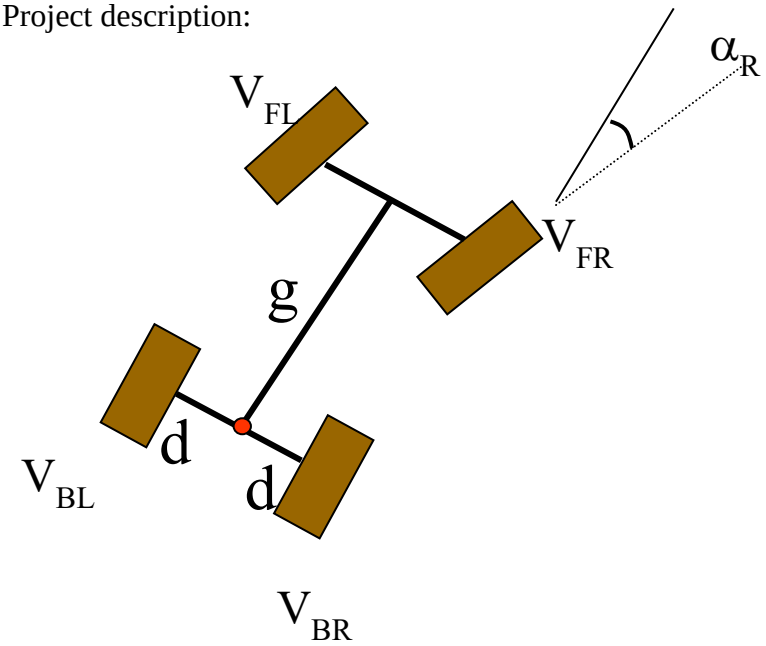
CSCE 452 Project #4 Driving Simulator for Porsche 911 Carrera (2019)

Project description:

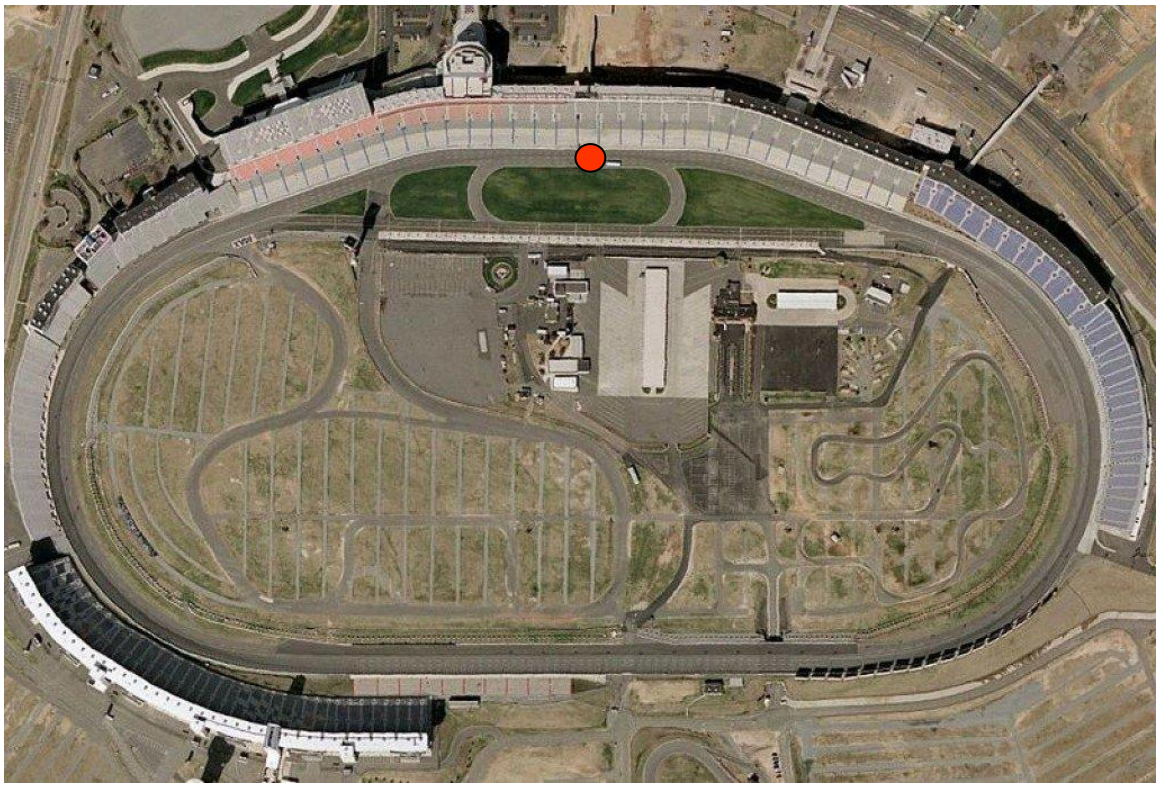


We have learned Ackerman Steering model in class. Let us build a driving simulator around it. For vehicle size, we use Porsche 911 Carrera as a reference. Its wheelbase g=96.5in, width 2d=60in. Wheel size information can be found here: https://www.porsche.com/usa/models/911/911-carrera-models/911-carrera/featuresandspecs/

The simulator should have two panels: vehicle drive panel and track panel.

The vehicle drive panel should include both steering control and velocity control. For the steering control, it should use a steering wheel-like control to turn vehicle left or right. It should control the α_R (see figure) directly. You may use mouse drag to generate steering angle. Please make sure that the maximum steering angle α_R is ±30 degrees which is similar to a real car. For velocity control, please use + and – buttons on the panel. The buttons directly controls V_{FR}. You can also use mouse right or left buttons to control it. Other wheel directions and velocities should be calculated using the Ackerman Steering model. The velocity range of the wheel speed is from -5 to 200 mph. At the bottom of the velocity, there should be a display of four wheel velocities and the overall vehicle velocity (speed of the red dot in the figure).

The track panel should include a top down view of NASCAR. Let us use Charlotte Motor Speedway as the test track shown in the figure below.



You may load this figure into your track panel. The track panel should have two displays. 1) An overall global view of the motor way with the vehicle represented as a dot, and 2) a detailed local blowup showing the vehicle on the track. The blowup should allow us to see clearly how the vehicle is moving with respect to the background. In the blowup view, the vehicle should be located in the center from a top-down perspective and background moves according to how you drive. The overall global view should include the red dot in the map which is used as the vehicle starting position.

You are also required to compute vehicle positions every 1/10 second during the driving and log the positions into a file. You are required to have a play back function to replay the last driving and display the trajectory overlaying on the figure above.

Each group need to submit a project report before/on due date. Grading is based on in-class demonstration (40pts), peer-review (40pts) and project website (20pts). Detailed project requirements are,

1. Complete a successful in-class demo (40pts)
2. Create sub directories for project 4 on your project website.
    a. Team member task allocation for current project (5pts).
    b. Team meeting log for current project (5pts).
    c. Source code for current project and instructions for compiling (5pts).
    d. Screenshot of the software interface of current project (5pts).

3. Peer Review (20 pts): You will be able to find a peer review form in our course website. Note this every student needs to submit the peer review form. Grading will be based on the overall score that your teammates evaluate you. Failure to submit peer review form before the deadline will lose 5pts as a penalty for the individual. Please download the form and submit it via Google classroom. In the peer review form, there are two main parts: personal evaluation (10 pts) and technical evaluation (10 pts).
4. We will have an in-class driving competition. The wining team will obtain 5 bonus points.