



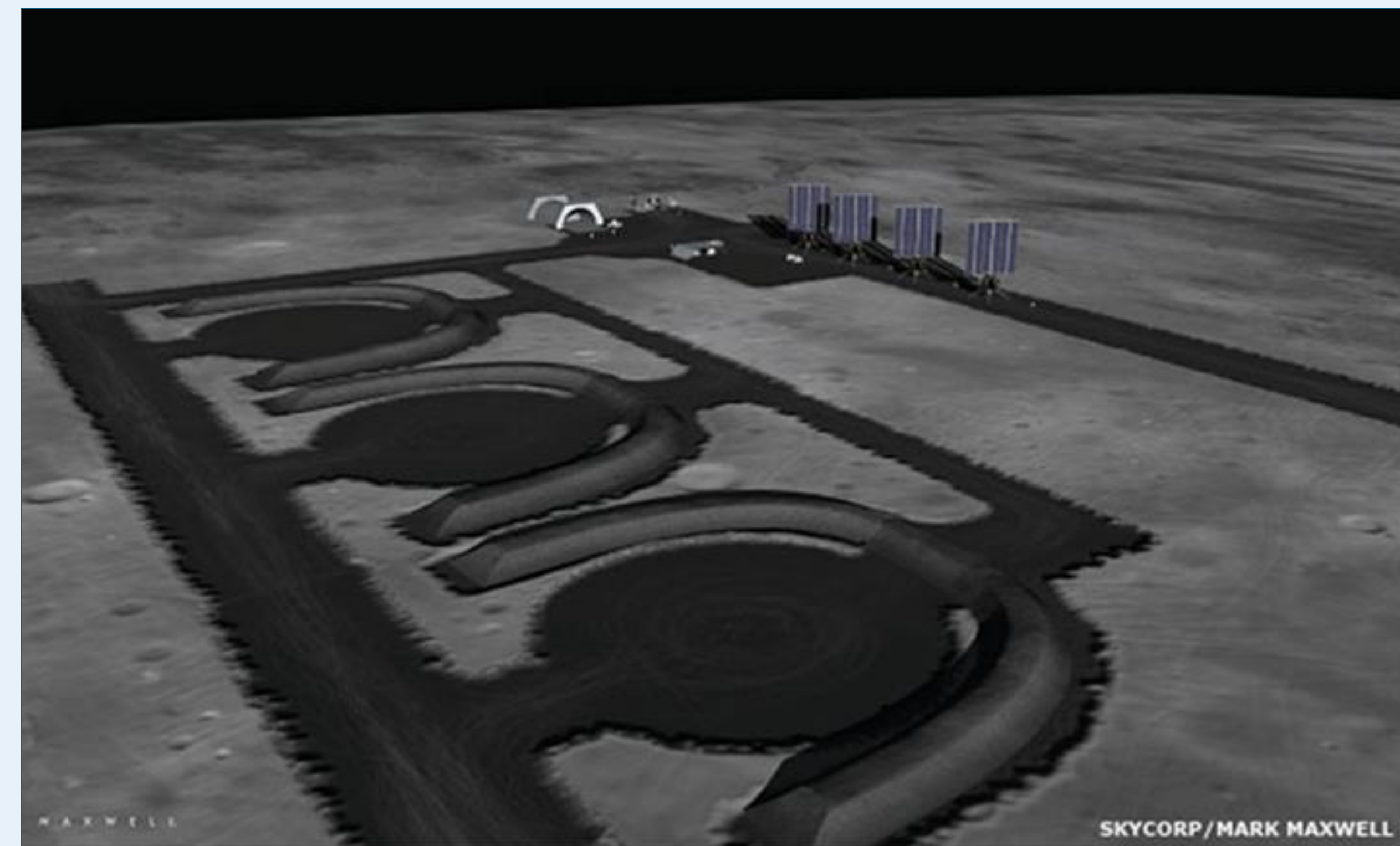
Determining Optimal Sensor Configuration for Autonomous Navigation of Lunar Excavation Robot



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Introduction

Nasa's Lunabotics Challenge is a yearly competition for building and designing lunar robots. The robots are designed to autonomously excavate and collect lunar regolith for the purposes of building berms. The UNH Lunabotics team needs a sensor configuration to implement autonomous function.

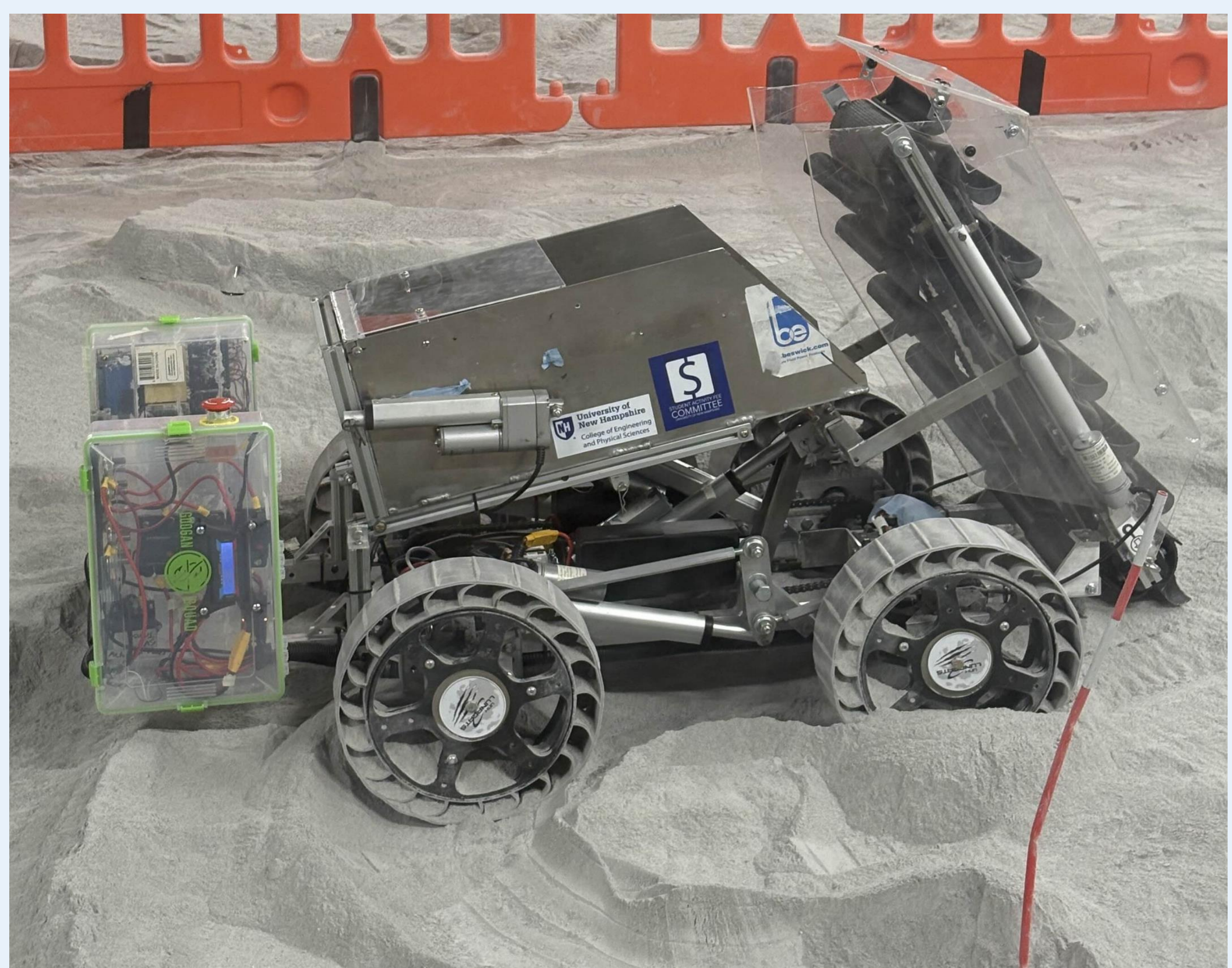


Landing pad Concept with berms. (Source: Nasa Lunabotics guidebook nasa.gov)

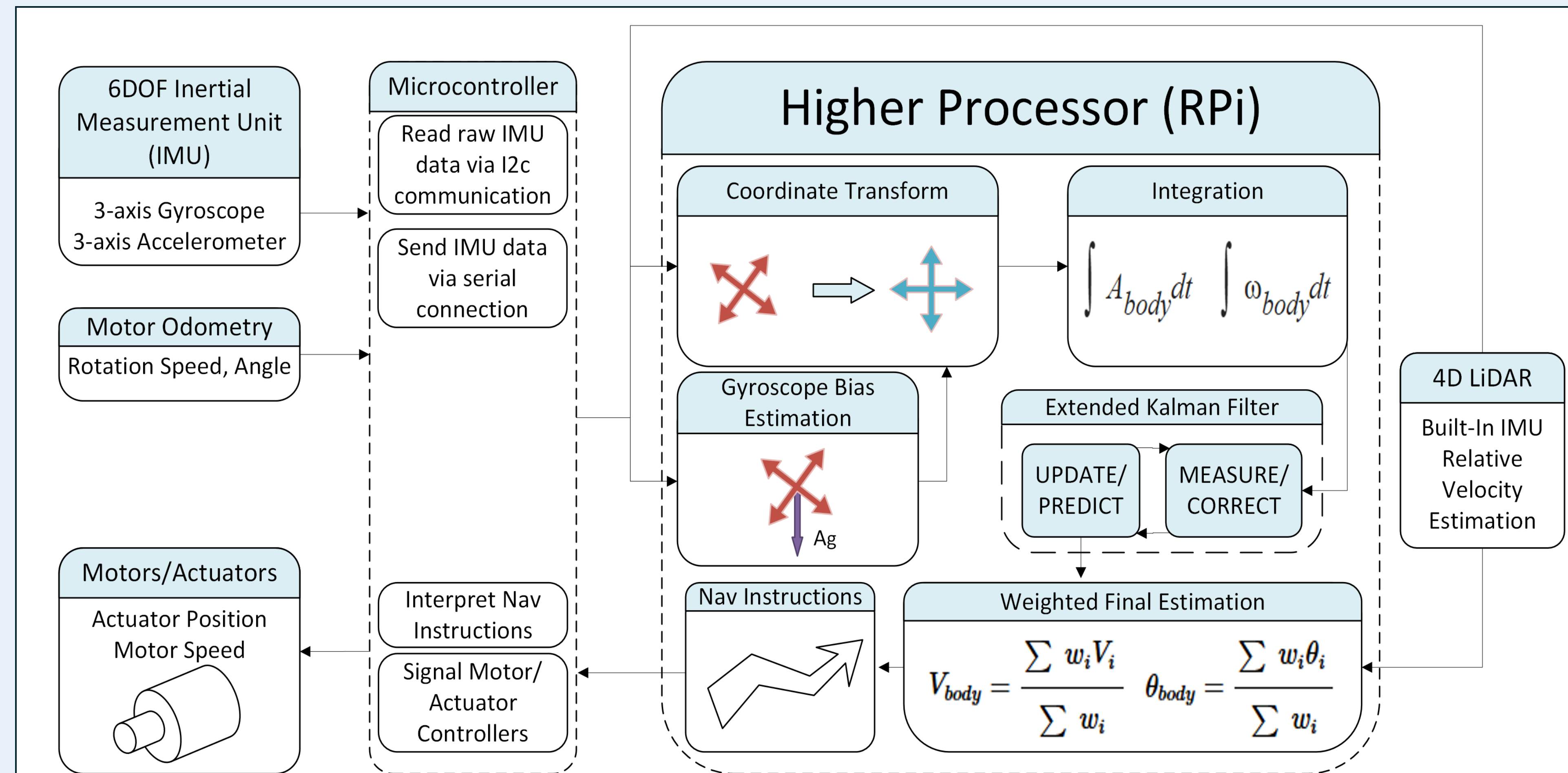
Objectives

- Design Sensor Configuration for autonomous navigation
- Optimize Configuration for power consumption, computational load, and accuracy

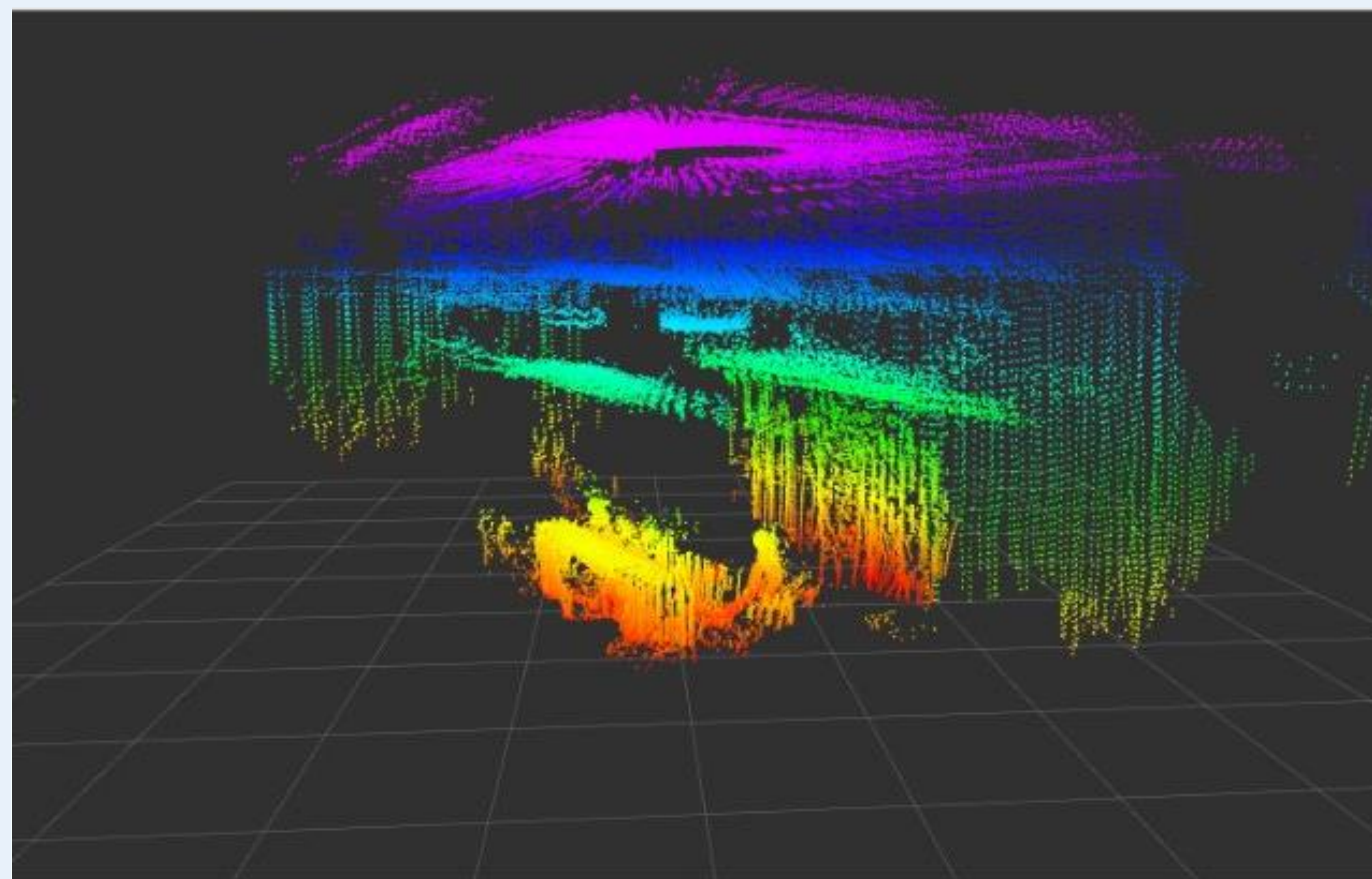
Testing Platform



Odometry Processing



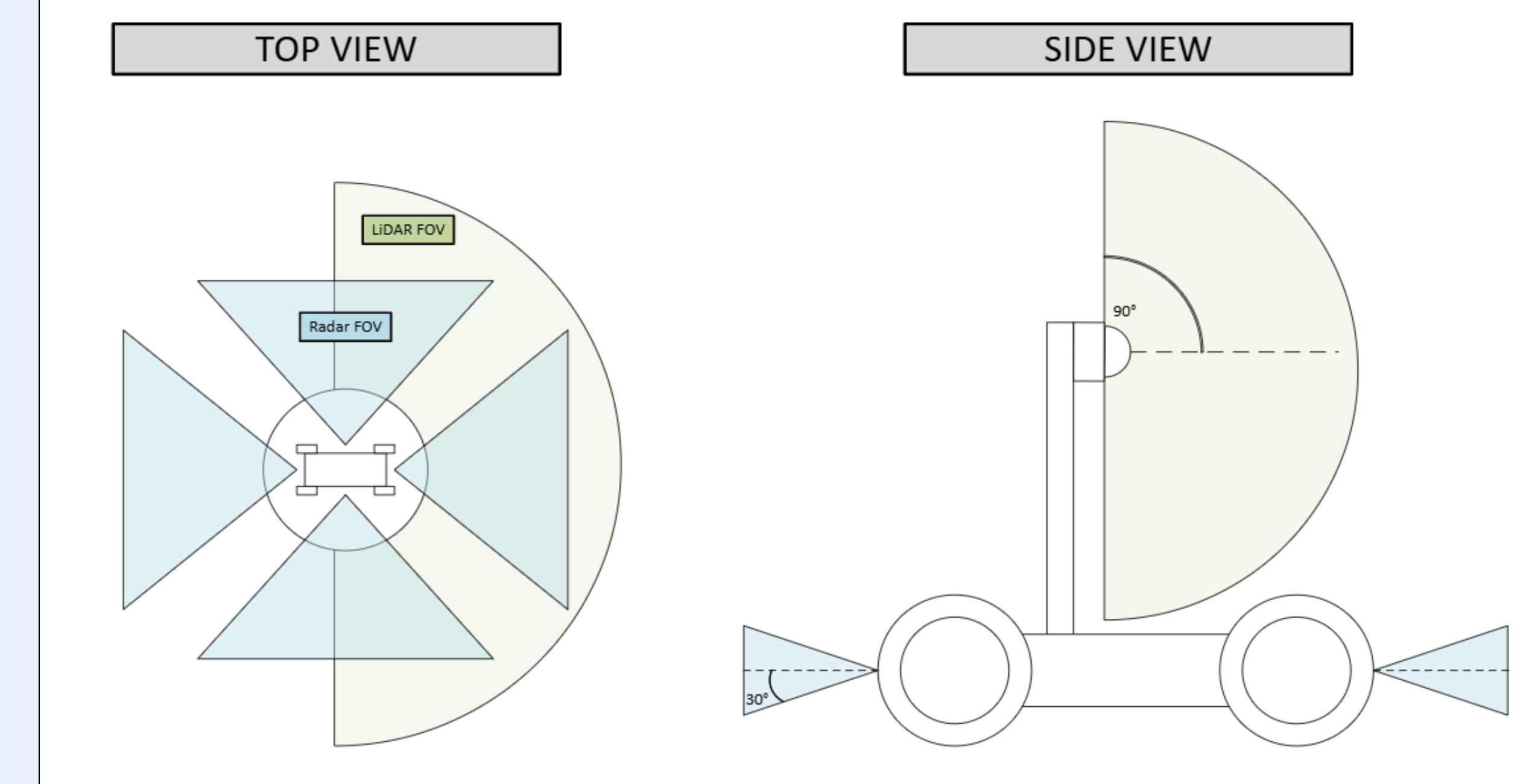
4D LiDAR-Based Mapping



Conclusion

The configuration of Lidar and Radar provides fast, low-power mapping and obstacle detection, that maintains accuracy through regolith dust-clouds and low-light conditions. Future work includes testing of different sensor placements and data processing methods.

Sensor Layout



Sensors

Unitree L2 4D Lidar:
High Resolution, Ideal for Mapping

DFRobot 24GHz Microwave Radar
Reliable, Unaffected by Environmental Factors

LSM6DS3TR-C 6-DOF Accel + Gyro IMU
Position and Velocity Error Reduction

Sensor Fusion

