## Project Requirements Document:

1. Overview
   1. Objectives: Why are we doing this project? What is the purpose?

The goal of this project is to combine what we’ve learned through the labs in this class as well as prior 319K knowledge into a coherent embedded system. The project provides a more open-ended scenario than the other labs which allows us to build a more creative system and see the creativity of other groups.

* 1. Interactions with Existing Systems: Include this if you are connecting to another board

Aside from using multiple TM4Cs, we will be interfacing via UART with ESP8266 microcontrollers for wireless communication. The goal is to minimize complexity of the networking protocol and have two ESP microcontrollers communicating with each other directly.

* 1. Terminology: Define domain specific terms used in the document.

None.

1. Functional Description
   1. Functionality: What will the system do precisely?

The system is a slot-car racing game. The game is two players, each with a car on a racetrack. Skill from the game is derived from controlling your speed around turns (you need to avoid flying off the track!) and timing your “shifting” to maximize your speed. The system will have two controllers that wirelessly communicate with their car, and a central TM4C for timing and/or counting laps, declaring the winner, and potentially additional stretch-goals.

* 1. Performance: Define the measures and describe how they will be determined.

Performance of this system will be measured through controller latency, timing latency, and speed and maneuverability of the cars. Controller latency could be measured via synchronous clocks on each system, and seeing the time elapsed between an input and seeing movement on the car, or through a slow-motion video. Speed an maneuverability of the cars can be measured by simply observing them move around the track.

* 1. Usability: Describe the interfaces. Be quantitative if possible

The main interfaces for the users in the system are the controllers. There will be two sets of controls, one for each car. The controller will not be battery operated. Instead, it will be wired to the track. The controllers will then communicate wirelessly to the cars. As a stretch goal, we intend to have speedometers and other metrics on LCDs as part of the controller.

1. Deliverables
   1. Roles and Responsibilities: Who will do what? What is the purpose?

Conner Leu will be largely responsible for designing the PCBs, and sourcing components. Frank Collebrusco and Sajid Bhuiyan will work heavily on the software managing wireless, timing, and potentially graphical systems. Rocco Perciavalle will work on 3D CAD models for the car chassis. All members will provide support across all aspects of the project, including building the track, cars, controllers, and software.

* 1. Reports: Simply state the reports for Labs 7 and 11 will be written

Reports for Labs 7 and 11 will be written.

* 1. Outcomes: What are the deliverables? How do we know when it is done?

The project is done once we have two functional cars and controllers that communicate wirelessly, along with a central controller to manage laps and timing. Any additional features are stretch goals.