**EE 445L Lab 7 Report Deliverables**

Team members: aur228, aj28285, sj26792, xc3994

**Requirements Document: Lightsaber**

1. **Overview**
   1. **Objectives**

The objectives of this project are to design, build, and test a custom embedded system. In practice, we are building a lightsaber. Our goal is to demonstrate our understanding of embedded systems design.

* 1. **Roles and Responsibilities**

We are both the engineers and the clients because we are both making a lightsaber and want a lightsaber. Responsibilities will be divided based on accessibility to lab equipment and prior PCB design experience.

* 1. **Interactions with Existing Systems**

Our system will interact with a NeoPixel LED strip to output lighting effects.

1. **Function Description**
   1. **Functionality**

We will attempt to closely resemble the functionality of a “real” lightsaber. There will be a handle for the user to grasp, and an illuminated endpiece. If the user presses the button, the lightsaber will turn on and off. Using the lightsaber’s wi-fi connection, the user will be able to configure lightsaber settings using an app, such as color and sound. Sound and lighting effects will play depending on the lightsaber’s movement.

* 1. **Performance**

The system will be judged first by the Spring 2021 EE 445L class, at the end of year competition. Second, it will also be judged by our satisfaction of the project.

Other criteria include software organization and readability, the system’s response to stimuli, and ease-of-use.

* 1. **Usability**

The system will be easy to use, and not require any training. There will be very few buttons on the side of the lightsaber to control lighting. Most features will use sensor data to trigger.

1. **Deliverables**
   1. **Reports**

The reports for Labs 7 and 11 will be written.

* 1. **Outcomes**

For Lab 7, we will deliver this requirements document, a schematic of our PCB, our software, current and cost estimations, and a discussion on debugging our system.

For Lab 11, we will deliver a more detailed requirements document, a detailed PCB schematic, a ½ page report on our software architecture, and measurement data for our system.

Additionally, we will deliver a YouTube video showcasing our product.

**PCB and Schematics:** uploaded on GitHub

**Discussion:** Debugging plan

HARDWARE:

(PCB and circuit already built and soldered, everything appears to be working correctly so far)

* We have access to lab equipment including an oscilloscope, microscope, soldering equipment, and multimeters.
* Individual connections and expected voltages can be tested using the oscilloscope, multimeter, or microscope if needed.

SOFTWARE:

* JTAG connector to enable remote testing on the board.
* Lightsaber functionalities split into different modules, which will be unit tested separately before integration
* Each member will be responsible for a few modules and the team will work together to understand other modules and how they combine.
* Modules needed include (but aren’t limited to) Buttons, timers, JTAG, WIFI (ESP module), NeoPixel LED drivers, ect.
* Modules will be integrated in tiers. Associated components will be integrated together in larger modules and tested before implementing the larger modules fully in the main loop.
* During testing stage, we will use a prototype main loop with a debugging driver to run only the things we want to test.