

## Progress Report 4

This week for senior project, I needed to make the final decisions for which radar to buy. I have no experience purchasing one of these radars, so I reached out to Basha for help. She stated that my finalized choice of the TI AWR1642BOOST was overpriced, too advanced, and out of our scope for senior project. I agree, I chose that option because it was providing everything we looked for, plus some for our project.

She recommended I look to buying the previous one stated in last semesters final project. I let her know that the API did not produce enough information and I could not find accurate demos to distinguish multiple objects or even get the raw data. She said she does not think it is a bad choice for radars, and I told her I would send in the order tomorrow. Order has been sent, and hopefully we will be one step closer to obtaining this device.

I also said last week, I wanted to work on the PID. I ended up getting covid and not completing the prototype, but I made good progress and found some basic code that can be used to help create the PID in C.

```
1  def run(robot, tau_p, tau_d, tau_i, n=100, speed=1.0):
2      x_trajectory = []
3      y_trajectory = []
4
5      prev_cte = robot.y
6      sum_cte = 0
7      for _ in range(n):
8          sum_cte += robot.y
9          dev = robot.y - prev_cte
10         prev_cte = robot.y
11         steer = -tau_p * robot.y - tau_d * dev - tau_i*sum_cte
12         robot.move(steer, speed)
13         x_trajectory.append(robot.x)
14         y_trajectory.append(robot.y)
15
16     return x_trajectory, y_trajectory
```

This code is using weights with tau to determine how much you need to adjust to get back onto the right path. The P is the major force to readjust the application to the goal. The I is the monitor for the path and to help if the robot gets stuck, and the D monitors the P and makes counter measures when needed.

People	Completed Tasks
Beau	Discuss with Basha on decision for radar sensor
Beau	Sent an email to place an order on our decided Radar sensor
Beau	Reached out to Jason To-Tran to begin developing an algorithm for object detection with this radar
Davis	Found documentation on 8-bit MCU, talked to Mark about jetson Nano, discussed with Prof P about large datasets, recreate basic image classification in Google Collab, finalized training data set.
Oscar	Met with Prof Mueller for PSPICE, talked to Prof Kohie about circuit design, simulated circuits, talk to prof Basha about communication for steering
Michael	Research into Haskell and GPS tech. Found GPS from Mark. Researched unit and mapped campus to a graph. Modified Python Prototype to read graph from a csv
Hemad	Ordered MOSFETs, contacted Dr Basha regarding throttle, and checked potentiometer

This week, after reaching out to Jason To-Tran. I plan on getting some assistance from him to begin working on our object detection algorithms using the radar vision. Without the radar yet, we will be working with mostly just brainstorming and head calculations for creating the decision making as objects are getting closer.

I also plan on talking to him about integration of parts and which coding languages I should be looking to write algorithms in to synthesize our code most effectively. This would help speed up our interactions between parts and help me to not have to recode in other languages multiple times.

Michael finished his campus map, and we are receiving the GPS unit from Mark. Michael and I plan on getting a first look at this GPS and our constraints/how it will work when we try it around campus. This will help us when we try to code our cart using the same GPS.

People	Tasks to Complete
Beau	Code prototype for PID in matlab to make sure calculations are correct
Beau	Speak with Jason about integration of code and object detection algorithms
Davis	Speak with Prof Chadi about training a CNN with multiple neural networks, complete google collab environment training, look into hardware status of sensors, minicomputer alternatives
Oscar	Control steering, finish circuit design, start eagle sims
Hemad	Finalize throttle decision, buy potentiometer, and work on circuits
Michael	Get GPS unit and begin work with it and continue with Haskell to get comfortable with it.
Beau, Michael	Set up and prototype guideline layer of campus map