PROGRESS REVIEW IO

TEAM J: ALIGN

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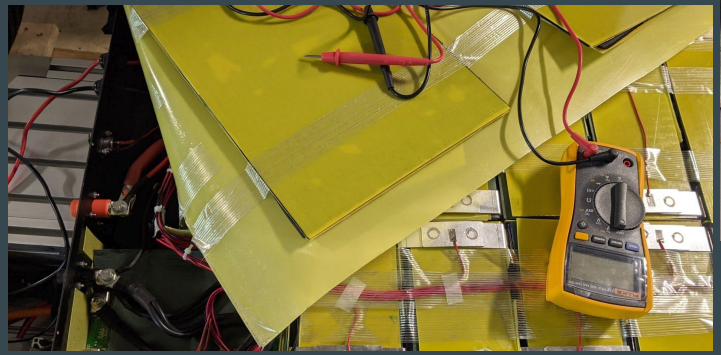
Sponsor: PIX Moving

GOALS

- Hardware setup status
- Complete Sim tests for Navigation and Docking subsystems
- Complete safety subsystem and relevant unit tests
    - The system should perform diagnostics, provide feedback, and log system health upon request

HARDWARE UPDATE

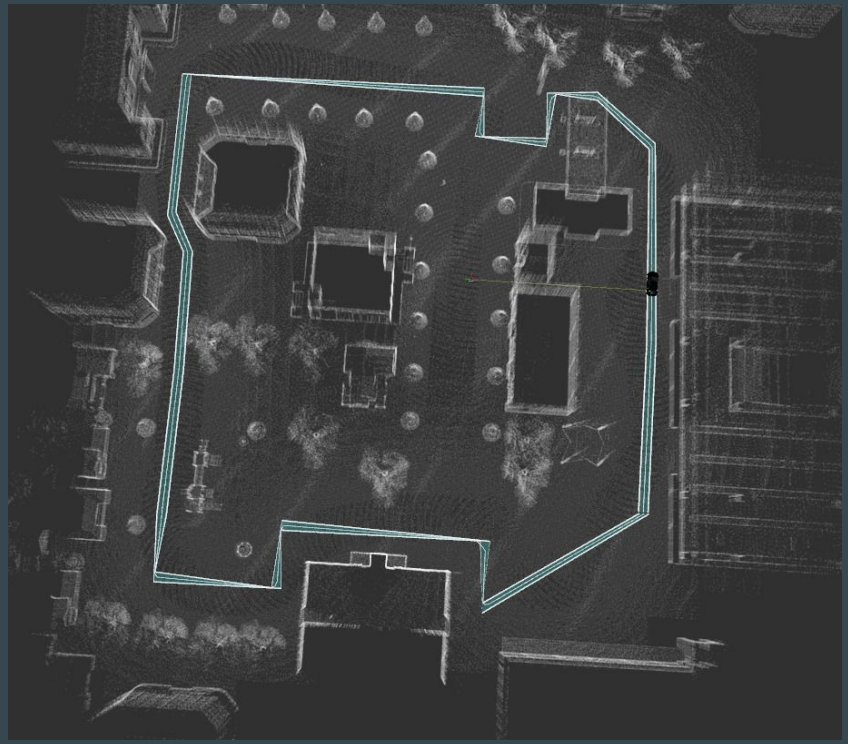


Battery damaged, not chargeable.

Tried disconnecting various ports on BMS and main battery, didn't work. Pod is deformed.

VECTOR MAP GENERATION AND TESTING

1. Tried generating the lane-only vector map using both Tier IV's online software as well as with the Assure Mapping Tools (dockerized) designed by the author of OpenPlanner.
2. Resulting maps seem correct but the vehicle is unable to plan a path with these maps, so we are discussing with the Autoware team to ensure they have been drawn correctly.
3. HD maps usually need professionals to draw them, and good quality ones cannot be drawn by hand.

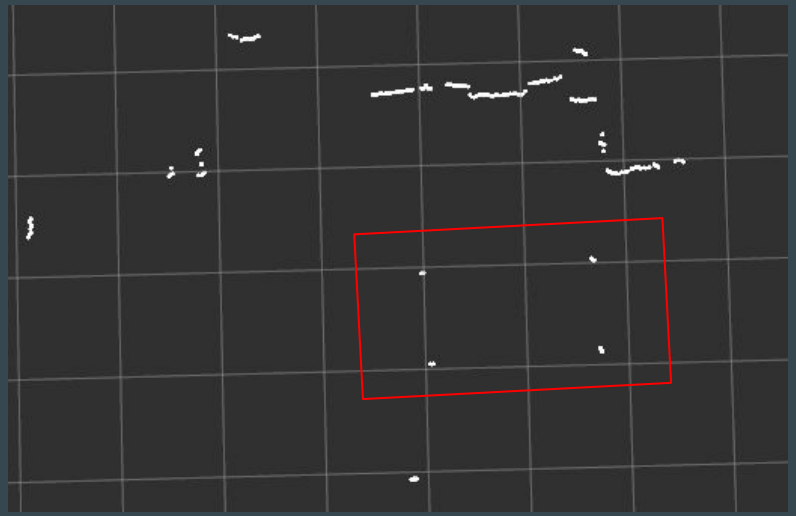


SENSOR FUSION FOR RELATIVE ODOMETRY

- Tried to get a new estimate of pod location using fused laser and camera data
- Led to increase in noise in some cases, probably because of incorrect covariances
- Changed formulation from relative localization to relative odometry i.e. instead of refining pod pose assuming odometry to be solved, jointly optimize both pod location and odometry
- Yet to fuse IMU for relative odometry

ADDING ROBUSTNESS IN LIDAR MEASUREMENT

- LiDAR measurement will be affected by clutter near the pod, we can't assume this will never be there
- Use aprilTag estimate as prior for Pod and use the Lidar indexes and ranges based on that estimate

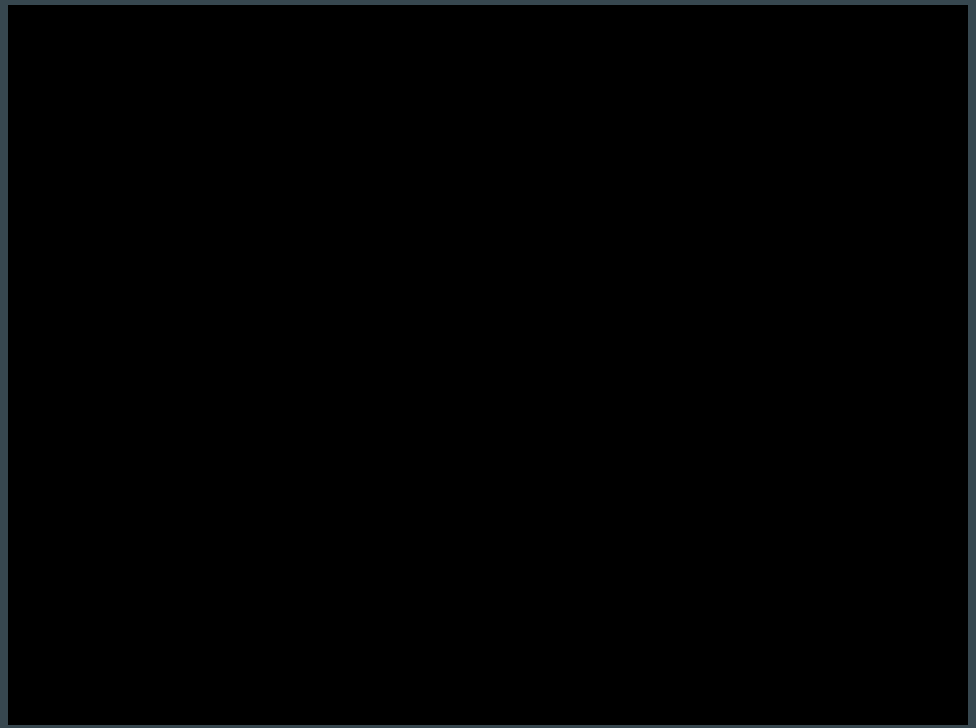


SIMULATION TESTS FOR NAVIGATION AND DOCKING

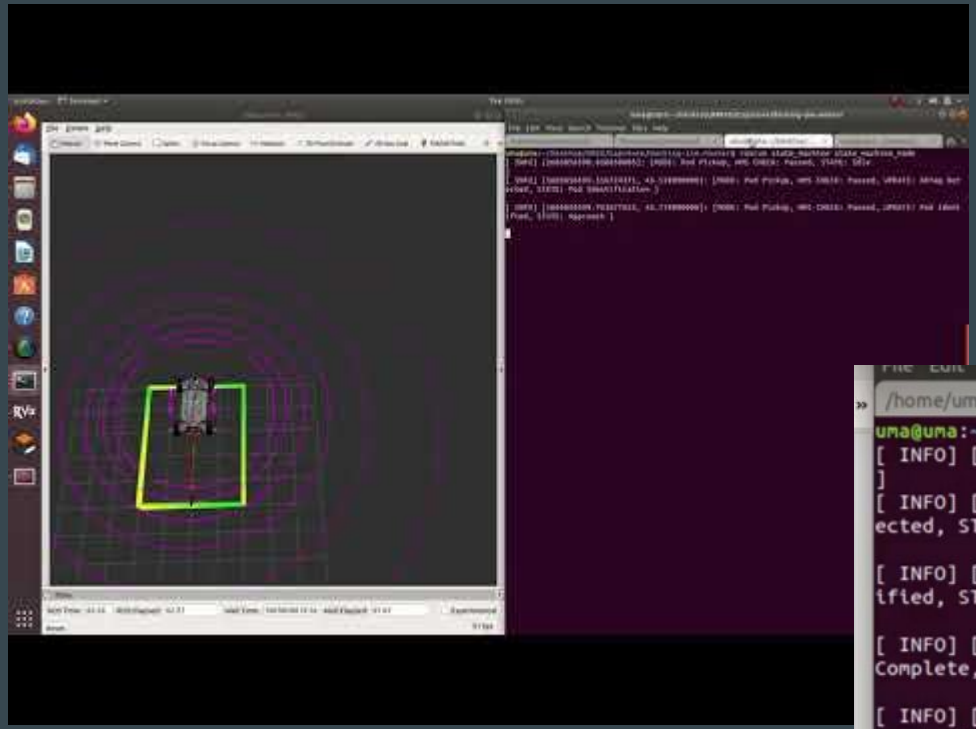
With Retrace

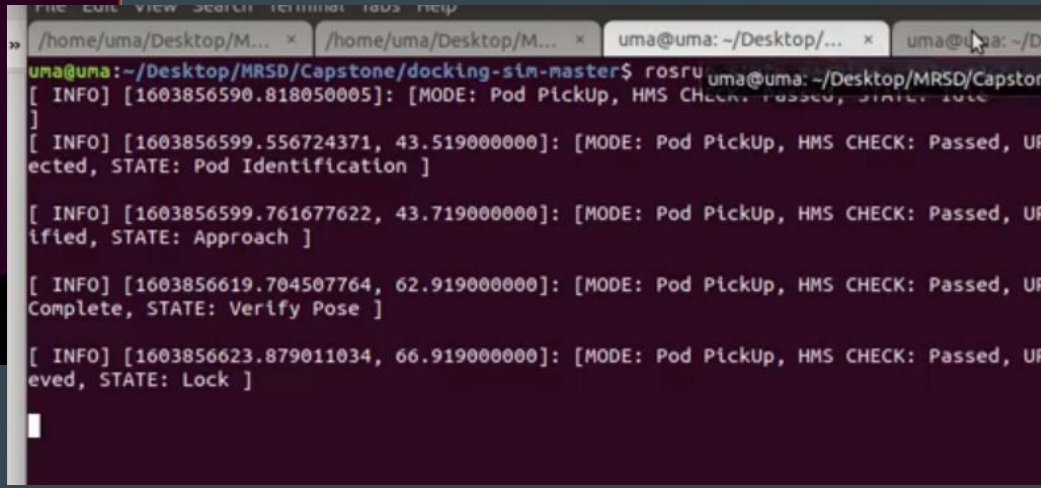
Without Retrace

PEDESTRIAN TRACKING & PREDICTION



STATE MACHINE INTEGRATION





CHALLENGES

- Hardware:
  - Multiple attempts at setting up chassis, issues with battery
  - Bent pod hindered the validation of software with real sensor data
  - Need to obtain intrinsics and extrinsics of camera & LiDAR

- Software
  - Test out relative odometry and fuse IMU measurements
  - Final integration testing complex due to many components
  - Generated vector maps for simulation environment unable to run simulation

TASKS

- System integration
- Dress rehearsal
- Collect Real-World Sensor data

Thank you!

Questions?