Journal Report 2
9/9/19-9/13/19
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Daily Log

Monday September 9

We finally found a user manual for our LIDAR sensor, and we attempted to interface with LIDAR sensor, but we didn't make any progress. I also got formal approval from Ms. Kusko to use the LIDAR and the RC cars, so we should have most of the expensive materials secured.

Wednesday September 11

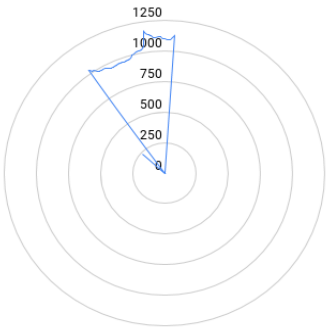
Got ultra_simple and simple_grabber to run on Tony's Mac. The two programs make the LIDAR sensor grab data and return it as a mapping of (theta, distance). Currently trying to figure out how the coordinate system (theta, distance) works. That is, which direction relative to the car is 0 degrees. We have a rough idea of the coordinates through some experimentation. Analysed the source code a little bit to adjust the baud rate to run on MacOS (which does not support the fastest option the Lidar offers).

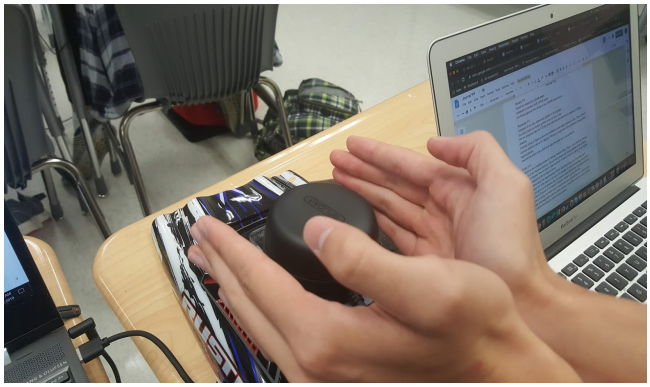
Friday September 13

Figured out the coordinate system by finding a manual online. Theta = 0 is at the front, and gets positive in the clockwise direction. Also got ultra_simple and simple_grabber to run on my Windows computer. Now we need to figure out how to make it work for Arduino, as our laptops will not be attached to the car when it drives.

We spent some time experimenting with the RPLIDAR sensor and found that it will return a distance of 0 if the surface is far away. For example, if you hold something very close to the sensor it will give you the distance, but if you point it down the hallway the distance will say 0. So we can take a distance of 0 to mean no obstacles nearby in a given direction.

Currently working on Python code to visualize the data collected from the LIDAR sensor. We are working with matplotlib to plot the (theta, distance) values. We got some sample data by cupping our hands around the sensor, but leaving a gap. I was able to plot the data using Google sheets, but we had to remove an outlier.





Timeline

Date	Goal	Met
Today minus 2 weeks	N/A	N/A
Today minus 1 weeks	N/A	N/A
Today	Download dependencies and setup a GitHub repositories and acquire a remote-control car	Yes, got permission from Kusko, and have a repo on both Tony's computer and my computer
Today plus 1 week	Create "road" patterns for car to follow and have Lidar code compiled and running	Yes, Tony started making the rules set that the car would follow, and we both got the sdk demos to compile and run
Today plus 2 weeks	Secure an Arduino, and write code that runs the Lidar off of the microcontroller.	We plan on using Tony's Arduino, but we have yet find a lidar library for Arduino

Reflection

Our challenge of getting the SDK code to compile and run is finally over. The main problem now is the reliability of the data. We have outliers that when plotted, change the entire picture of the Lidar's surroundings. We might have to program an algorithm, and implement it into the source code that automatically omits outlier values. This will be challenging to do live because we will not know if a data point is a true outlier until we have examined the data that comes after that datum.

I also suspect that we will have to completely rewrite the lidar code ourselves when we port over to the Arduino, becuase of how specialized the compilation process is for the SDK. It utilizes make files for Linux/MacOS and Visual Studio on Windows to generate an executable with (its own custom libraries). Hopefully we can find some universal Lidar library that will work with our RPLIDAR.