Welcome!

Agenda:

- Announcements
- Look over onboarding document
- Go over high level goals(time permitting)

Announcements:

- **Welcome New Folks!**
    - Go ahead and start working on the **Perception Challenge**. **Once you are finished**, submit the **general application** including your github link and we will review your application.
    - For those finished with the perception challenge and approved, start working through the **onboarding document** **here**
    - Last step of onboarding is filling out a survey about what project you want to work on - I will meet 1 on 1 with you to assign you to a task after you fill this out

High Level Goals for Semester:

High Priority

- Improve robustness of traffic sign and sensor fusion classifiers
    - Brainstorm ideas for best approach
        - Consider from no-data(heuristic based) to large data-driven approaches
            - Choose model architecture that generalizes well
            - Gather robust dataset of traffic signs bare minimum 20k images, ideally at least around 100k
- Debug Perception CAN messages
- Lane Line Detection
    - Start from scratch
    - Need robust algorithm that can operate in variety of lighting and weather conditions
        - Can be deep learning, but needs to be lightweight and requires extensive testing to ensure generalization
        - Can also be classical computer vision
- Retrain YOLO to only detect traffic signs, cars, and pedestrians
- Lidar Pipeline
    - Better clustering algorithm
        - PCL is easy to implement but poor control over which algorithms to use
- Sensor Calibration
    - Calibration Tooling(software)

    - “Big Ass Checkerboard”
- Implement Adaptive Exposure Settings for Camera
    - Required to normalize lighting and ensure image quality across sensor suite
    - Should not have different cameras seeing the same image and classifying them as different objects due to a fault in the camera itself rather than the classification algo
    - Auto Exposure?
        - https://www.flir.com/support-center/iis/machine-vision/application-note/using-auto-exposure/

Important to Look Into

- Case study on radar?
- Perception Tracker(Fault Detection Pipeline)
    - Monitor status and outputs of ROS Nodes
    - Be able to identify and alert any failures(none or invalid output)
    - Possibly be able to rectify any failures
- Data Pipeline(Machine Learning Infrastructure)
    - Database Accumulation
    - Streamlining YOLO training process
    - Streamlining CNN training process
    - Model Tracking
- Streamline Testing On ROS
- Sensor Fusion involving Kalman Filtering?
    - Look into better sensor fusion approaches