**Requirements document**

1. Overview

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

The objectives of this project are to design, build and test a Wi-Fi connected voice communicator.

1.2. Process: How will the project be developed?

The project will be developed using the TM4C123 board. There will be at least one Push-To-Talk button and one navigation button that the operator can use to control the system. The system will be built on a printed circuit board and run off a battery supply. The initial design will be prototyped and tested on a breadboard, then constructed on a printed circuit board.

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

EE445L students are the engineers and the TA is the client. For this project, Jon Ambrose will be responsible for circuit design layout and DAC sampling and John Starich will be responsible for Audio playback, User interface, and possibly server applications.

1.4. Interactions with Existing Systems: How will it fit in?

The system will be self-contained and will use the TM4C123 board, a printed circuit board, a speaker, a microphone, Wi-Fi card, and control buttons. Power will be supplied by a 7.4V Li-ion battery.

1.5. Terminology: Define terms used in the document.

PTT – Push-to-Talk

1.6. Security: How will intellectual property be managed?

The system may include software from StellarisWare and from the book. No software written for this project may be transmitted, viewed, or communicated with any other EE445L student past, present, or future (other than the lab partner of course). It is the responsibility of the team to keep its EE445L lab solutions secure.

2. Function Description

2.1. Functionality: What will the system do precisely?

The basic purpose of the system will be to record short voice messages and transmit them via Wi-Fi to a second device for communication.

When the PTT button is pressed, the system will record up to 10 seconds of voice from the microphone input. When the PTT button is released, the system will transmit the audio data to a second device via TCP/IP over the Wi-Fi link. Once received, the second system will play back the audio data via the system speaker.

A user interface will be displayed via LCD screen. The user may scroll through a contact list with the navigation buttons up and down direction. When the user presses in on the navigation button, the contact is selected and communication established. When the user is being hailed, the UI will display an accept/decline screen where the user can select their response with the navigation button.

Voice recording will be handled by sampling the microphone at a predetermined rate. The audio software will use the same sampling rate for playback.

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

Phase 1 is prototype and test; phase 2 is the PCB layout and ordering; and phase 3 is assembly and demonstration.

2.3. Prototypes: How will intermediate progress be demonstrated?

A prototype system running on the TM4C123 board and solderless breadboard will be demonstrated. Progress will be judged through multiple lab sessions with the TA’s.

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

Audio Fidelity – How well the system can capture analog voice and recreate it. SNR can be measured via O-scope but mostly audio fidelity will be subjective.

Transmission Latency – How quickly the system can transmit its Audio data from point to point. This will measured with a timer.

Reliability – The ratio of successful operations vs attempts.

2.5. Usability: Describe the interfaces. Be quantitative if possible.

There will be a master power switch for the battery. There will be a PTT switch and a navigation switch. One LCD display. One Microphone, One Speaker.

2.6. Safety: Explain any safety requirements and how they will be measured.

Audio output should not exceed comfortable level when the speaker is placed over the ear.

3. Deliverables

3.1. Reports: How will the system be described?

A lab report described below is due by the due date listed in the syllabus. This report includes the final requirements document.

3.2. Audits: How will the clients evaluate progress?

The preparation is due at the beginning of the lab period on the date listed in the syllabus.

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

There are three deliverables: preparation, demonstration, and report.