Final Project Requirement Document
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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 an embedded system. Educationally, we are learning how to create a stand-alone system using PCB. It also serves as a comprehensive review of the materials we learned throughout this semester, such as ADC, Speaker, LCD, switch interfacing. Our goal is to create a stand-alone smart display system.

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

The client is our TA Mahesh. Michael and Jack will deisgn the smart display system together. Michael will design the PCB and work on system software. Jack will work on Wifi module and data acquisition through web services. Together Michael and Jack will integrate the entire system.

1.3. Interactions with Existing Systems: Include this if you are connecting to another board

Our system will be connected to a ESP mini Wifi board.

2. Function Description

2.1. Functionality: What will the system do precisely?

The system is a stand-alone display device used for news updates, weather forcast, temperature, social media notifications, and an alaram clock. More precisely, it will be placed on a desk or a night stand. It will pull data from open servers and display notable information. It will be capable of displaying different time zones and weather zones. It also has an alarm clock functionality. There will be buttons to set alarm and refresh updates on notable information. There will be a light sensor to automatically audjust the brightness of a screen.

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

The performance will be measured based on the time it takes to retreive data from a server and data loss.

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

Our system will be interfaced with ESP wifi module. There will be at least two switches interfaced. It will also be interfaced to an LCD screen and to a speaker. Our speaker will simply be interfaced with a transistor circuit to make buzzing sound for alarm. Lastly there will be a light sensor interfaced and use ADC to recognize the birghtness of surroudnings.

We will use an LCD screen to display time weather, and important news or some notable information. There will be an automatic slide feature on the display since we cannot fit all the information in one screen. The brightness of the screen will be adjusted based on calibration of a light sensor and using PWM. There will be two ISRs. One for switch interface and the other for making sound. There could possible be another interrupt to contorl the brightness of the LCD.

3. Deliverables

3.1. Reports: Simply state the reports for Labs 7 and 11 will be written

Reports for Labs 7 and 11 will be written.

3.2. Outcomes: Simply copy/paste the Lab 7 and Lab 11 deliverables.

Lab7:

A) Objectives

1-page requirements document

B) Hardware Design

Regular circuit diagram (SCH file)

PCB layout and three printouts (top, bottom and combined)

C) Software Design

Include the requirements document (Preparation a)

D) Measurement Data

Give the estimated current (Procedure d)

Give the estimated cost (Procedure e)

E) Analysis and Discussion (none)

Lab11:

A) Objectives

2-page requirements document

B) Hardware Design

Detailed circuit diagram of the system (from Lab 7)

C) Software Design (no software printout in the report)

Briefly explain how your software works (1/2 page maximum)

D) Measurement Data

Include data as appropriate for your system. Explain how the data was collected.

E) Analysis and Discussion (none). The YouTube video is required