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Product Requirements Document

Goals: What does the project seek to accomplish?

The primary goal of this project is to create 2 devices to communicate vocally using wifi. Secondary objectives include radio communication, text-based communication, message recording and transmission, and multiplayer game development.

Process: How will the project be developed?

The development of the project will focus on completing the primary objectives before working on the secondary objectives. This will help ensure the minimally viable product is accomplished on time while allowing for the possibility of including extra features. Overall design will flow from the hardware components to the software modules. The project will be developed as follows:

- 1) Hardware development and design
 - a) Determine the minimum hardware necessary for all primary features.
 - b) Design interfaces for the required hardware.
 - c) Determine extra hardware requirements for secondary objectives.
 - d) Design interfaces for the extra hardware.
 - e) Design an enclosure for the overall device.
- 2) Software development and design
 - a) Determine the hardware and software modules necessary for the primary features.
 - b) Design the call graphs and data flow diagrams for the primary modules.
 - c) Write the primary module drivers.
 - d) Determine the hardware and software modules necessary for the secondary features.
 - e) Design the call graphs and data flow diagrams for the secondary modules.
 - f) Write the secondary module drivers.

Roles and Responsibilities: Who will do what? Who are the clients?

EE445L students are the engineers and the TA is the client. The group is allowed to divide the responsibilities of the project but all members of the project are expected to understand all aspects of the design.

1. Som- Mic and Speaker
2. Yuqi- Keyboard
3. Kevin- Mic and Speaker
4. Allen- Radio Transiever

Scope: List the phases and what will be delivered in each phase.

The project will be developed in several phases including:

- 1) Research
 - a) ESP Point Communication
 - b) Keypad integration
 - c) Microphone filter design
- 2) Test
 - a) General data transmission through ESPs
 - b) Transmit recorded waveform
 - c) Video game
 - d) High-speed audio sampling through a microphone
- 3) Debug
 - a) Hardware debugging
 - b) Performance debugging (software-timing)
 - c) Data debugging (software)
- 4) Implementation/Result
 - a) This stage comprises creating a shell and placing all the respective parts in the shell. This will be done twice for the two phones. Final testing will be performed and the product will be demonstrated to the client.

Prototypes: How will intermediate progress be demonstrated?

- a. ESP point communication

- i. Demonstrate communication between two ESP
- b. Keypad integration
 - i. Type a message out on the screen
- c. High-speed audio sampling
 - i. Output a good quality audio recording
- d. General data transmission
 - i. Send out data between two ESP
- e. Transmit waveform
 - i. Take a simple waveform and send it between ESP
- f. Video game
 - i. Create and debug a two-player video game
 - ii. Send data between the two devices

This will be done in a modular fashion. Once all of the above have been implemented, they will be combined.

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

Performance of the system will be determined by four measures. These measures include software style, modular design, hardware design, and abstract data structures. Each of these is important as it correlates with greater understanding and ease of use. Software style helps understand the syntax of the code. The data structures must be abstracted for the same reason. Modular design is necessary for debugging and splitting up work between the group. Lastly, the hardware must be designed well in order to reduce noise and keep everything in working order. Quantitative measures include ISR percentage time, SNR, and jitter for each module in the code.