1. **Overview**
   1. Objectives

Our goal is to design an embedded system and lay the PCB board for the circuit. We will study and make decisions based on the issues of power, clock, reset, and programming.

* 1. Roles and Responsibilities

Justin Nguyen and Trevor Murdock are the engineers assigned to this project. Justin will begin the design of the PCB and will later design the testing software for the hardware prototype. Trevor will acquire the parts necessary and build the hardware prototype. Trevor will also research and configure an external server for use later in the project. Dylan Zika, Professor Jonathan Valvano, and our peers are the clients.

* 1. Interactions with Existing Systems

This project consists of two identical embedded systems communicating indirectly with each other through the use of an external server. Each will download and upload data to the server.

1. **Function Description**
   1. Functionality

The system will be a real-time multiplayer video game. Two embedded systems send user input to and receive game state information from an external server. The handheld user interfaces will be wireless and communicate through Wi-Fi. Music and sound effects play from both systems.

* 1. Performance

There are five defined project milestones. Each will be met in sequential order and tested individually: 1) Each embedded system will use UDP to communicate directly with the server and indirectly to the other system through the server. 2) The multiplayer game design will be competitive, engaging, and fun to play. The communication protocol will not cause noticeable delay between user input and visible action. 3) The system will be tested to see if dropped/out of order packets considerably affects the game’s performance. If so, we will redesign the communication protocol or information processing such that each system and the server will be capable of recovering from such corrupted packets. 4) Each controller will produce sound effects. 5) The music played will be multi-melodic and will not cause significant slowdown to the foreground process.

* 1. Usability

The user interface consists of two analog sticks, two game interface buttons, an ST7735 LCD display, 8W speaker, a reset button, and power switch per handheld system.

1. **Deliverables**
   1. Reports

The report for Lab 7 will be written and submitted.

* 1. Outcomes:

We will submit a circuit diagram and PCB layout of our system. We will provide an overview of our software design, current consumption, and cost of the system. We will demonstrate a hardware prototype of the system to Dylan. Additionally, we will include test code and analysis of the system along with discussion as specified in the Lab document.