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CROWD MANAGEMENT AND MONITORING AT THE ENTRANCE FOR COVID SAFETY

A Temperature detection system that helps in the times for covid-19

Parkar Saeem , Seeman Ansari , Ashish Yadav , Urja Thakur
Prof. Nargis Shaikh, Dr. Varsha Shaikh

saeemparkar@eng.rizvi.edu.in, seemanansari@eng.rizvi.edu.in,
ashishyadav@eng.rizvi.edu.in, urjathakur1010@eng.rizvi.edu.in
B.E. Electronics Engineering
Rizvi College of Engineering, Mumbai, India

Students of Electronics Engineering,

HOD. Department Of Electronics Engineering, Principal of
Rizvi College of Engineering

Abstract: As the world is stricken by a global pandemic that is the novel Corona virus. ▫ Markets and businesses have taken a hit and after being shut for a while they have now started functioning again but at a smaller level. ▫ In order to sustain their businesses it is very important that people take necessary measures like sanitization of their workplace and not allow people to gather in large numbers. ▫ Our project "**CROWD MANAGEMENT AND MONITORING AT THE ENTRANCE FOR COVID SAFETY**" focuses on the last bit. ▫ Our project senses the number of people entering a place and operates the entrances and exits depending on the number of people that leave the building/place and allows the next slot based on feedback from system.
▫ The advantage of this project is that it eliminates the need of human involvement and provides a long solution by means of automation.

Keywords: **Arduino , MLX90614**

1. INTRODUCTION

The World Health Organization, WHO, has advised people to stay away from crowded places to protect themselves from the spread of Coronavirus disease. ▫ Even though people practice social distancing, it may not be effective when they are present in crowded places. We came up with this idea after we read the WHO guidelines about preventing the spread of COVID-19. ▫ This project is an automatic, cheap and effective way of limiting the crowd. ▫ Using a human to limit the number of people in a particular place would not be as effective as using an automatic system due to the lack of staff members in some areas. ▫ This prototype can be used in real-life situations by replacing the servo motor with a solid-state relay module. ▫ In order to maintain proper distancing near our facility entrance and exits, it may be deemed necessary to limit people through specific entrance and exit points.

We likewise make use of a basic arrangement depending on infrared temperature sensor named (MLX90614) which would avoid risk of spread of infection near jam-packed region like places of business. The ability of a body to radiate energy defined to be the proportion between radiant energy produced by it and the amount of radiation emitted from a black body precisely the equivalent temperature. Clinical practice believes dry

skinned human as an ideal black body, having most extreme outflow frequency rounded to 9.3µm. The amount of energy transmitted from the black body is characterized by the Planck's law and the Stefan Boltzmann law portrays the unearthly radiant emittance of a specific frequency. Dry skinned human were found to have an emissivity around 0.98. It introduces an infrared temperature estimation arrangement adequately modest to be utilized for a huge scope, yet with an exactness that would empower early location of conceivably tainted individuals. The aim of the proposed method is to make use of an infrared temperature measurement solution which is of low cost and can be used by many people which would ensure an accuracy of probably detecting the infected people in prior. At the public places and at the entrances, people were allowed to enter after scanning their body temperature. It would be difficult to check temperature for all the individuals without missing anyone and there might be a chance of being nearer to the person, which is harmful. Hence, the proposed system could detect the body temperature and open the doors for those temperature is within a threshold limit there by reducing human intervention and if it indicates the temperature greater than the threshold there would be a buzzer/led glow as a sign.

I. PROBLEM STATEMENT & OBJECTIVE

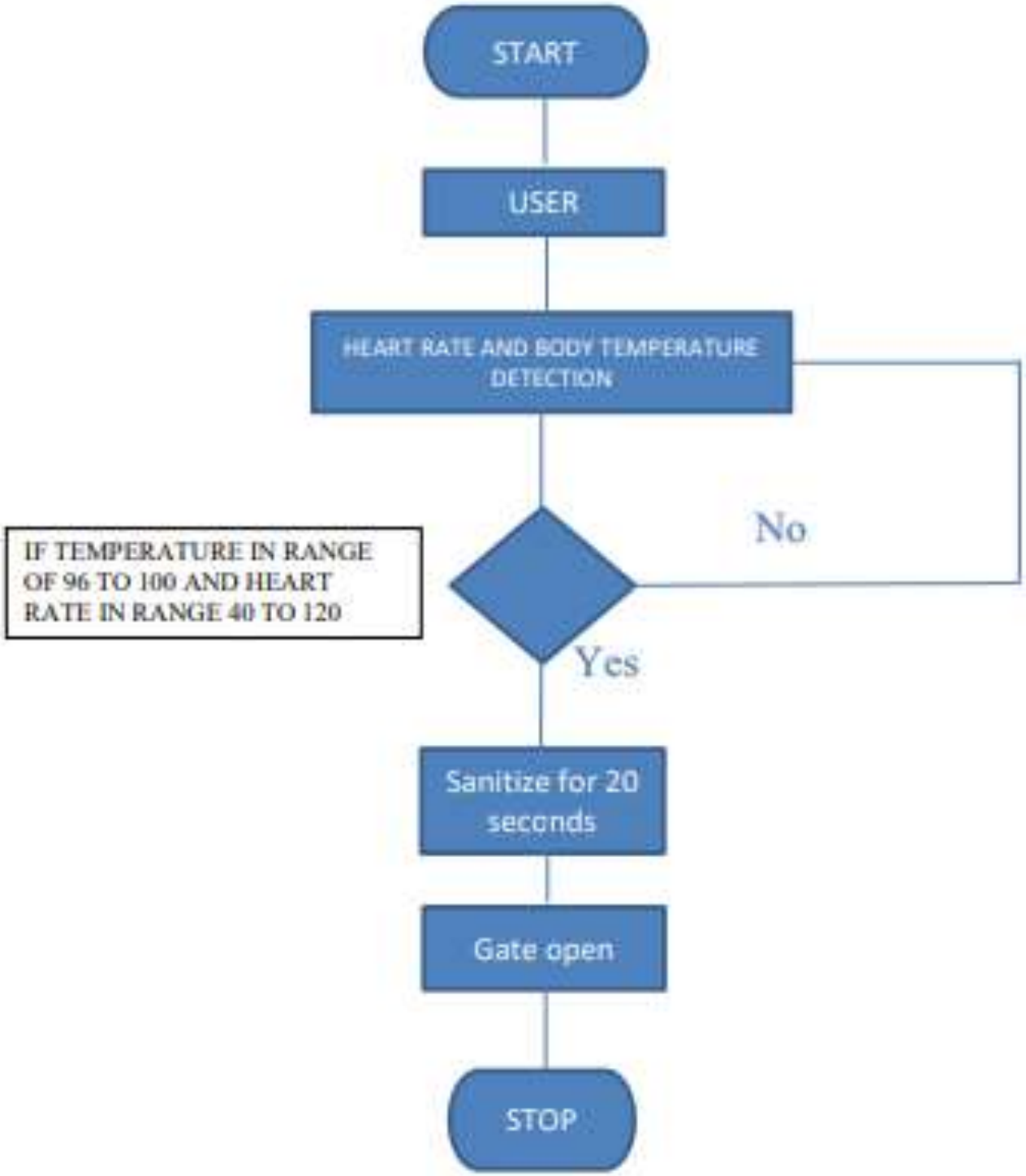
Researchers have proposed several methods and techniques to understand crowd behaviors for developing a safe and secure environment in order to avoid crowd congestion, public riots and terror attacks. In crowded scenes, standard computer vision techniques are not applicable in first hand manner due to severe occlusion and complex background scenarios. Many computer vision algorithms exist for tracking, detecting and in analyzing behavior of crowded scene. Although they provide a good result Iin a low to medium density of population, but it is still a challenge to deal with a dense crowd. Also, in the analysis the main focus is on the detection of the object, its tracking and its behavior recognition, and therefore, the conventional methods fail sometimes in the crowded scenes of high density because they are extremely cluttered and have high occlusion. Another problem was presented was where they identified some issues concerning the unexpected behaviors of crowd, and thus causing difficulty in controlling this crowd.

II. LITERATURE SURVEY

The first case of the COVID-19 pandemic in India was reported on January 30, 2020. As on May 17, 2020, the Ministry of Health and Family Welfare, Government of India has reported 90927 confirmed cases from 33 states with 2872 deaths [3]. Though India is in complete lockdown since March 24, over the weekend there is a rapid increase in COVID-19 cases in some states in India notably from Maharashtra, Gujarat, Tamil Nadu, Delhi, Madhya Pradesh and few other states. The rapid increase over the weekend in the month of May has created some kind of panic in India. The government and other civil bodies are making efforts to mitigate the spread of this virus. Eighty-Nine articles have received 186 citations in all with an average citation of 2.18 per documents. The article entitled "Chloroquine and hydroxychloroquine in the treatment of COVID-19 with or without diabetes: A systematic search and a narrative review with a special reference to India and other developing countries" authored by Awadhesh Kumar Singh et al. and "Prudent public health intervention strategies to control the coronavirus disease 2019 transmission in India: A mathematical model-based approach" authored by Sandip Mandal et al., and "Fear of COVID 2019: First suicidal case in India!" by Kapil Goyal and others have received 28 citations each and topped the Table, followed by the article "Full-genome sequences of the first two SARS-CoV-2 viruses from India" authored by Pragya Yadav with 18 citations Crowds which we witness time to time differ in many ways. A crowd would usually belong to an event, which may be regular or otherwise. Events like Hajj, Kumbh Mela, and Arbaeen are regular and generally predictable, whereas irregular events are usually unpredictable in nature and size and the crowd within them can build up spontaneously. Examples of these are funeral processions, protest or celebration marches, election rallies, sporting events, and musical concerts. Prediction of the size and nature of the irregular and spontaneous crowds is very difficult due to many uncertainties surrounding them. To illustrate, it was not anticipated that the funeral of South Indian politician, Annadurai, in 1969, would gather fifteen million people.

Case Study 1: A Thermal Camera Based Continuous Body Temperature Measurement System
Authors: *Jia-Wei Lin, Ming-Hung Lu, Yuan-Hsiang Lin*

Methodology: Body temperature acting an important role in medicine, a number of diseases are characterized by a change in human body temperature. Monitoring body temperature also allows the doctor to track the effectiveness of treatments. But current continuous body temperature measurement (CBTM) system is mainly limited by reaction time, movement noise, and labor requirement. In addition, the traditional contact body temperature measurement has the problem of wasting consumables and causing discomfort. To address above issues, we present a non-contact, automatic CBTM system using a single thermal camera. By applying deep-learning based face detection, object tracking, and calibrated conversion equation, we can successfully extract subject's forehead temperature in real-time. The experimental results show that the overall mean absolute error (MAE) and root-mean-squared-error (RMSE) of our proposed framework compared with industrial instrument are 0.375° C and 0.439° C, respectively.


START
USER
HEART RATE AND BODY TEMPERATURE DETECTION
IF TEMPERATURE IN RANGE OF 96 TO 100 AND HEART RATE IN RANGE 40 TO 120
No
Yes
Sanitize for 20 seconds
Gate open
STOP

Case Study 2 Auto Temperature Detection System at the Entrance
Author: Bollu Gayathri

Methodology: The aim of the proposed method is to make use of an infrared temperature measurement solution which is of low cost and can be used by many people which would ensure an accuracy of probably detecting the infected people in prior. At the public places and at the entrances, people were allowed to enter after scanning their body temperature. It would be difficult to check temperature for all the individuals without missing anyone and there might be a chance of being nearer to the person, which is harmful. Hence, the proposed system could detect the body temperature and open the doors for those temperature is within a threshold limit there by reducing human intervention and if it indicates the temperature greater than the threshold there would be a buzzer/led glow as a sign

III. LIMITATIONS OF EXISTING SYSTEM

It requires power supply to be connected to make it perform the task which is desired by the user. The failure of a single component affects functionality of the overall system being designed. It is somewhat costlier than the normal thermal scanner which is being used now-a-days.

IV. METHODOLOGY

Management of regular events might seem easier but the reality is quite opposite as most of the stampedes have occurred during Hajj and Kumbh Mela. However, technologies like RFID, WSNs, Cloud, and Fog can be used to manage a regular crowd, which may not be feasible in cases of irregular and spontaneous crowds

2: Design Details

The above block diagram, the working is shown. In this as soon as a person enters, their heart rate and temperature will be monitored. If temperature is in the range of 96 to 100 and heart rate is in the range 40 to 120 then only the person will enter into sanitization chamber and after that sanitize for 20 seconds and then person can enter the premises, but if the requires conditions are not satisfied then a person cannot enter the premises.

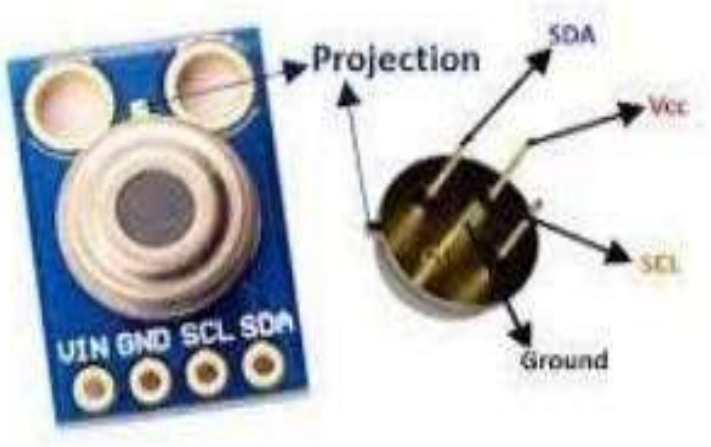
COMPONENTS:

- Infrared Sensor

  IR sensor is an electronic device that emits the light in order to sense some object of the surroundings. An IR sensor can measure the heat of an object as well as detects the motion. Usually, in the infrared spectrum, all the objects radiate some form of thermal radiation. These types of radiations are invisible to our eyes, but infrared sensor can detect these radiations. The emitter is simply an IR LED (Light Emitting Diode) and the detector is simply an IR photodiode. Photodiode is sensitive to IR light of the same wavelength which is emitted by the IR LED. When IR light falls on the photodiode, the resistances and the output voltages will change in proportion to the magnitude of the IR light received.

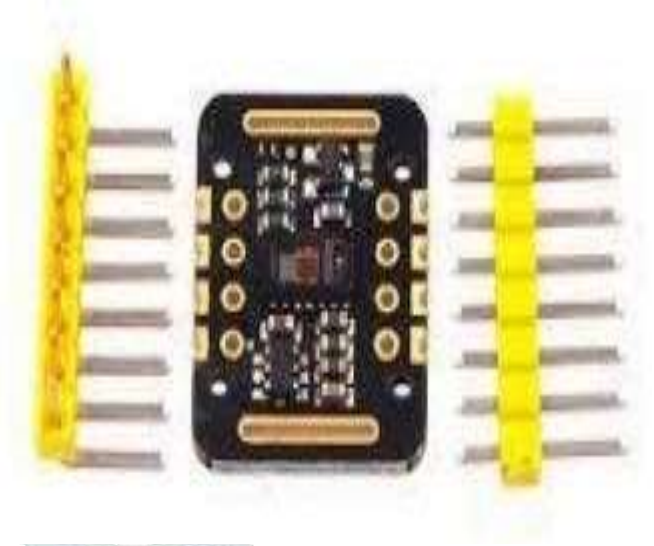
- Temperature Sensor

  Temperature sensor is a device, typically, a thermocouple or resistance temperature detector, that provides temperature measurement in a readable form through an electrical signal. A temperature sensor is a device that is designed to measure the degree of hotness or coolness in an object. The working of a temperature meter depends upon the voltage across the diode. The temperature change is directly proportional to the diode's resistance. The cooler the temperature, lesser will be the resistance, and vice-versa. Contact Type Temperature Sensors: There are a few temperature meters that measure the degree of hotness or coolness in an object by being in direct contact with it. Such temperature sensors fall under the category contact-type. They can be used to detect solids, liquids or gases over a wide range of temperatures. Non-Contact Type Temperature Sensors: These types of temperature meters are not in direct contact of the object rather, they measure the degree of hotness or coolness through the radiation emitted by the heat source We have used non-contact temperature sensor in our project.



- Heart Rate Sensor

  Heartbeat Sensor is an electronic device that is used to measure the heart rate i.e., speed of the heartbeat. Monitoring body temperature, heart rate and blood pressure are the basic things that we do in order to keep us healthy. In order to measure the body temperature, we use thermometers and a sphygmomanometer to monitor the Arterial Pressure or Blood Pressure. Heart Rate can be monitored in two ways: one way is to manually check the pulse either at wrists or neck and the other way is to use a Heartbeat Sensor. In this project, we have designed a Heart Rate Monitor System using Arduino and Heartbeat Sensor. You can find the Principle of Heartbeat Sensor, working of the Heartbeat Sensor and Arduino based Heart Rate Monitoring System using a practical heartbeat Sensor.

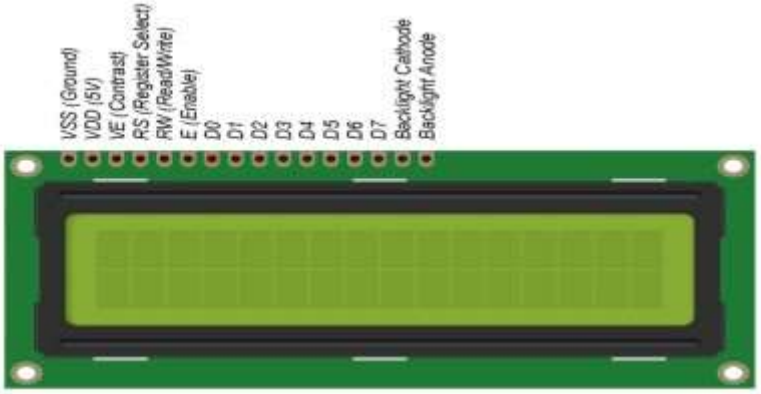


- LCD DISPLAY (16×2)

  Various display device such as seven segment display. LCD display, etc. can be interfaced with microcontroller to read the output directly. In our project we use a two-line LCD display with 16 characters each.

  GENERAL SPECIFICATION

  • Drive method: 1/16 duty cycle.
  • Display size: 16 character * 2 lines.
  • Display data RAM: 80 characters (80*8 bits).
  • Character generates ROM: 192 characters.
  • Character generates RAM: 8 characters (64*8 bits).
  • Both display data and character generator RAMs can be read from MPU.
  • Character structure: 5*8 do



- ARDUINO UNO

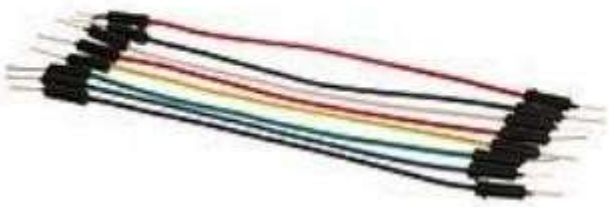
  It consists of different types of memories such as flash memory, EEPROM, SRAM. We have already mentioned, Arduino has been programmed by using C and C++ programming language. These c and C++ are high level languages. Normally it has 18 number of input and output pins. ATMEGA 328 microcontroller, which acts as a processor for the Arduino board. Nearly it consists of 28 pins. From these 28 pins, the inputs can be controlled by transmitting and receiving the inputs to the external device. It also consists of pulse width modulation (PWM). These PWM are used to transmit the entire signal in a pulse modulation. Input power supply such as VCC and GND are used. These IC mainly consists of analog and digital inputs. These analog and digital inputs are used for the process of certain applications.

- Servo Motor

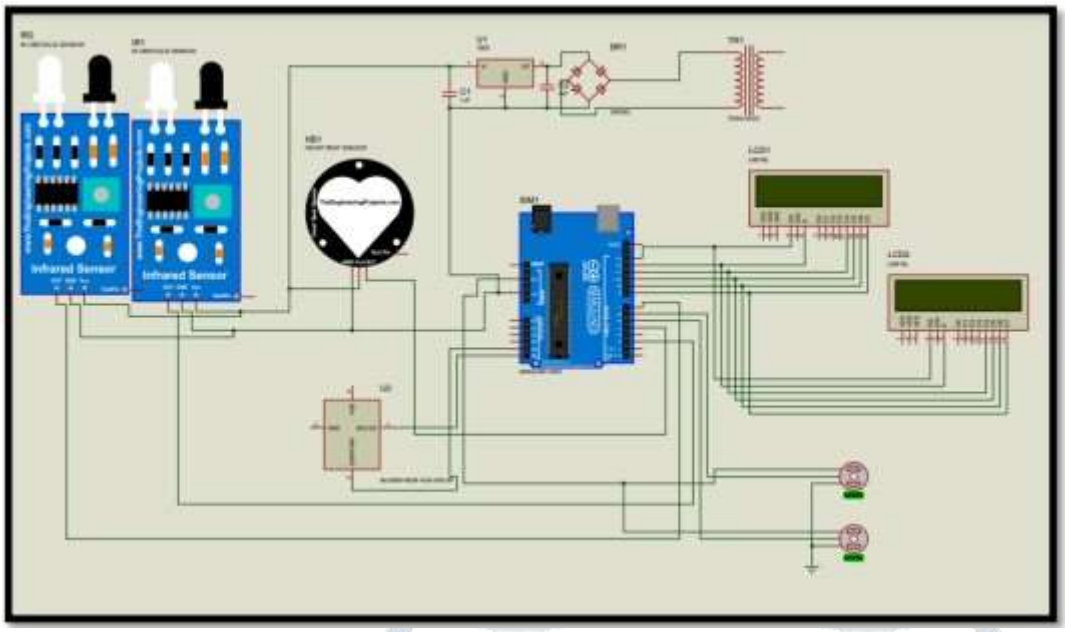
  A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. It consists of a suitable motor coupled to a sensor for position feedback. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are not a specific class of motor, although the term servomotor is often used to refer to a motor suitable for use in a closed-loop control system. A servomotor is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is a signal (either analogue or digital) representing the position commanded for the output shaft Servo motors are geared DC motors with the closed-loop circuitry incorporated within them. The basic configuration of a servo motor composed of a DC motor, gearbox, potentiometer and control circuit.

- Jumping Wires

  A jump wire (also known as jumper, jumper wire, jumper cable, DuPont wire or cable) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering

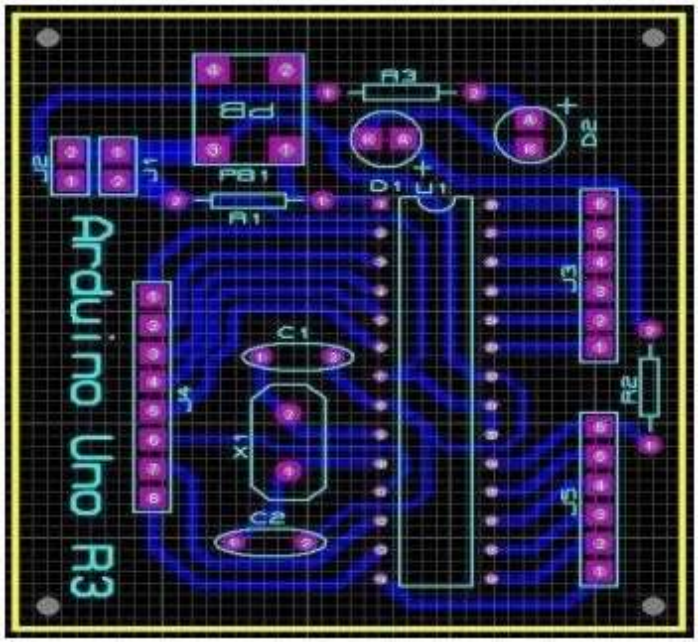


2.1: Circuit Diagram



2.2: Working of the system:

Let's talk about the working of the circuit for better understanding we divide the whole circuit into 3 part namely the 1st is Input part , 2nd is Arduino part and 3rd is Software part . In Input part is mostly consist of all sensors which will take input from our body. Heart beat sensor, Stress sensor, Sound sensor and an Accelerometer which are been used over here. Since every sensor working is already explain so we know that what information they will take according to their work. Second part is of mediator which also the brain of the circuit which consist of Arduino micro-controller which will interpret all the data and accessed according to it. It will help to display all value on LCD screen or if any of these value goes over the threshold it will make buzzer of help us to notify. Third part is of software which will be totally dealing with output on Android app on mobile. On the app we will get to see all the data and results and the most important work of this app to save data and if any value goes over threshold, then it will also notify by sending us mail or ping us a text message to a registered mobile number. This is how the whole circuit work.



2.3: Software Used

Arduino Integrated Development Environment (IDE):-
The Arduino Integrated Development Environment - or Arduino Software (IDE) - contains a text editor for writing code, a message area, a text console, a toolbar with buttons for common functions and a series of menus. It connects to the Arduino and Genuine hardware to upload programs and communicate with them. The Arduino Integrated Development Environment (IDE) is a cross platform application (for Windows, mac OS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards The source code for the IDE is released under the GNU General Public License, version 2. The Arduino IDE supports the languages C and C++ using special rules of code structuring. The Arduino IDE supplies a software library from the Wiring project, which provides many common input and output procedures. User-written code only requires two basic functions, for starting the sketch and the main program loop, that are compiled and linked with a program stub main() into an executable cyclic executive program with the GNU tool chain, also included with the IDE distribution.

V. CONCLUSION

The World will slowly get back to normal, and we have to ensure that we do it in a controlled and sophisticated manner ▫ Our project helps in achieving just that goal, maybe on a small scale but in a very vital manner ▫ In future an integrated system can replace the human involvement at places where a large crowd needs to be managed

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