Project Title: **Pololu Lane Keeping**

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EECS 149/249A Final Project Fall 2023

Project Goal:

The goal of this project is to allow the Pololu robot to stay in its lane based on camera data.

Project Approach:

We will construct arbitrary roads for the robot to take, and have it move along using just the camera data fed into Raspberry PI4. Using OpenCV, we will figure out where the Pololu needs to be facing and moving, just based on the camera data. This data will be fed to the Pololu robot, which will then change its moving trajectory based on data sent by the RP4.

Resources:

We will be using a Raspberry Pi 4 along with a 12MP camera in order to track two lanes on either side of the Pololu 3pi+ 2040 in order to keep it in the center as it moves using OpenCv. The candidate for the camera will be Raspberry Pi High Quality HQ Camera - 12MP (https://www.adafruit.com/product/4561) alongside a 16mm 10MP Telephoto Lens (https://www.adafruit.com/product/4562). OpenCV will be used in order to process the position of the lanes and using the GPIO pins provided on both the Raspberry Pi and Pololu, the Raspberry Pi will send information to the Pololu motors in order to move it into the desired position. The state machine and interrupt handling will be done on the Raspberry Pi taking in information in a feedback loop from the camera in order to ensure the Pololu is kept in the center of the two lanes as it moves forward. The Pololu will take basic information from the Raspberry Pi and then control the motor output to reach the desired position.

Schedule:

Date	Deliverables
10/23/2023	Project proposal
10/24 - 11/6/2023	● Design state machine/model model(s), wiring diagrams ● Order hardware ● Make a track
11/7/2023	Milestone 1

11/8/2023 - 11/?/2023	● Have lane tracking down ● Connect Raspberry Pi and Pololu ○ Pololu can take some input and move based on that
11/?/2023	Milestone 2
11/?/2023 - 12/13/2023	● Fine Tuning (testing on edge cases), making sure everything is connected and works ● Make poster, work on report ● Decide on a demo
12/13/2023	Poster and demo

Risks:

One risk with this project is that it's hard to tell how difficult it will be to integrate OpenCv with the Pololu. The capabilities of the robot and the Raspberry Pi may vary greatly.

Github Repository:

https://github.com/abotvinik/Pololu-Lane-Keeping