1. **Overview**
   1. Objectives

Our goal is to design a two player, twin-stick shooter called WIFI DOGFIGHT. Our goal is to make the game have unnoticeable lag, implement peer-to-peer WIFI, have a few modes of gameplay (e.g. dogfight, death match, etc.), have sound effects and music, nice animations, and add cool gimmicky features with the ADXL accelerometer. We will make decisions based on the issues of power, timing, data transfer/processing, clock speed, and time to write code.

* 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 do research on how to implement peer-to-peer WIFI with the ESP8266. We will both design the software modules (including a graphics module, timing module, sound module, buttons module, accelerometer module, etc.). Dylan Zika, 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 UART. Players will also interact with our game through the accelerometer, joysticks, buttons, and sound.

1. **Function Description**
   1. Functionality

The system will be a real-time multiplayer video game. Two embedded systems will talk directly to each other through the ESP8266. 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 be able to talk to the other microcontroller (both transmit and receive). 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, an ESP8266 WIFI module, an accelerometer, three/four game interface buttons, an ST7735 LCD display, 32 ohm 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.