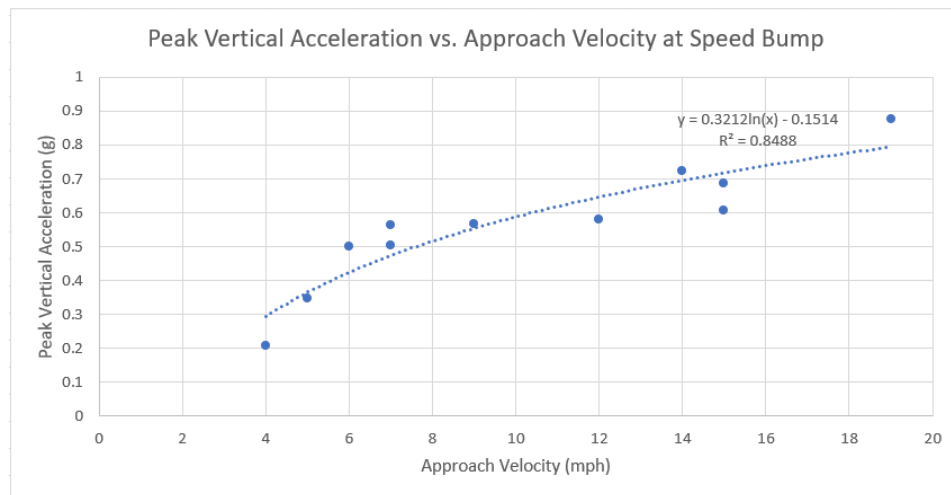**AutoDrive Project Weekly Report - November 16th**

1. **Fails of the week**
   - Things are great!

2. Successes of the week
   - Conducted vertical acceleration experiment — found relationship between approach velocity and peak vertical acceleration:

Peak Vertical Acceleration vs. Approach Velocity at Speed Bump

$y = 0.3212\ln(x) - 0.1514$
$R^2 = 0.8488$

   - Integration test between software and hardware

After training and testing the model in the simulated environment, we want to see how the model performs on real-world data. We collected snapshots of "paper tracks" with the camera on the prototype and fed the data to the model. Theoretically, the model should output a steering angle close to the steering angle of the track. We tested the model in 3 basic scenarios: 1) left, 2) straight and 3) right.

Here are the results:

Sample Image	Steering Angle	Throttle
left_1	-0.07146952301263809	0.079644
right_1	0.03908034786581993	0.8582879999999999
straight_1	-0.03622625395655632	1.0337062
straight_2	-0.021753234788775444	0.4809422

We observe that the model can output a correct steering direction based on the track condition. When the track is extending towards the left, the model outputs a left/negative steering angle -0.07; and when the track is turning right, the model outputs a right/positive steering angle 0.03. Based on the result from the test, we are confident that the model would also perform reasonably on real-world image data.

We plan to integrate the software model with the hardware prototype by deploying the model on the Raspberry Pi and all relevant data transformations will be supported by the Data API and the Control API.

3. Difficulties this week

- Figured out initial approach to measuring passenger discomfort in experiment did not match standard industry ratings. May go forward with a different rating scale ("Motion Sickness Dosage Value") suggested by Prof. Pollard or just use best practice vertical acceleration limits from other contexts to determine recommended approach speed.
- Difficult to mount and anchor the camera on the prototype. The change in orientation and positioning of the camera may add unwanted distortion to how the track looks in the captured image, which in turn adds noise to the neural network's output.

4. Goals for next week

- Install dependencies of the end-to-end neural network to run it on the raspberry pi
- Explore methods to recompile the end-to-end neural network to utilize hardware acceleration with the Movidius Compute Stick.
- Thanksgiving!