Daily Log

Monday November 25

Got long wires from the electronics lab director. Now we can control the steering and log the steering information out to a text file. The Arduino outputs data to the Raspberry Pi, which then prints it and puts it in a text file. The code can be found in anglelogger.py on our GitHub.

Monday December 2

We decided to make some progress with our Lidar data. We logged into the Raspbery Pi, downloaded the RPLIDAR SDK, complied the code for Linux, then ran the program to make sure it worked. We then decided to disconnect the sensor from the monitor, and see if we could run the code from my laptop via ssh. The program ran as expected, and if we left the Lidar sensor plugged in overnight, we could gather Lidar data at TJ from our houses if we wanted.

Wednesday December 4

Our wires finally came today, so we spent some time re-wiring our existing connections with our new wires. We also color-coded any voltage, ground, or signal wires with the colors red, black, and white respectively. Afterwards, I continued to try to get the ESC to work but to no avail.

Friday December 6

Using a bit banging method, we were finally able to control the ESC, and subsequently the motor, using the Arduino. I stabilized the PWM signal by connecting the ground, but I did not complete the voltage circuit, as that is what fried our old Raspberry Pi. The signal operates at a frequency of 100Hz, with 15% duty being neutral, 10% being full reverse, and 20% being full forward.

Timeline

Date	Goal	Met
Today minus 2 weeks	Have the car navigate a hallway on its own with hard coding	Yes
Today minus 1 week	Have the Raspberry Pi gather Lidar data	Yes
Today	Have the Raspberry Pi gather Lidar data	Yes
Today plus 1 week	Find a way to gather camera and Lidar data at the same time	No, we have not started yet
Today plus 2 weeks	Find a way to gather Lidar, camera, steering data, and throttle at the same time	No, we have not figured out the first two
WINTER GOAL	Have training data gathered from the lidar, steering, and camera, and format it all in one array or csv, so that it can easily be fed into a neural net	We have gotten much closer to our goal, and we have even decided to expand it by including throttle data in our collection as well.

Reflection

We reached a major milestone this week by being able to control the ESC with the Arduino. With this step completed, the car can officially have the ability to be fully-autonomous. The current method of controlling the ESC utilizes a bit banging method that utilizes delays to manually simulate a PWM signal. This use of delays effectively renders the Arduino useless for any task other than creating a PWM signal. To solve this, we might have two Arduinos, one for controlling the servos and another to control the motor/ESC.

The Pi will still be the brains of the operation. It will provide the instructions to the Arduinos, who have better DACs, who will in turn interface directly with control components. The Lidar will also be directly controlled via the Pi. Moving forward, our challenge is connecting all of these rather separate components with one program.