Weekly Meeting Slides

JetRacer Soccer League

ROS (Casey, Cooper)

Previous Work:

- Integrated NVIDIA Jetracer package
- Setup keyboard tele-op publisher
- Tested car's movement capabilities
- Helped determine future sensor strategy

Future Work:

- Car tele-op control more reliably
- Determine optimal gain/offset values
- Setup Unity hooks

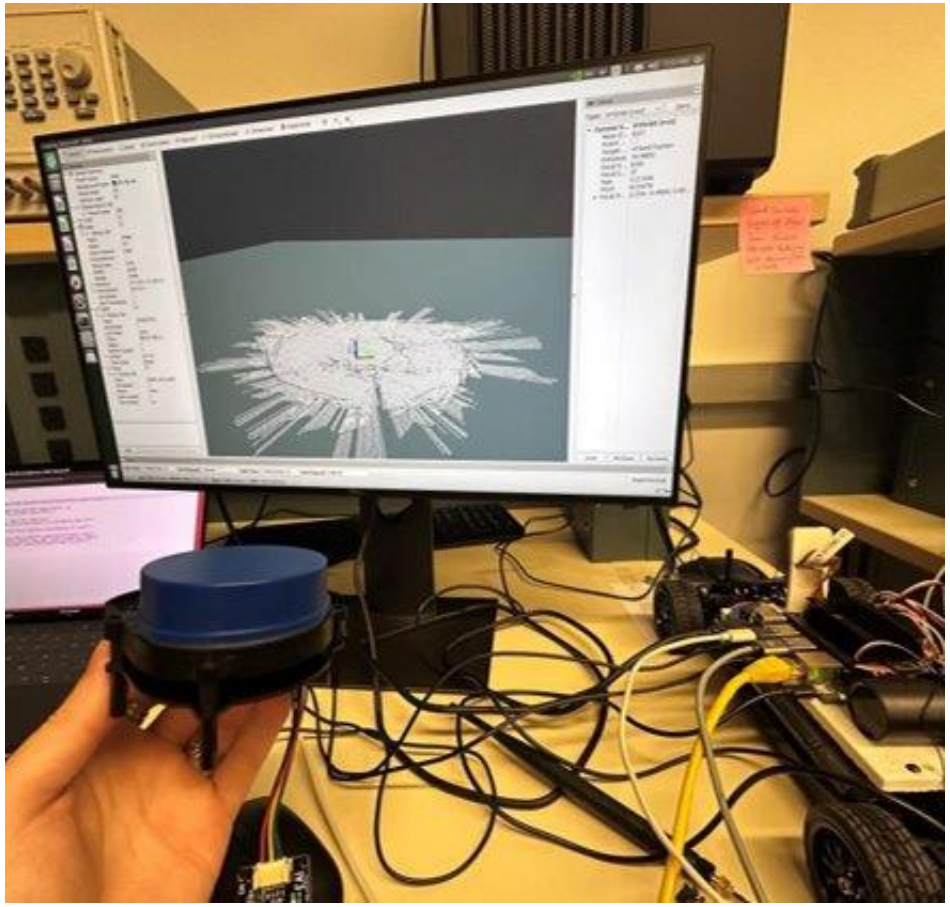
LiDAR (Arjun, Jarod)

Previous Work:

- Continued to troubleshoot hector SLAM and testing feasibility without odometry
- Investigated tradeoffs of rotating camera + 1D LiDAR/ultrasonic

Future Work:

- Make Soccer Field to test LIDAR
- Mount LiDAR on cars, test mapping in real-world
- Use SLAM maps to inform navigation



Object Recognition (K, Julie)

- Previous work:
  - Attempted to follow object following methods from previous years, ran into several roadblocks
    - Car is missing Jetbot package that can only be flashed directly onto SD card
      - Would wipe the entire system if we did
    - Year 1 managed to get it working with Darknet, but it only works with their YoloV4 model which we do not have
      - Looked into converting our model into Darknet format but could not find anything about it
  - New plan: Implement object following from scratch
    - Find x offset of ball from center of FOV, pass to ROS and control servos to reduce offset to 0 through PID
- Future work:
  - Work on object tracking metric
  - Coordinate with ROS team to use it to steer the car towards an object
  - Test ball following then use similar metric to get ball displacement from goal

Unity (Mason)

Previous work:

Optimized the simulation further, start looking to the movement parameter of the machine learning agents, the goal is to simulate the cars movement IRL as realistic as possible.

Future work:

Create a 3rd year repo for the JetRacer github page for the sake of progress tracking.

Improve the machine learning agent model so that they have a realistic collision model.

Continue to improve the movement of the simulated cars and the integration of the environment using the SDK.

Questions

- Using rotating camera vs. front and back camera to get "360" view
- Using ultrasonic sensor or 1D LiDAR on front of car to find distance to ball
  - Could we use the size of the ball in the camera's FOV to find distance?
- Is there a need for 2D LiDAR?
  - Do we need to know the position of the car relative to the field?
- Does the field need to occlude the camera from seeing the external environment?