

ECE 445

Project Proposal

TA: Yifan Chen

Andrew Kelley, Jack Lanser, Claire Lundtveit
akelley5@illinois.edu, jlanser2@illinois.edu, cpl3@illinois.edu

Group 33

COVID-19 Thermawave Monitor

Introduction

Objective

Due to the COVID-19 pandemic, many businesses are requiring people to have their temperature taken before they can enter the premises. In order to do this, these businesses are having to hire someone to stand at the door with an IR thermometer to take each person's temperature. This can be costly and especially during a time like this where local businesses are seeing reduced revenue, it can be an extra burden. We are proposing a solution to this problem in which we replace the need for an employee to stand at the building entrance with a door attachment that can automatically take the temperature of anyone who wants to enter, as well as notifying people with fevers that they are not allowed access into the building. This will allow businesses to cut down on costs during this time.

Background

The pandemic has disrupted many normal day to day activities for many people. When you go outside, you are required to wear a mask, and everyone is confined to their homes during quarantine. Many people want their old lives back and want to go to restaurants, and concerts. One step, in order to get back to normal, is to ensure that unhealthy people stay home and healthy people are able to do necessary tasks. Businesses do not have a steady plan in order to ensure that those who have a fever stay out of their business. Wearing a mask is simply not enough to ensure the virus does not enter the business. A better plan is needed in order to ensure that safety precautions are taken seriously within businesses.

Physical Design

In terms of machining, the device will be mounted on a stand that will be placed next to the entrance. In addition, on a circuit board, there will be a speaker that will play an alarm sound if the temperature of someone is outside a healthy range.

High Level Requirements List

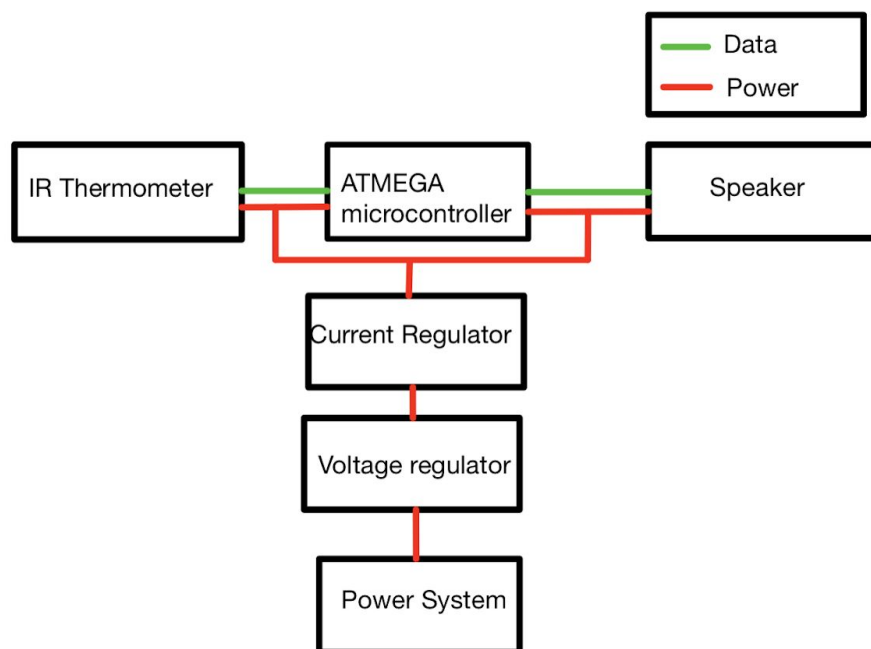
- The Thermawave Monitor must be able to accurately measure the temperature of a person standing in front of it. The person may be instructed to position their forehead close to the sensor.
- The signaling system must be able to easily notify the patron that they are not allowed entry if they have a fever. Should be 100% accurate in reading temperature results. This will have a range set to a healthy level. Any

temperature below 100.3 will be considered safe. [The CDC states that anyone with a temperature above 100.4 degrees is considered a fever.](#)

- The entire process of someone getting their temperature taken and walking through the door should take less than one minute.

Design

Block Diagram



Functional Overview

- The **ATMEGA Microcontroller** is the brains behind our project. It will interpret input data from the IR Thermometer and decide whether to activate the speaker alert system.
- The **Current Regulator/Voltage Regulator** will step down and modulate the voltage and current from the wall outlet.
- The **IR Thermometer** measures the temperature of the person passing through the door. It needs to be accurate to the hundredths in fahrenheit. This will allow

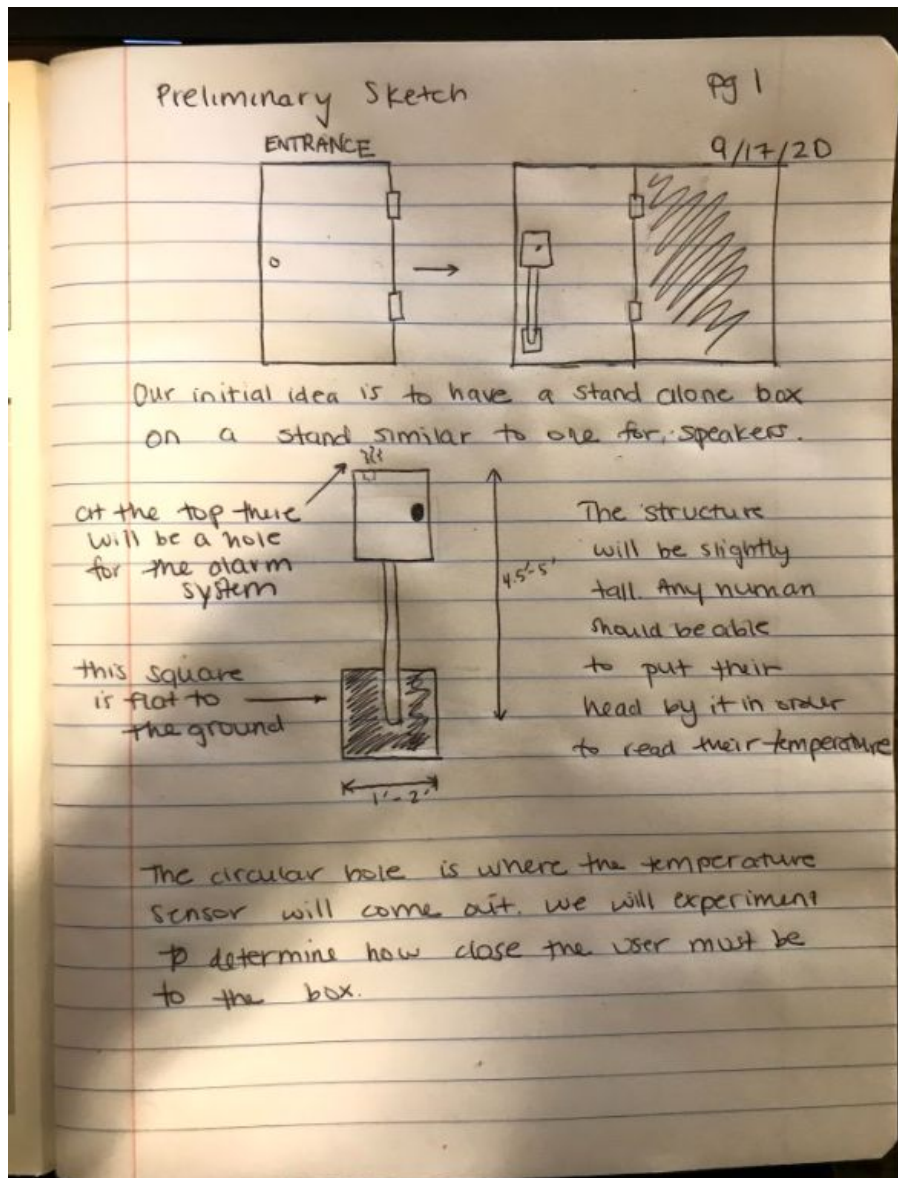
the microcontroller to easily determine if the temperature is within the dedicated range.

- The **Power System** runs the microcontroller. This will allow the microcontroller to run for extended periods of time. This will also indirectly run the speaker and thermometer.
- The **Speaker** acts as an alarm system. The speaker will output an alarm if someone tries to enter the building with a fever.

Block Requirements / Sub-System Requirements:

- Heat Sensor System: The heat sensor subsystem must be able to
- Access Granted System: This will be a speaker on a breadboard that will sound an alarm if the person is outside the temperature range.
- Micro-Controller Linking System: This will drive the entire system. It will determine if the temperature is out of range. It will ultimately give the signal to the speaker if the person is out of range.
- Machined Door Frame Latch: The latch should be able to attach to any standard door frame, and support the electrical system properly.
- Battery Power System: The will either be a 9V battery or a wall plug.

Preliminary Sketch



Risk Analysis

In terms of risk, the biggest concern is the accuracy of the [infrared temperature sensor](#) that will be used. This needs to be extremely accurate. The accuracy of the sensor will be the make or break factor of our project. We need to ensure that it can ideally read to the hundredths in fahrenheit.

Ethical & Safety Concerns

There are no ethical concerns, as defined by [IEEE](#), as long as the temperature of a specific individual is not identified with that individual and stored. [HIPAA](#) prevents the spread of patient information without the consent of the patient. This can easily be applied to our project. Each individual entering the store will have their temperature taken. This temperature will not be matched to a specific name or identity. It will simply state whether or not the temperature is in a healthy range. This ensures that we are not taking unethical information. In terms of safety, the only concern is the 110V outlet we will be using. These outlets kill many people, year after year so it is important to ensure that we are following the guidelines. We will follow every guideline that [OSHA](#) states in their electrical safety packet.