Path Planning and Tracking for Autonomous Cars  
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Introduction  
- Autonomous vehicles have the potential to increase safety, efficiency, and reliability in transportation services.  
- Given the starting position and orientation of the car, the objective is to navigate to a target position and orientation

Hypothesis  
- The car will not identically match the simulation since there exist external factors that can affect the trajectory of the car in the real-world.

Methods

Path Planning  
- Utilize a Dubins path to find fastest route between a starting position & orientation and a target position and orientation shown in figure 1  
- Dubins path contains a fixed turn radius and can consist of 3 segments

Path Tracking (Simulation)  
- Run simulation where proportional controller is implemented to adjust the turn and follow the path as accurately as possible as shown in figures 2.1-2.3

Path Tracking (Real-World)  
- Transfer values from simulation to hardware and try to mimic path trajectory

Results

Simulation  
- In Figure 3.1, the car’s actual path was mapped versus its target trajectory  
- Successful tracking since both paths are very similar

Real World  
- In figure 3.2, desired and actual are minimally offset  
- Expected some difference but not this little

Future Research  
- Use multiprocessing to live track the real car and make it more accurate  
- Implementing LEDs to facilitate car tracking and sharpen precision

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