



Going Contactless With Electromyography

“An Armband which can make a difference in the lives of people.”

◆ ANANYA ANANT
◆ SANKALP SHUKLA

◆ ARON SAMUEL JACOB
◆ SWARUP TRIPATHY

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A brief intro to our team

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01 Project Relevance


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Premise

COVID-19 was declared a pandemic by the World Health Organization in March 2020, making it critical to track and review the state of research on this virus to provide guidance for further investigations.

Although medical science, drug discovery, and epidemiology have seen the most attention, the COVID-19 pandemic is a multidimensional phenomenon and as such has strong socio-economic, psycho-social, and technological implications.



Mostly the spread of covid 19 has been noted as being through air and contact. The fact that this can be used combat any form of disease that require the entry to human body through the open orifices on the face i.e mouth,nose,ears etc makes this product highly marketable.

Since each and every human being throughout the world has been advised to follow the social norms but the most important factor is the safety of ourselves first. Even though people are asked to maintain the social distance, a few follow them but the prior motive is to take care of yourself in every possible manner.

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A stylized illustration of a diverse crowd of people, all wearing white face masks. The background is a mix of soft colors like teal, orange, and pink. The people are depicted in various poses, some looking forward, some in profile. A large blue box with a black border is centered in the upper half of the image, containing text. A black arrow points downwards from the bottom of this box to an orange box with a black border in the lower half of the image, also containing text. A small '~5' is visible on the right side of the image.

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united front against both
these pathways for the virus.**

**YOUR SAFETY IS THE FIRST
AND FOREMOST PRIORITY**



02

EMG

[Electromyography]

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What and Why?

The EMG signal that is captured is a biomedical signal that measures electrical currents generated in muscles during its contraction representing neuromuscular activities.

When EMG is acquired from electrodes mounted directly on the skin, the signal is a composite of all the muscle fiber action potentials occurring in the muscles underlying the skin. These action potentials occur at random intervals.

So at any one moment, the EMG signal may be either positive or negative voltage. Individual muscle fiber action potentials are sometimes acquired using wire or needle electrodes placed directly in the muscle.

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The amplitude range of EMG signal is 0-10 mV (+5 to -5) prior to amplification.

The signal lies in the frequency range from 0-500 Hz and most dominant in between 50-150 Hz

Wearable Technologies

- Devices that are worn with a set of functions and a simple interface to satisfy the needs of a specific group of people.
- The main components being power source, controllers/actuators/sensors and software(data acquisition, display and storage)
- Has many use in the healthcare industry ,hazardous workplaces and even fashion
- Economic significance:high growth is seen throughout the last few years due to the popularity of health consciousness(FITBIT).
- Risks involved are minimal understanding of the tech with leads to apprehensions to its safety and security.
- Ideal wearable device should be unrestrictive and observable to the user.



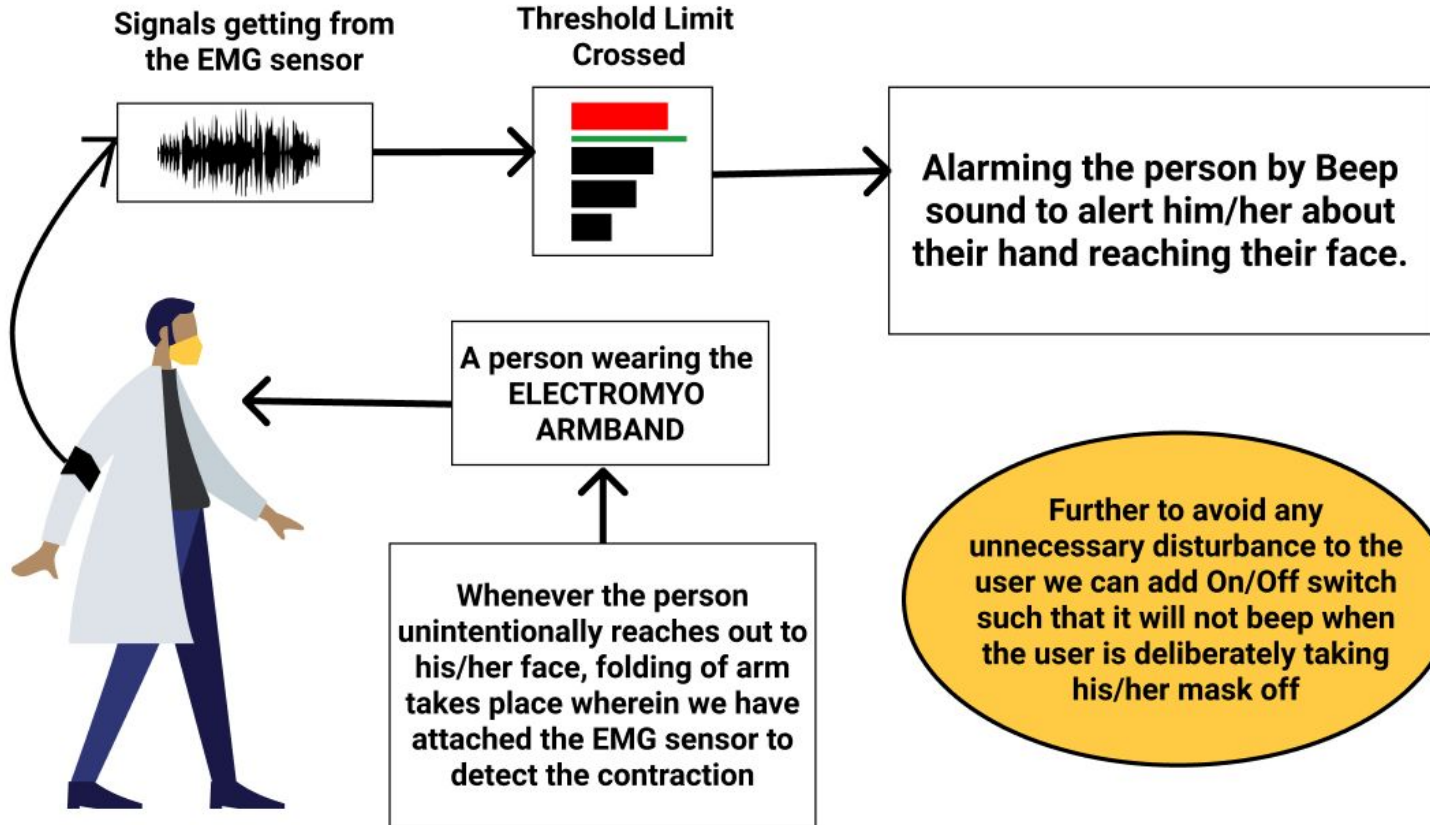
03

Project Process

- The armband consists of an EMG sensor, wireless signal transmitter and power source.
- It will be worn by the user on his arm where we obtain the signals generated by the biceps/triceps.
- We set a threshold value for the signal. Once the arm proceeds to perform a certain action that will cause the electric signals generated by the muscles to exceed the threshold limit.
- This will in turn cause the EMG sensor to send a response action function which may be auditory or visually.

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Working of Our Project !



MEMBERS / WORK DIVISION

- Ananya Anant (19BEE0226)- Documentation
- Sankalp Shukla (19BEE0211)- Software
- Aron Samuel Jacob (19BEE0348)- Software / Documentation
- Swarup Tripathy (19BEE0167)- Hardware

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The background features abstract, organic shapes in shades of dark blue, light blue, and grey, primarily located on the left and right sides. Scattered throughout the white background are several small, solid blue circles of varying sizes.

Thank You



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Final Review


(Review 3)



Problem Statement

Covid Today:

The advent of the Covid-19 pandemic started towards the early days of the month of February in India. The sudden surge of covid cases as we have seen ever since could have been avoided or reduce the chances of contracting Covid to say the least, only if we could reduce the hand to face contact .This is when we realised that with use of technology we could provide a solution.



*Brainstorming,
Ideation,
Research analysis*

Thought Process

How Did We approach the problem:



Resources:

We had acquired the necessary hardware parts such as EMG sensors, Arduino module for threshold and a buzzer to alert the user. We also downloaded the required supportive softwares.

Idea for application :

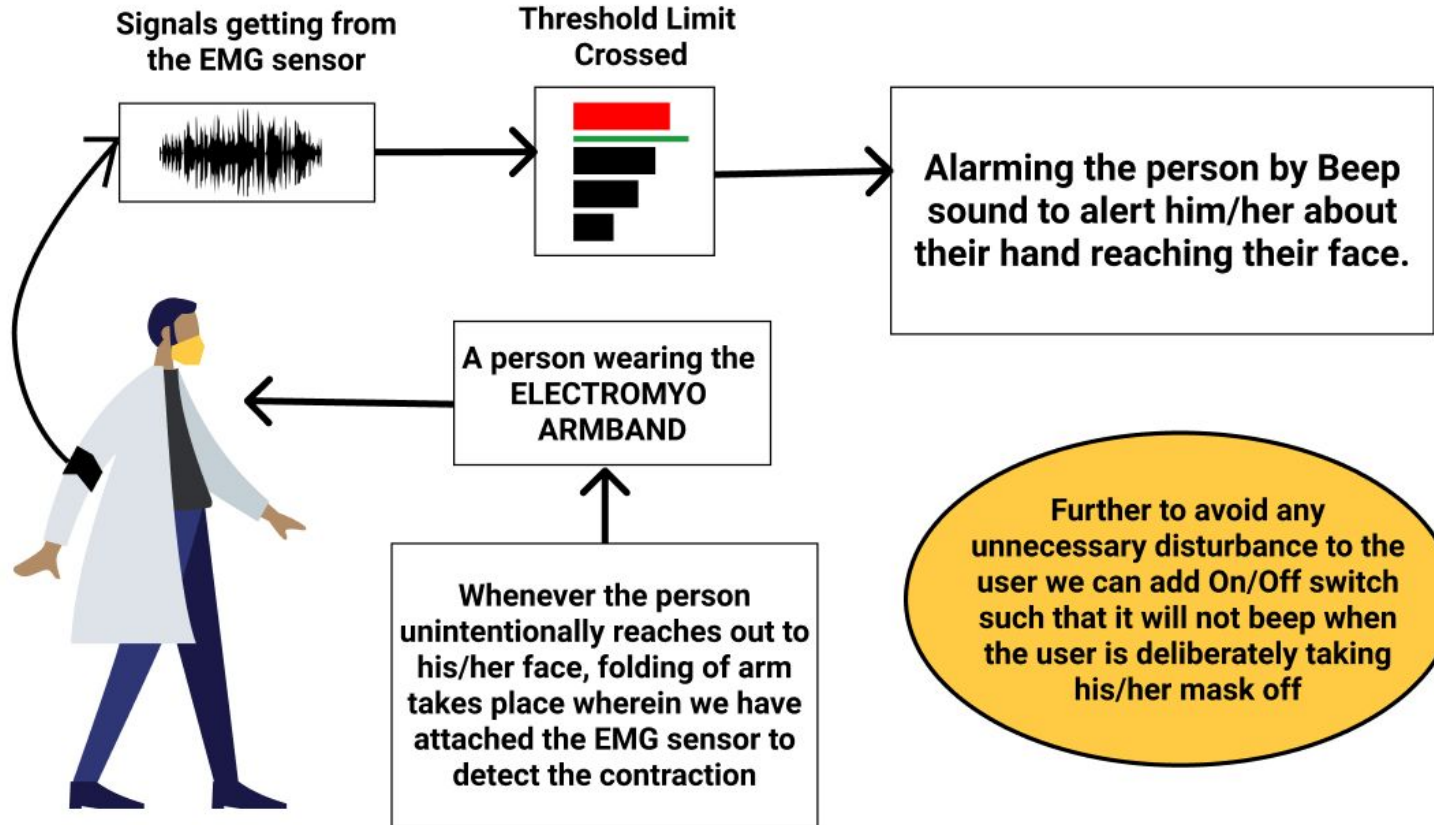
We envisioned a set series of event that usually occurs leading upto a person touching his/her face. It generally involves the need to remove any obstruction to sensory activity or to relieve discomfort from constant irritation.

While the causes themselves cannot be fully dealt with, we realised that alerting to the user to the close proximity of his/hand and face could provide an opportunity to reconsider the action.

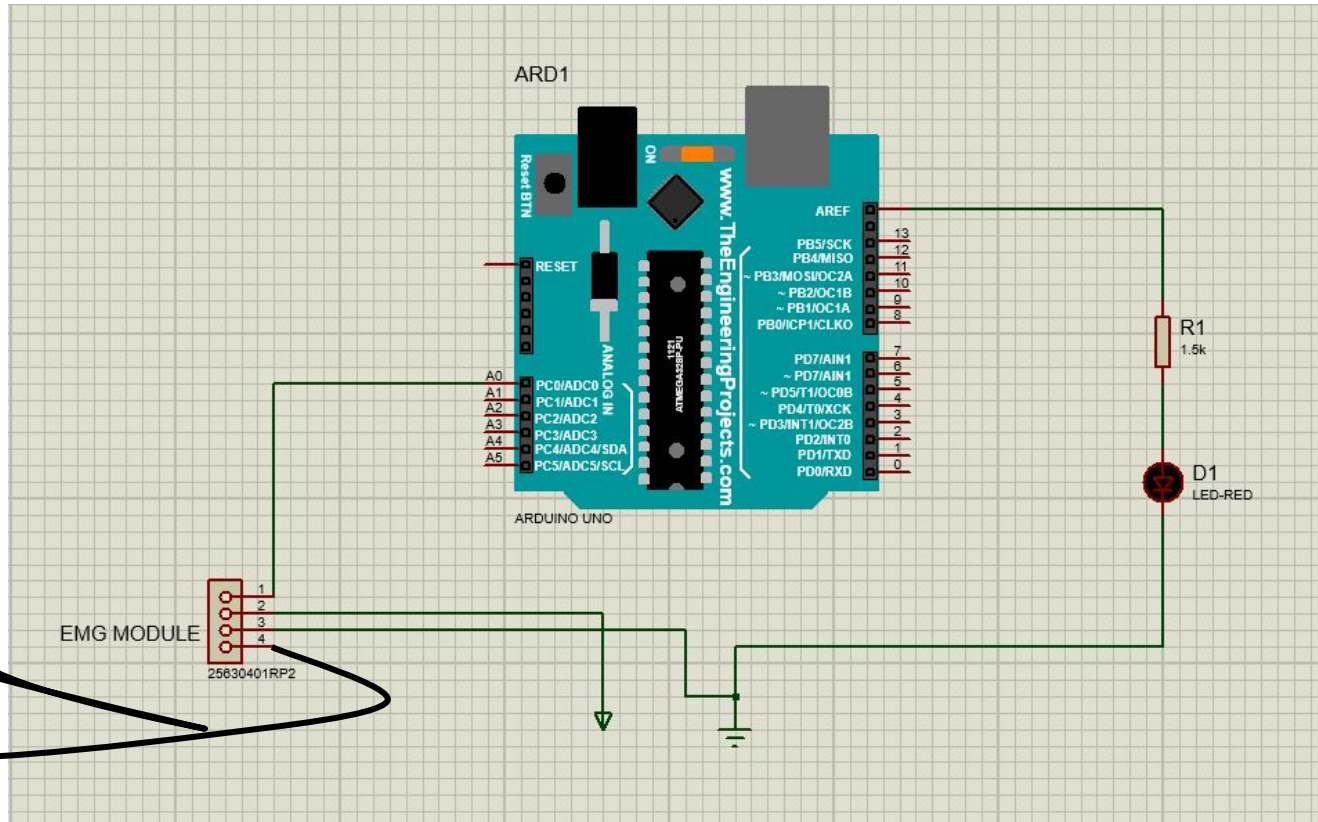
Working and Output



Working of Our Project !



The Initial Circuit



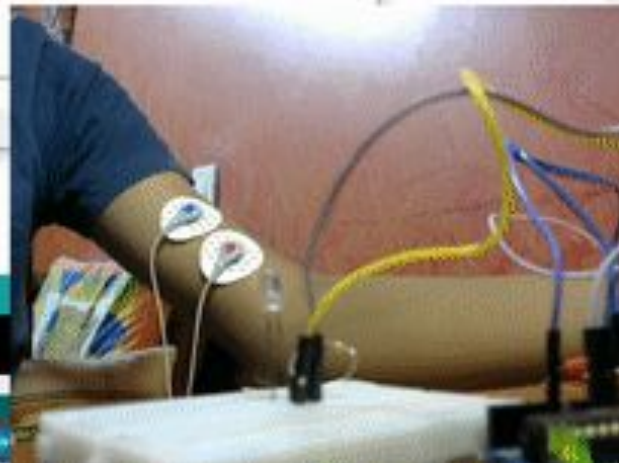


```
sketch_apr08e  
void loop() {  
  // put your setup code here, to run once:  
  digitalWrite(LED, HIGH);  
}  
  
void loop() {  
  // put your main code here, to run repeatedly:  
  int sensorValue = analogRead(A0);  
  if (sensorValue > 512) {  
    pinMode(LED, OUTPUT);  
    digitalWrite(LED, HIGH);  
  } else {  
    digitalWrite(LED, LOW);  
  }  
  Serial.println(sensorValue);  
  delay(100);  
}
```



Task complete

Sketch uses 2194 bytes (6%) of program storage space, maximum is 32254 bytes.
Global variables use 188 bytes (1%) of dynamic memory, leaving 1860 bytes for local variables. Maximum is 2048 bytes.

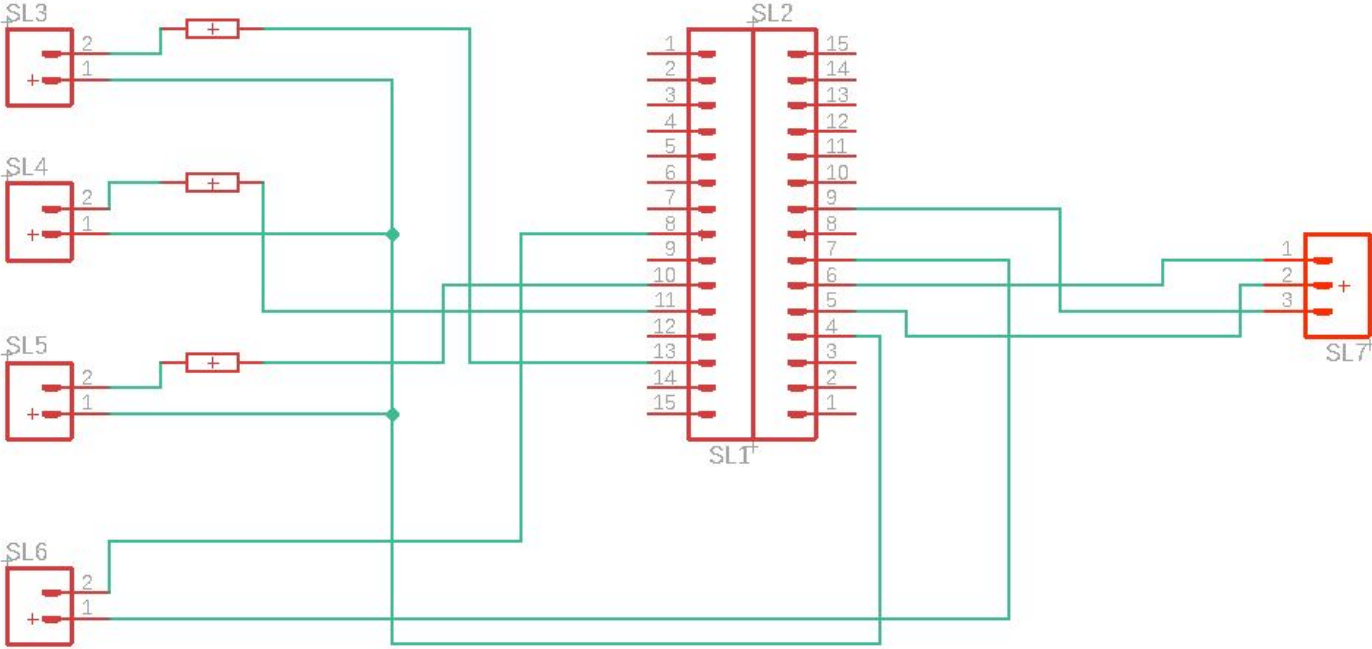




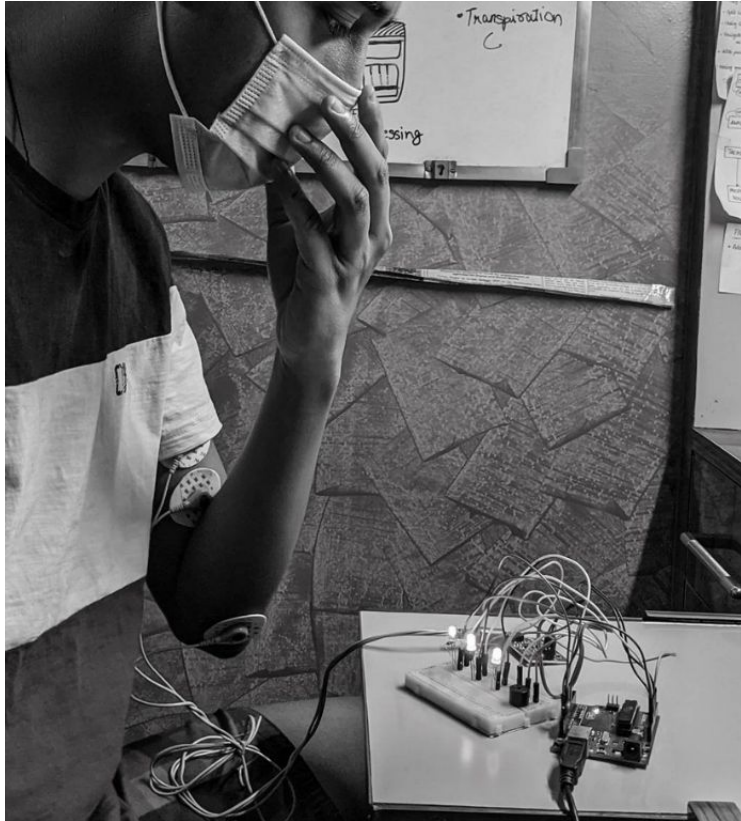
Final Demonstration

Addition of 3 LED
lights of different
colours along with a
buzzer to make
some noise.

Eagle EDA circuit



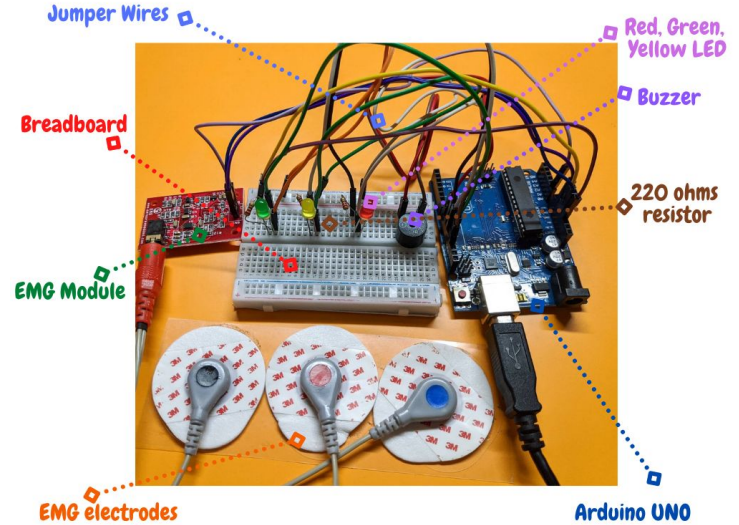
Some More Pictures

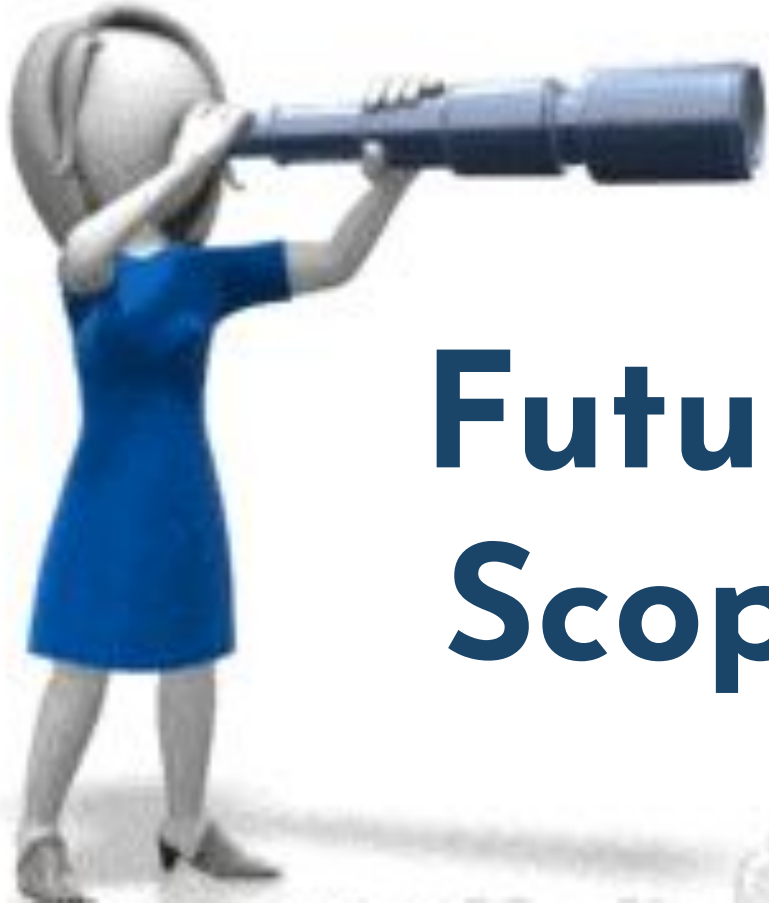


Person Wearing Mask

Wearing the Electrodes

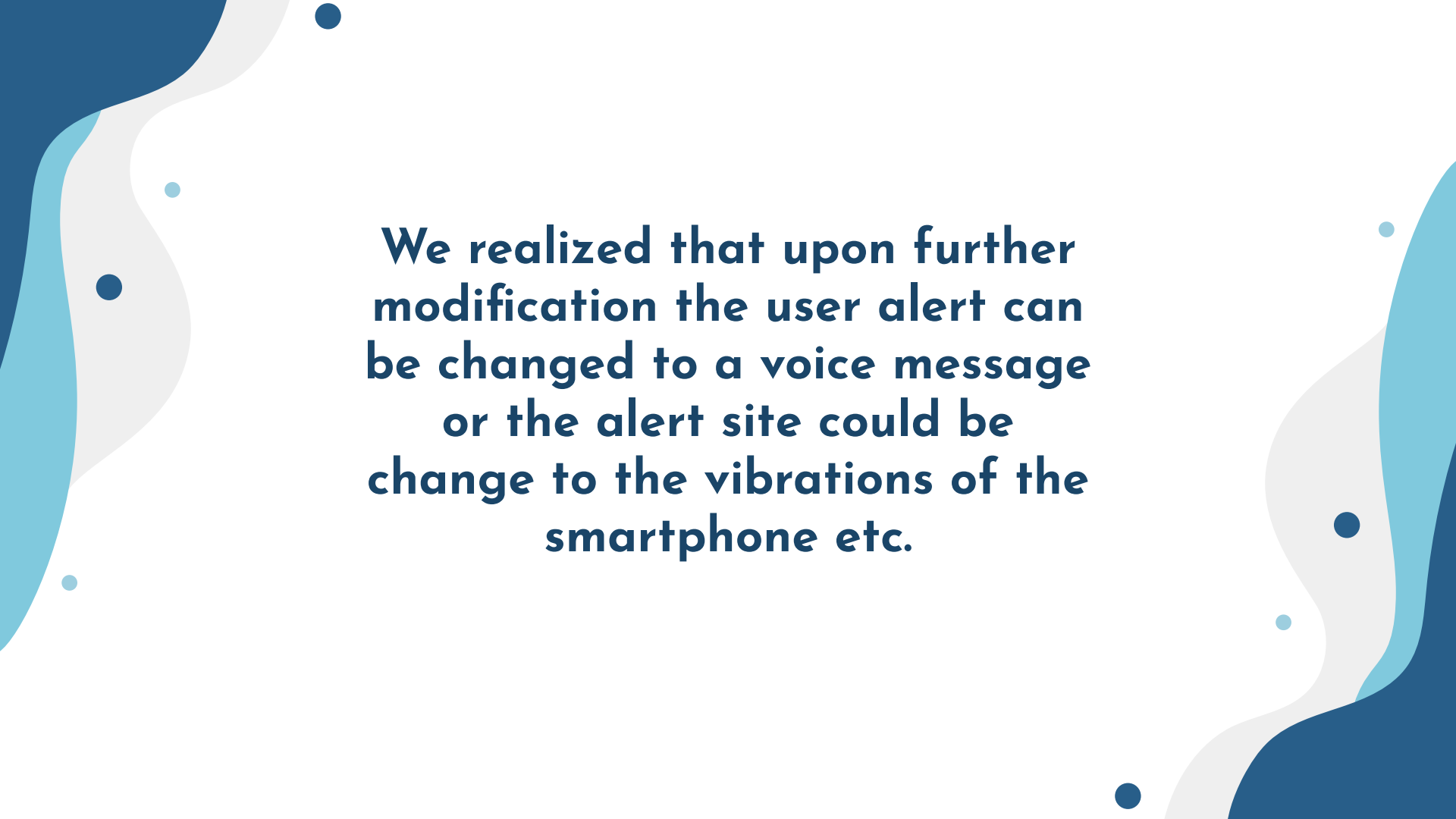
Desired Circuit which alarms the person via beep and lights





Future Scope





We realized that upon further modification the user alert can be changed to a voice message or the alert site could be change to the vibrations of the smartphone etc.

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**YOUR SAFETY IS THE FIRST
AND FOREMOST PRIORITY**

A pair of black dumbbells with red straps is centered against a bright yellow background. The dumbbells are shown from a slightly elevated, side-on perspective. The central text 'Thank You' is written in a bold, blue, sans-serif font, positioned between the two dumbbells.

**Thank
You**

Hindrances:

Motion Artifact is caused by the relative movement of the sensor with respect to the underlying skin over the muscle of interest.

It can result from:

- 1) a direct impact to the sensor or to the body,
- 2) a rapid movement of the body segment to which the sensor is attached,

Motion artifact is particularly problematic during dynamic contractions or vigorous activities.

Physiological Noise:

Physiological noise originates from tissues other than muscles that generate electrical signals, such as ECG signal.

It can be reduced by properly locating the EMG sensor further away from the source of the noise, if possible.

Cross-Talk Contamination:

Some portions of the EMG signal may not be from the muscle of interest. Instead, they may result from signals propagated to the sensor from neighbouring muscles.

Sensor placement:

The location of the sensor on the muscle is the single most important factor for good SNR. The placement can maximize the physiological EMG signal and minimize crosstalk interference from neighboring muscles.

Sensor Attachment:

The sensor should be firmly attached to the skin using the double-sided adhesives to ensure good contact between the electrodes and the skin.

What do we need to do further:

Yet to be done:

We have to port the arduino module to the buzzer module and ensure the smooth functioning of the entire setup.

We also need to rectify the errors or noises from the EMG signals such as to provide a smooth working of our project and also we'll be embedding it to an armband.

To design a cad model for the same

Projected Date of completion:

20/05/2021

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Thank You