COVID-19 Thermawave Monitor

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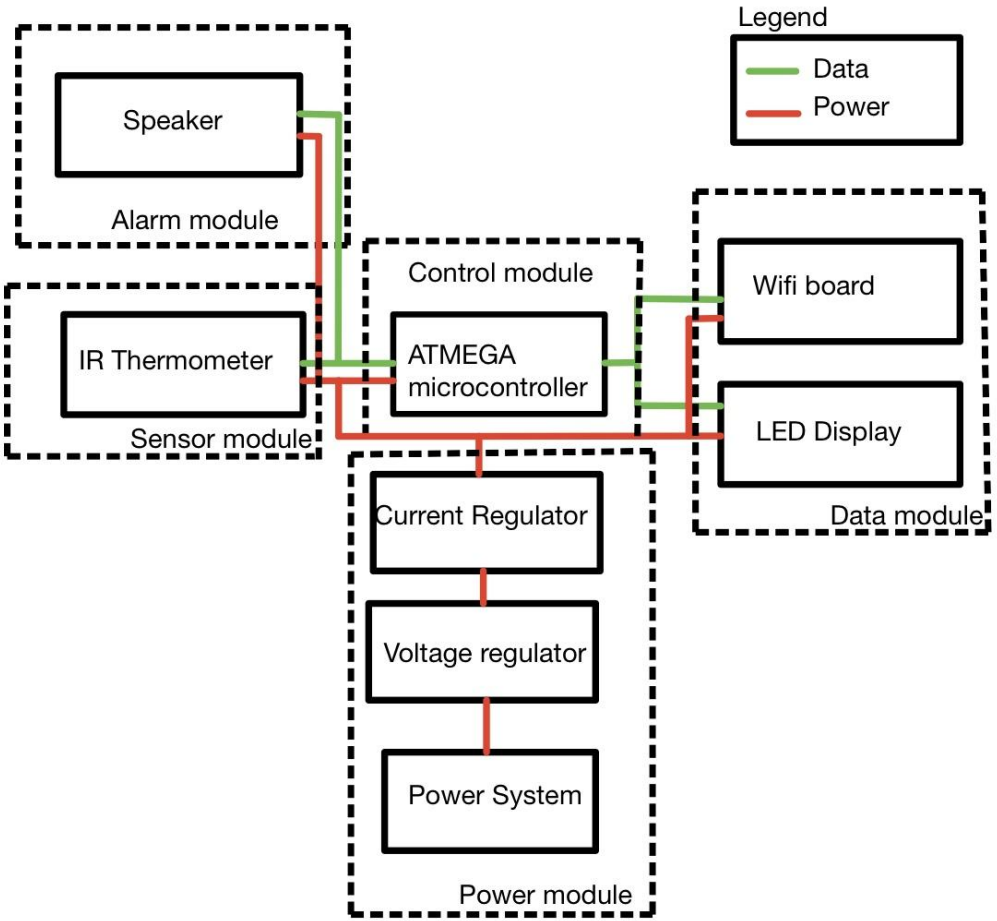
Introduction

We will build a COVID-19 temperature monitor for independent businesses. Businesses have the problem where they have to hire someone to stand at their entrance in order to check the temperature of people wanting to enter. This autonomous temperature monitor will allow businesses to continue to monitor temperatures for the safety of the community without having to hire more workers during this already tough financial time.

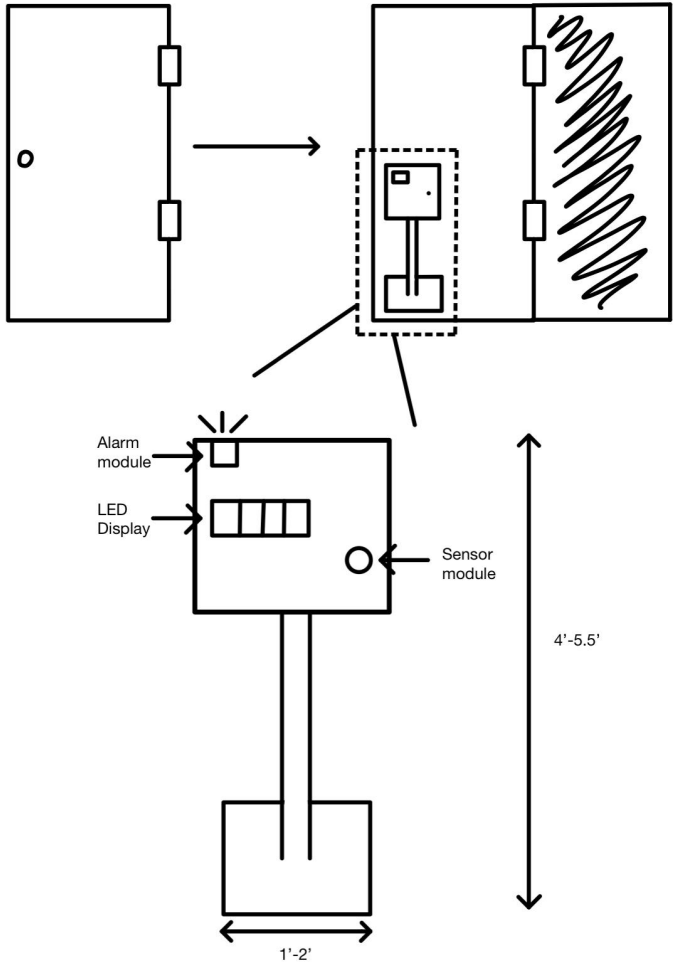
High Level Requirements

- The Thermawave Monitor must be able to accurately measure the temperature of a person standing in front of it. The person may be instructed to position their forehead close to the sensor.
- The signaling system must be able to easily notify the patron that they are not allowed entry if their temperature is considered to be a fever. Any temperature below 100.3°f will be considered safe[1].
- The entire process of someone getting their temperature taken and walking through the door should take less than 30 seconds.

Block Diagram



Physical Design



Alarm Module R&V

Requirements	Verification
• Speaker will start with a frequency of 0Hz and increase quickly to a frequency of 1,000Hz. • The alarm will sound for four seconds.	1A. Measure the output wave of the speaker by connecting the oscilloscope pins to the output of the speaker 2A. Measure the amount of time that the signal is high by measuring the top most part of the square wave on the oscilloscope. This can be done by moving the measuring lines.

Sensor Module R&V

Requirements	Verification
1. IR Thermometer will read the temperature to an accuracy of 0.35°f	1A. Connect IR thermometer to a microcontroller 2A. Probe known temperatures 3A. Compare to oral thermometer with accuracy of 0.35°f

Data Module R&V

Requirements	Verification
1. Send data with a BAUD rate of 9600	1A. Send sample packet to remote computer 1B. Measure bit rate over a set time period 1C. If needed, adjust bit rate using AT commands
2. Show temperature on LED Display	2A. Connect LED display to working microcontroller and oscilloscope. 2B. Send test data to display and measure data signal using oscilloscope.

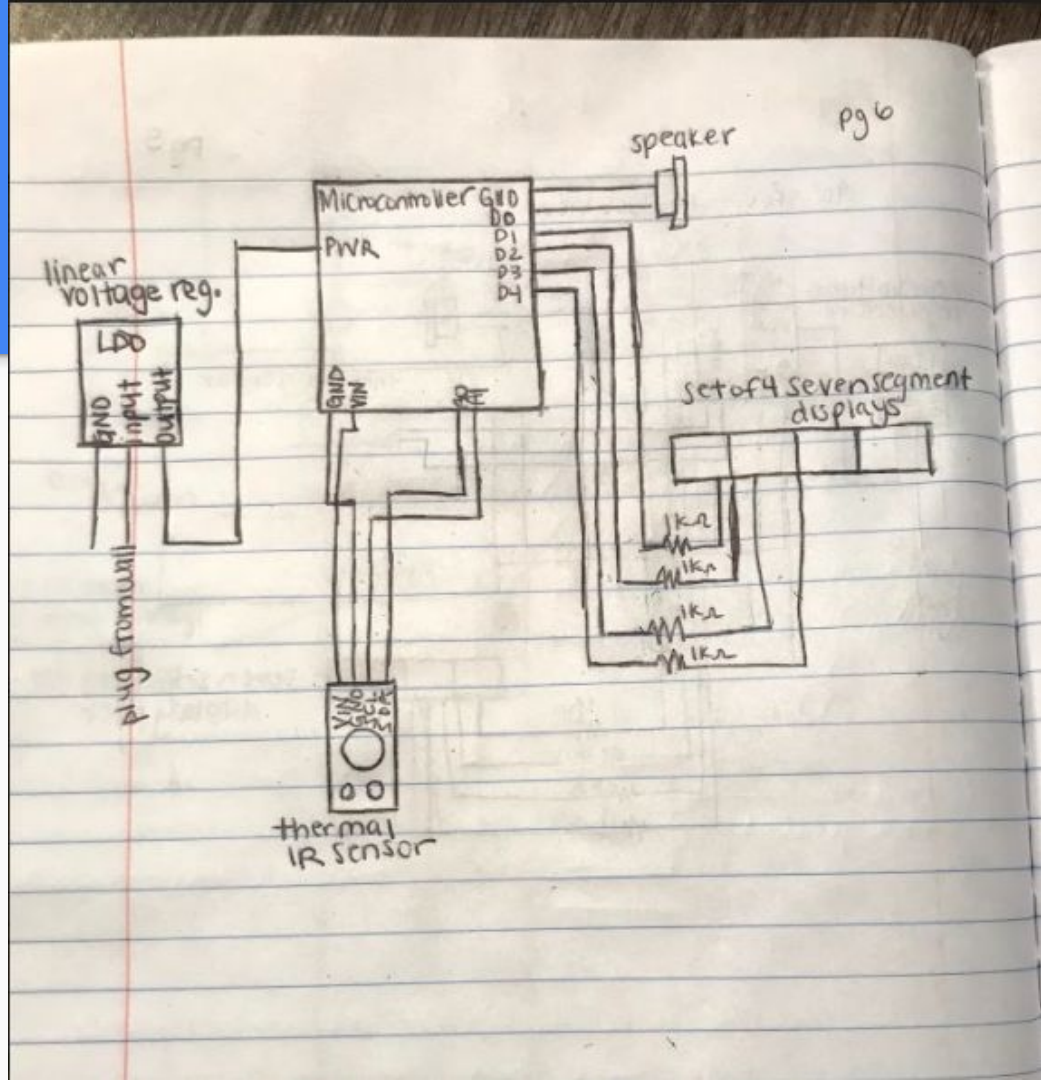
Power Module R&V

Requirements	Verification
1. Provide 3.3V +/- 0.5% from 3.7V-4.2V Source	1A. Measure the output voltage using an oscilloscope, ensuring the output voltage stays within 5% of 3.3V.
2. Can operate current within 0 - 170mA	2A. Connect the output of the voltage regulator to VDD node in a constant current test circuit. 2B. Alter values of resistance until 170mA is achieved. 2C. Measure the output voltage using an oscilloscope, ensuring the output voltage stays within 5% of 3.3V.

Control Module R&V

Requirements	Verification
• This ATMEGA Microcontroller will interpret input data from the IR Thermometer and decide whether to activate the speaker alert system. • Any temperature above 100.3 degrees fahrenheit will set off the alarm	1A. Build a test program that will automatically send a series of ones and zeros 2A. Verify on the oscilloscope by connecting pins to the input of the speaker in order to ensure the correct decision was made within the tolerance.

Circuit Schematic



Tolerance Analysis - Infrared Temperature Sensor

Range: -20 to 120 °C

Resolution: 0.02 °C

Output: Fahrenheit to the tenths

Determine the optimal distance range in inches between head and sensor

Safety & Ethics

All data on the web application must be collected on an aggregate level, individual user data will not be tracked in accordance with HIPAA.

No safety concerns except for a common 110V wall outlet.These are dangerous so we will follow OSHA’s electrical safety packet.

The physical design itself has no major safety concerns compared to a typical door.

Citations

- [1]https://www.cdc.gov/coronavirus/2019-ncov/community/homeless-shelters/screening-clients-respiratory-infection-symptoms.html#:~:text=Fever%3A%20Any%20temperature%20100.4,is%20considered%20a%20fever

Questions?