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Semester: Spring 2024

Course: ECE445L

A) ***Objectives*:**

1. In a few sentences, describe the purpose of the lab.

Purpose is to design an embedded system that can fit in an enclosure. We are building the Tpod, which is an Ipod like music player that stores song in an SD card, plays songs through headphones, and has touch display and can send messages over wifi. This lab builds the PCB for the system

B) ***Hardware Design Deliverables:***

1. N/A

C) ***Software Design Deliverables:***

1. I have pushed my project to GitHub for grading (Yes/No):
2. Deliverable 1: System design diagram of the modules created.

A diagram of a software program

Description automatically generated

D) ***General Deliverables:***

1. Deliverable 2: Software Tests

Based on our design diagram, we had separate tests for each module. For the dis-play, to test our initialization function we built a basic circuit to connect our TM4C to the ILI9341 screen, and see if basic functions such as drawing pixels work on the screen. After that, we added draw and outString functions for our project. For the SD card, we wrote basic code for reading from a txt file and outputting the values that we read on the screen. Furthermore, for sound we first tested the sound with individual notes, then moved on to reading from a music array that was set as a constant within the program. Lastly for mes-saging, we tested the server by using dummy clients and sending messages. Along that same line we tested sending from the TM4C by matching the message to what was received by the server and what was sent by the TM4C. We tested receiving by matching the mes-sage that was displayed by the TM4C to what was sent by the server. For integration tests, we used the same tests for each module as we integrated each module with each other. We first integrated display with SD card, then sound, then buttons and last-ly messaging, and tested each module with the tests described above at every step.

1. Deliverable 3: Hardware Tests

Tested all the board voltages with a multimeter to make sure power worked.

Tested audio software test on PCB to make sure headphone jack worked.

Tested wifi communication on PCB to make sure it worked same as breakboard.

Tested potentiometer to make sure it worked for ADC on PCB.

Multiple iterations of enclosure to make sure PCB fits and buttons can be pressed

1. Deliverable 4: Power consumption

Launchpad Base – 86 mA \* 5V = 430 mW

Screen - 25 mA active \* 3.3V = 75 mW

Music – 14-144 mA volume range \* 5V = 70-720 mW

ESP –78 mA active \* 3.3V = 257.4 mW active

Total – 1.482W when music active, .832.4 W when music passive

1. Deliverable 5 (10pt EC): Characterization of the system N/A

E) ***Analysis and Discussion Questions:***

1. N/A