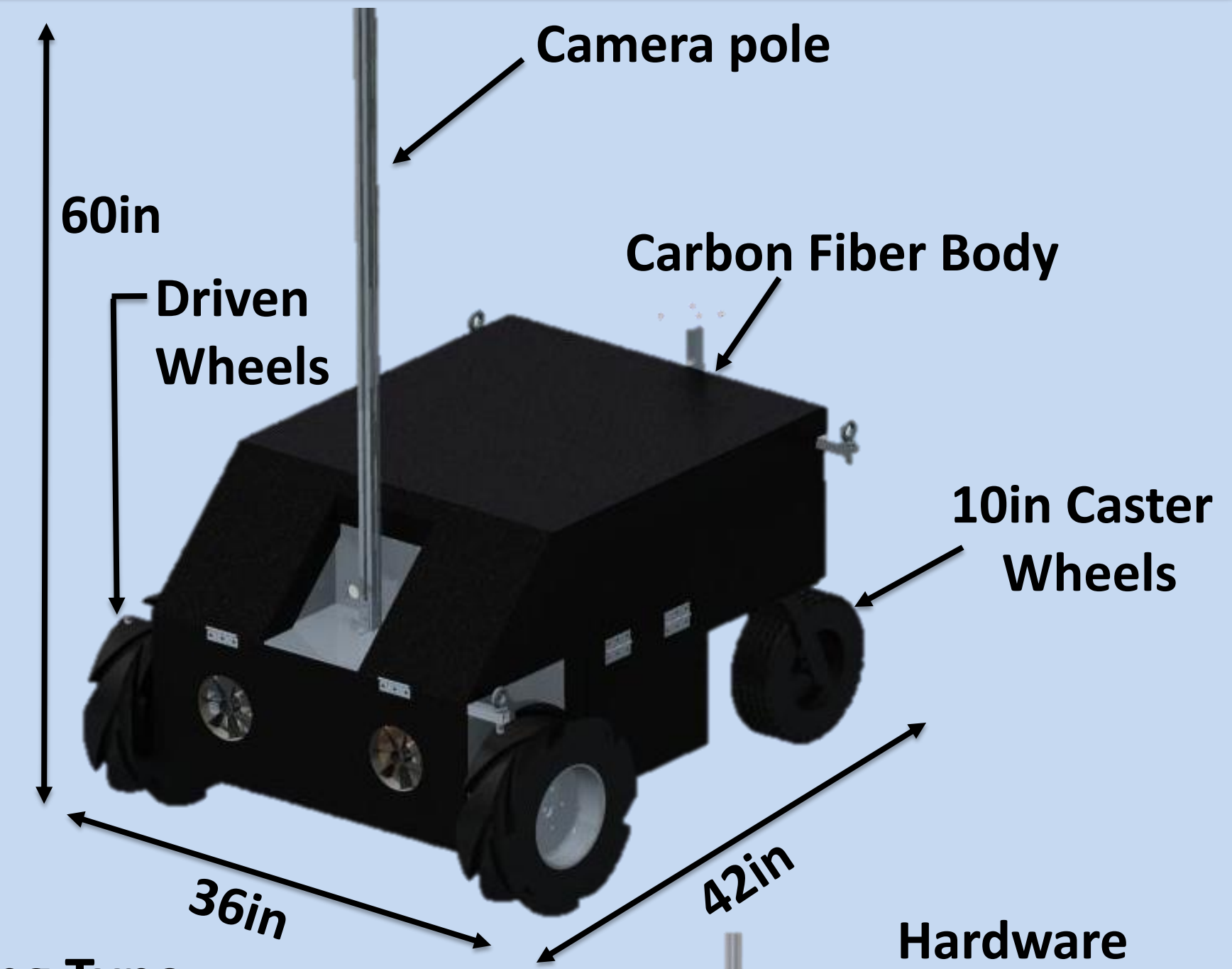


Implementation

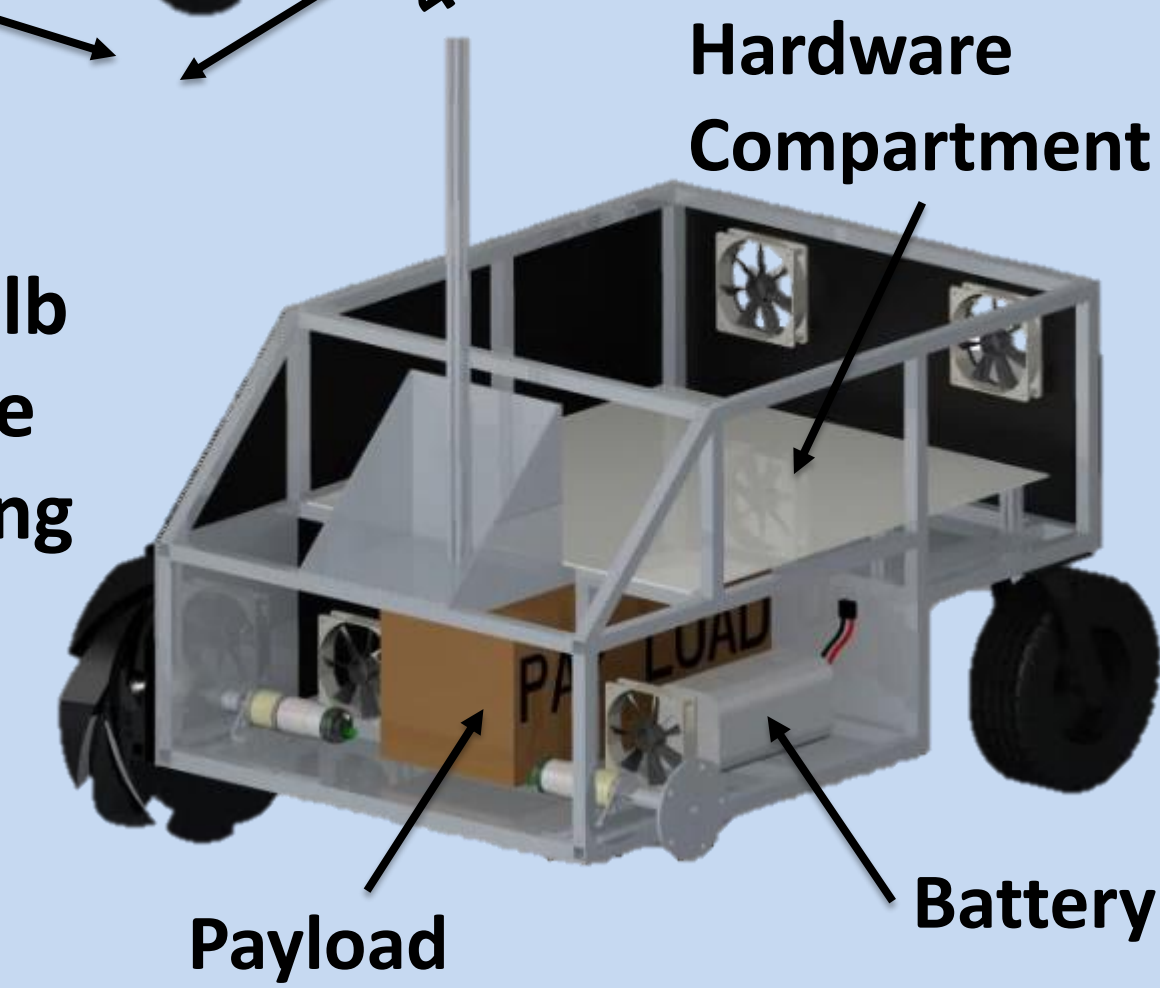


1. Motion Planner: Sampling Based Model Predictive Optimization
2. Position Controller: Proportional derivative controller that implements velocity control for effective position

Design



- Steering Type: Differential
- Estimated Weight: 120lb
- Frame Material: Square hollow aluminum tubing



Future Work

- Fully assembled robotic platform
- GPS/INS/odometry integration using Kalman filter
- Synchronization of operations
- Visit Florida Institute of Technology for testing on mock course

Acknowledgements

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