

COVID SLAYER - A Covid safety kit with biometric attendance system

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Abstract - The beginning of the decade started with an outbreak of covid-19. Many people lost their lives in this pandemic. It created a immense impact in the entire world moreover in negative way as compared to its positive impact. Lockdown was imposed almost in every country. Many researchers, scientists and doctors were looking for symptoms and solution for it. As of now the situation has become normal as researchers, scientists and doctors have discovered vaccines for this covid outbreak. But still there is slight fear present in the minds of people about this covid as new variants are been found. Due to this pandemic, wearing mask and sanitizing/washing hands has become mandatory precaution in every person's day to day life. Rise in body temperature, cold, fever, low oxygen level and heart rate are some of the symptoms of Covid which can be observed in a person. Whereas the biometric attendance system used in office, college, school etc. has been discontinued or used in less amount after this covid outbreak as it is not safe. So looking at this we aimed to make this project 'COVID SLAYER - A covid safety kit' as it would help in monitoring all the possible parameters such as body temperature, oxygen level and heart rate without any contact. This project also consist of an contact-less automatic hand sanitizer along with a biometric attendance system and a blocker wherein the person have to first sanitize their hands and then have to scan finger for attendance if not then blocker won't allow to scan the finger. The most crucial factor of our project is the software application which is built up for mask detection. If a person has not wore a mask then it will display no mask detected and will make a sound saying please wear your mask. Overall we hope that this project would be beneficial all the way possible as we tried to build a Covid safety kit which can cover all the parameters.

1.INTRODUCTION

COVID-19 is an infectious disease which is caused due to sars-cov-2 virus. This sars cov-2 virus is group of many viruses which impacts on human body and badly effect on it. Their symptom include like cough, fever, tiredness, not able to taste or smell these are some of the usual symptoms found whereas the symptoms which unlikely common symptoms includes sore throat, headache, diarrhoea. Mostly corona virus (COVID-19) affects the different patient in different ways, it depends on immunity system of the patient. Group of many viruses includes SARS (Severe Acute Respiratory System), MERS (Middle East Respiratory Symptoms) and other common viruses like cold and flu viruses. So, world

health organization named the worldwide global pandemic as 2019-Cov on January 2020. This worldwide pandemic COVID-19 has affected major causalities in entire world. Approximately 30 millions of people from all over world has infected by covid-19 virus out of which 900K persons are reported dead. Countries like US, India, Brazil and Russia facing for maximum numbers of affected people due to covid-19. In India alone 5.73 millions of people were affected. Out of first 500 patients are admitted to different hospital across the cities and it is observed that 60% of them are men. 80% of patients affected by covid-19 required ventilator to get rich oxygen into their body. During second wave of Covid-19, there were many cases found in India due to which it was difficult to handle high numbers of patients and unavailability of ventilators, beds also doctors, nurses, etc. Also vaccine for this Covid-19 virus is not launched by government or World health Organization (WHO) till second wave. Hence it is very clear and important to tackle with this covid-19 situation we need to ensure that safety and security of each person. When things get to normal people are going for their work with guidelines provided by government like wear mask compulsory. So in this situation safety about covid-19 is not compromised at any cost. While some safety measures are taken by State government and central government to control this situation.

Observing all these pandemic issues and with these reasons related to covid-19 we proposed one model that will definitely help to ensure the safety, security and health of all the people working in the organization like hospital, company, school/college and office. Now world is facing the deadliest virus that is corona virus in the history and scientists, doctors and paramedical force are also struggling very hard to control the covid-19 situation. All over the country Lockdown is established by authorities of India to control this spread SARS COVID-19 virus but it has created an adverse effect on the economy of our nation. So authorities discussed and came to a conclusion that having lockdown imposed is not the correct solution for this, so government allows people to work but only by taking all necessary and safety measures. First and foremost measure is to wear a mask whenever going to any public places and wearing mask properly can somewhat avoid affecting and spreading of covid-19 virus. Then most common type of symptoms observed are fever and low oxygen level. So for fever and oxygen level we decided to implement a system to identify temperature to check fever using temperature sensor and using oximeter to check the oxygen level. In places like school, colleges, offices, and hospitals where only

employees/staffs are allowed, in such cases biometric system is used to track the record of attendance which could not be safe in today's situation. Also maintaining social distance and sanitizing hand is very crucial procedure which will protect us from touching infected areas and due to use of sanitizer spreading of covid-19 virus it keeps safe as covid-19 spread by touching infected areas or person so it is necessary to keep our hand sanitized. Hence we proposed contactless automatic hand sanitizer which can be used to sanitize our hands without any requirement of manpower or body part. Temperature, heart rate and oxygen level measurement can be deciding factors for checking the symptoms. Then we designed an android app to ensure mask is worn or not.

As of now in India there is no health monitoring system which checks all parameters like temperature, oxygen level, heart rate and also consist of automatic hand sanitizer, biometric system and app for mask detection. At many places Hand sanitizer are also available but people have to physically contact it with the surface of bottle before sanitization or at many places have to press a paddle using leg then sanitizer pops out from sanitizer bottle and this are not the correct ways to ensure safety. If temperature and oxygen level is detected in separate way then it is prevalent because it requires additional man power. We tried to ensure that all the checking of parameters are covered in one single kit along with mask detection and biometric attendance system.

A. OBJECTIVE OF THE PROJECT

The idea behind the project is to make a Covid safety Kit in which the following things would be included first is Face Mask/Shield detection in which system will detects whether person was wearing a mask or not. Automatic Hand Sanitizer through which person can get sanitize their hands automatically. 3rd is Biometric/ Fingerprint sensor. then it detects body temperature, oxygen level and heart rate. It is also consist of fingerprint blocker it will not allow person to biometric verification till his/her hands get sanitized.

B. MOTIVATION

1. No matter in which organization we belongs to, keeping our self clean and following all the safety precautions should be at the top and has to be give higher priority. People should be vigilant enough when they go to any public place; they are protected from covid-19 or not. There could be harmful viruses that could live in the most unlikely places and can spread easily from person to person by coming in contact. So Automatic Hand sanitizer can be a great option to reduce the risk of spreading covid-19 infection.

2. In place such as businesses and organizations where they are planning to start back their business and offices during this pandemic. Mask can be a better solution to prevent spreading of virus via our mouth by coughing or by sneezing.

According to the research, it is seen that mask reduce the chance of getting infected by other people when worn over the nose and mouth. Alongside temperature measurement nowadays plays a vital role as it can be one of the factor to determine if a person has covid infection if that person has a high temperature. Also it has been observed, where a person infected with COVID-19 has level of oxygen low but otherwise person feels healthy or no symptoms are seen. However this does not mean that everyone who tests positive for COVID-19 will have low level of oxygen. So looking after all this problems and solutions to it we got the motivation of building this project which can bring all the parameters together safely and in a very innovative way.



Fig. 1. Motivation

2. RELATED WORK

In[2],[4] Temperature detection is done using GY906 infrared sensor and mask detection is done using opencv library in python. technique used for opening door is also not safe because here they don't use hand sanitization and mask detection. Next automatic hand sanitization [3] is done using Arduino uno, servo motor and ultrasonic sensor but here sanitizer level detector is not implemented. then paper proposed by Lei and Chen [8] it includes temperature, heart rate and pulse rate detection using MAX30100 and MLX90614 sensor. They also implemented health monitoring app in which it will display all parameters. In next paper [7], they include infrared temperature detection using MLX90614 and here green and red led's are connected to indicate temperature is high or not. In [6], they implemented automatic hand sanitization using ultrasonic sensor and pump motor. then temperature detection and face mask detection [1] is done for multiple people at same time this can be useful in shopping malls, theatere. contactless smart home system to prevent covid is implemented [5] temperature detection, face recognition and they created whats app bot for notification.

3. PROPOSED WORK AND METHODOLOGY

In this system at the beginning when a person comes in front of the kit he has to sanitize his hand using the automatic hand sanitizer. Next the person have to go through mask detection where his/her mask will be detected. Then that

person have to scan his/her fingerprint using the fingerprint scanner. If the person doesn't sanitize hand he/she won't be able to scan the fingerprint due to fingerprint blocker. After scanning of fingerprint, he/she have to check his/her body temperature and then oxygen level along with heart rate.

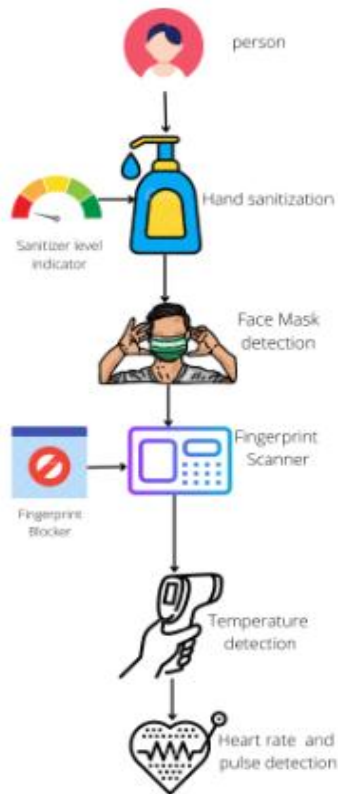


Fig. 1. Project flow

i. AUTOMATIC HAND SANITIZER

In the automatic hand sanitizer the components used are two IR sensors, one channel relay module and a submersible water pump. When a person place his hand beneath the hand sanitizer, IR sensor's will detect the hand. One IR sensor will send the signal to one channel relay which will turn the water pump ON and sanitizer will come out. Whereas the other IR sensor will send the signal to the Arduino UNO which is present in the main kit.

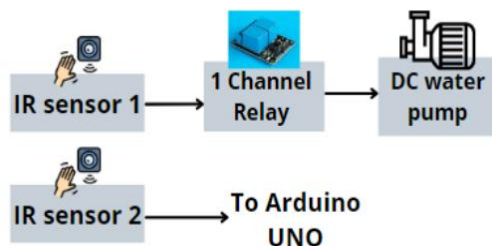


Fig. 2. Automatic hand sanitizer

ii. SANITIZER LEVEL INDICATOR

In the sanitizer level indicator BC547 transistor, LED's (red, yellow, green) and 1K resistors are used. Using this components, the sanitizer level indicator is made. Different colours of LED are used to indicate the different level of sanitizer present in the dispenser wherein red indicates level of sanitizer is very low, yellow indicating level of sanitizer is medium and green indicating level of sanitizer in dispenser is in good amount.



Fig. 3. Sanitizer level indicator

iii. FACE MASK DETECTOR APP

The android app is designed to detect a person or user is wearing a mask or not. In this entire process, the person have to wear his/her mask. If the person is not wearing a mask, the app will make a sound "PLEASE WEAR YOUR MASK". Even if the person is not wearing a mask covering his/her nose it will make a sound. So person have to wear his/her mask properly covering his/her nose. In the mobile app, training of mask detection model is done using python. Whereas the interface of app is built using Android Studio. Using all this we will perform real time mask detection. This app can be installed on any Android mobile even if it is outdated.

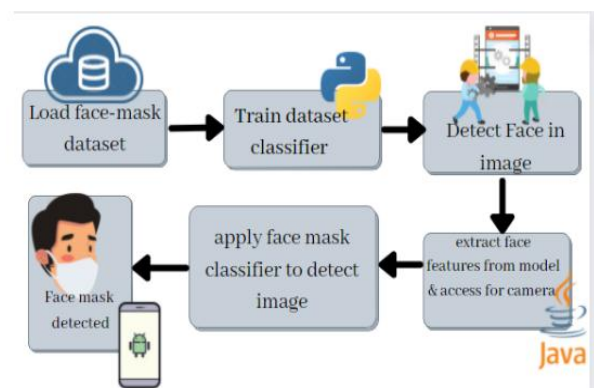


Fig. 4. Face mask detector APP

iv. BIOMETRIC FINGERPRINT SCANNER

In Biometric fingerprint scanner, the components used are ESP32, R305 fingerprint scanner and 16x2 LCD display. Firstly, the person have to enroll his/her fingerprint on the

fingerprint scanner. Each person will have his/her own unique ID. If the person has successfully enrolled his/her fingerprint, he/she will be able to access the fingerprint scanner. On the LCD, it will displaying the username and roll number if the person has successfully enrolled. If the person has not enrolled his/her fingerprint and tries to scan the fingerprint a message would be displayed on the LCD display saying "Fingerprint not enrolled". If we want to delete or replace or change the ID all this can be done using the ESP32.

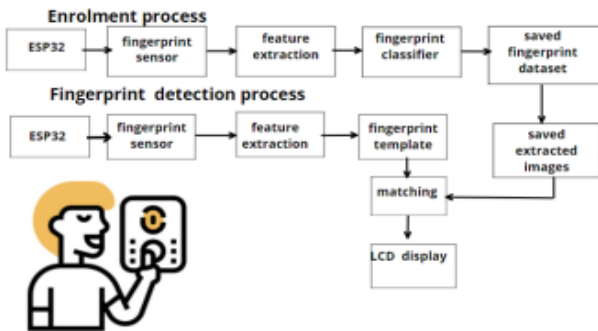


Fig. 5. Biometric Fingerprint Scanner

v. BIOMETRIC BLOCKER

In this biometric fingerprint blocker a servo motor(MG90S) is used along with a small acrylic sheet attached to it. Servo motor's pwm pin is connected to Arduino UNO. The second IR sensor as mentioned in the automatic hand sanitizer provides the signal to the Arduino UNO as the hand is detected. If we don't sanitize our hand and try to scan our finger on the biometric, the blocker will resist to place the finger on the scanner.

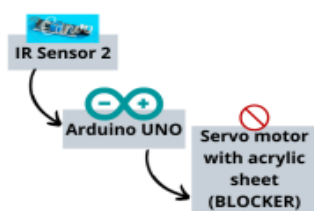


Fig. 6. Biometric blocker

vi. DATABASE SYSTEM

The data which is been displayed on the screen such as name and roll number of person along with the fingerprint id and Timestamp is been stored in an excel sheet via ESP32. In an excel sheet, data is stored in form of tables and in well-structured form which consists of columns and rows which are easy to read and understand. Using IFTTT we created a unique link and added that link in the ESP32 code. Whenever the code is running it sends a web requests to the IFTTT. When IFTTT accepts it then it adds a row with all the above

mentioned parameters in the excel spreadsheet which is created.



Fig. 7. Database system

vii. BODY TEMPERATURE DETECTION

For measuring body temperature MLX90614 contactless IR temperature sensor is used along with Arduino UNO, HC-SR04 Ultrasonic sensor and buzzer. Temperature detected from MLX90614 is displayed on an 0.96 inch oled display. HC-SR04 ultrasonic sensor is used because whenever a hand comes in range of 2cm to 8cm, MLX90614 will display the temperature of the hand. Whenever there is no hand placed in front of the ultrasonic sensor, MLX90614 will display the room temperature. The temperature displayed on the oled display will be in fahrenheit (°F). Basically, normal body temperature is between 96°F to 98.6°F. When temperature goes above 100°F, buzzer will go high and make a sound which will make person alert that his/her body temperature is high.

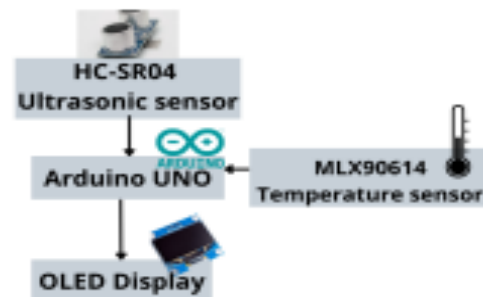


Fig. 8. Temperature detection

viii. OXYGEN LEVEL AND HEART RATE DETECTION

When a person is done with temperature detection, next he/she has to do is to detect heart rate and oxygen level of their own body. Here the components used are Arduino UNO, 0.96 inch oled display and MAX30102 Pulse oximeter and heart rate sensor. When a user place his/her finger on MAX30102, his/her heart rate(bpm) and oxygen level(SpO2) gets detected and is displayed on the oled display. to detect this parameter it will take 15-28 seconds to display the accurate heart rate (bpm) and oxygen level (SpO2). An ideal oxygen level and range of oxygen level includes between 96% and above. correct range for heart rate should be between 50 to 90 beats per minute (bpm).

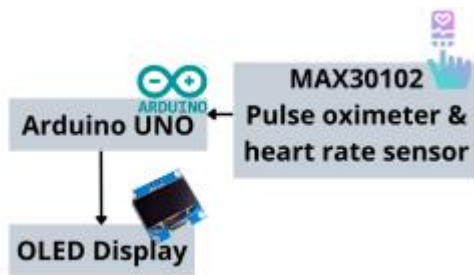


Fig. 9. Oxygen level and heart rate detection

4. IMPLEMENTATION & EXPERIMENTATION

I. BLOCK DIAGRAM

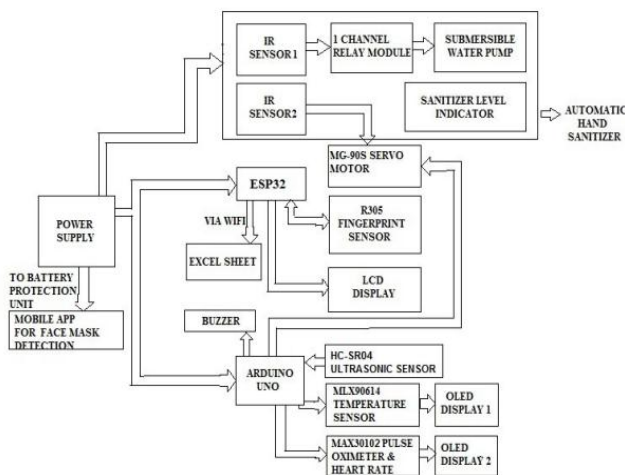


Fig. 10. Block Diagram

The following figure describes the block diagram of our project. As you can see, power supply is provided to 4 different parts. Firstly, power supply is provided to the automatic hand sanitizer as no board is used here. Secondly, the supply is provided to ESP32 and Arduino Uno from there the supply is provided to different sensors and displays. Also, the supply is provided to a mobile phone as a mobile is used without a battery. In the automatic hand sanitizer, 2 IR sensors are used along with 1 channel relay module and submersible water pump. Sanitizer level indicator is also used in hand sanitization. Interfacing of R305 fingerprint sensor and LCD display is done with ESP32. Using the inbuilt WiFi module of ESP32, fingerprint data is transferred to an Excel sheet via WiFi connection. Interfacing of Arduino Uno is done with MLX90614 temperature sensor, HC-SR04 Ultrasonic sensor, and MAX30102 pulse oximeter and heart rate sensor. Each of these sensors' data will be displayed on their respective OLED display. Ultrasonic sensor is used for detection of hand within a given range. Buzzer is connected to Arduino Uno to create sound when any parameter goes beyond the normal level.

II. FLOW CHART

The following figure depicts the flow chart of our project. In which to start the kit we have to turn on the power to turn on the circuit. As the circuit gets turned on, the first process to follow is the automatic hand sanitization process. If hands are sanitized, then only you would be able to do the next process. The next process is mask/shield detection; if it is detected successfully, you can go ahead with the next process. After mask detection, you have to scan your fingerprint on the fingerprint sensor. If in case you don't sanitize or do mask detection, you won't be able to access the fingerprint sensor as there would be a fingerprint blocker to block the sensor. If the finger is scanned successfully, next comes temperature detection using a temperature sensor; it will detect your body temperature and will display it on the OLED display. If your temperature is displayed successfully and below the normal level, you can check your heart rate and oxygen level using the pulse oximeter sensor. All this sensor data will be given to the database, and this is the end of the process.

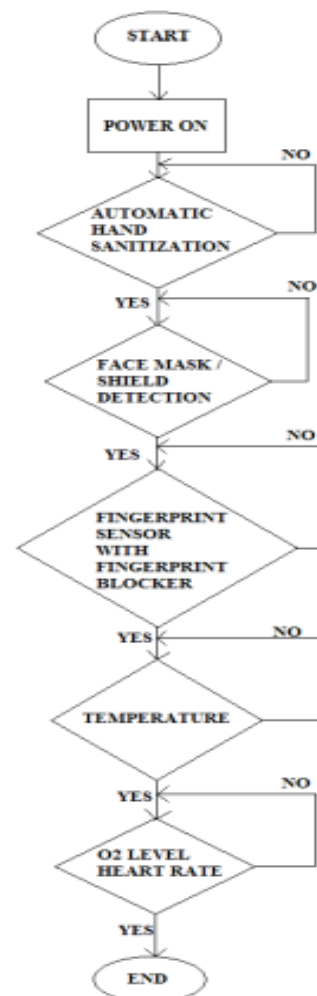


Fig. 11. Flow Chart

5. CIRCUIT DIAGRAM

i. AUTOMATIC HAND SANITIZER

The following figure is the circuit diagram of an Automatic Hand Sanitizer. In which the components used are 1 channel Relay module, Submersible water pump, 2 IR sensor. Data pin of IR sensor 1 is connected to IN pin of relay. Whereas the data pin of IR sensor 2 is given to Arduino UNO. Submersible water pump's Vcc pin is connected to NC of relay and Ground to negative pin of power supply. However, the supply to relay and 2 IR sensor is provided by power supply.

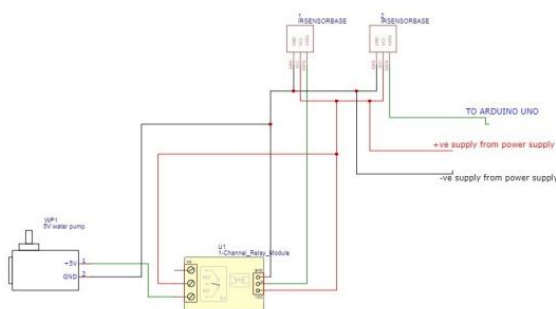


Fig. 12. Circuit diagram-automatic hand sanitizer

ii. SANITIZER LEVEL INDICATOR

The circuit diagram of Sanitizer Level Indicator. In this circuit we used BC547 transistor, LED (3V), resistors (220ohms) and connecting wires. In the circuit diagram Q1 and Q2 are PNP transistors the arrow indicate emitter terminal. All the emitters of transistor are connected to negative terminal of the cathode of supply and all the collectors are connected to LED in series with 220 ohm resistor to anode of supply. The base terminal of the all transistors is connecting in series with a 220 ohm resistor and dipped into water to detect level. When we power on the supply of the circuit there is low current flowing through the transistors because transistor work as a switch hence all the remaining circuit also off state. When we put the base terminals of the transistors in bottle one by one as required level and put the anode terminal of the battery to sanitizer bottle, then low current in Micro Amperes starts flowing in base terminal. This time it switching off the transistors to ON state. Now the sanitizer level in the bottle decreases or increases the other base terminals also turn on the remaining transistor then supply by sanitizer and thus other LED and buzzer starts conducting as per level.

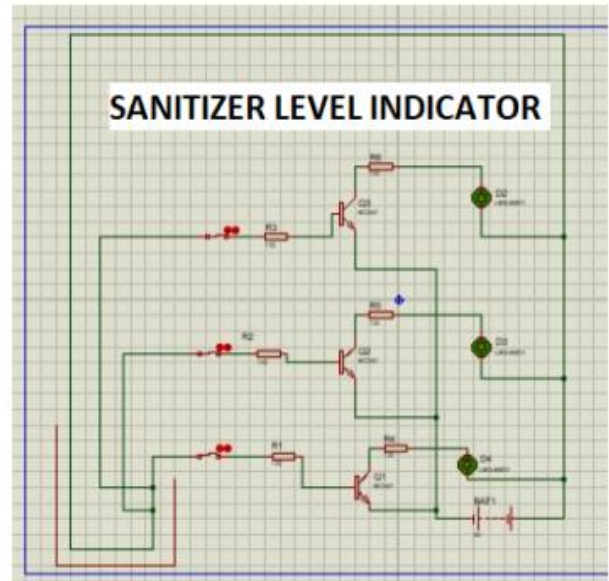
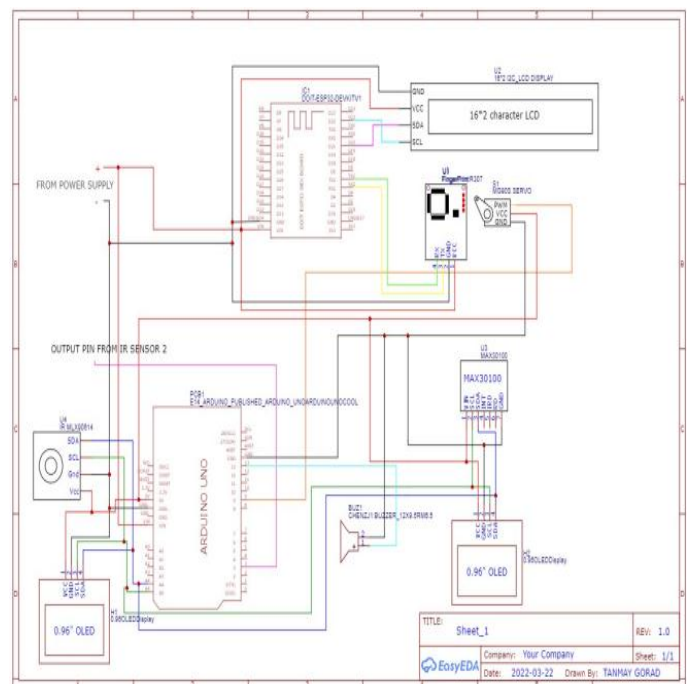


Fig. 13. Circuit diagram-Sanitizer level indicator

CIRCUIT DIAGRAM OF MAIN KIT

The following is the circuit diagram of main kit wherein there is interfacing of ESP32 with R305 fingerprint sensor and 16x2 LCD display, Interfacing of Arduino UNO with MLX90614 temperature sensor, MAX30102 pulse oximeter sensor and Oled display



.Fig. 14. Circuit diagram-main kit

6. RESULT



Fig 15 Covid safety kit



Fig 16 Facemask detection



Fig. 20. Temperature detection



Fig. 17. Level indicator



Fig. 18. Fingerprint scanner



Fig. 21. Oxygen level and heart rate detection



Fig. 19. Fingerprint blocker

7. CONCLUSION

In this paper we implemented a system to ensure that COVID-19 protocols are being followed. The system we have made consist of automatic hand sanitization, detecting of face mask, oxygen level, heart rate and temperature is implemented. Face mask detection is implemented using Arduino UNO and python along with a camera. Automatic hand sanitization is implemented using ultrasonic sensor and servo motor. Database system is implemented using spreadsheet and ESP32 via Wi-Fi. Temperature detection is done using non-contact infrared temperature sensor (MLX90614) and oxygen level and heart rate is done using pulse oximeter sensor (MAX30100). This system/kit can be setup at the entrance of school, college, office, ATM and other government offices without any help of additional manpower. Also all the COVID-19 protocols will be covered and ensured that they are followed. The entire system is completely automatic and is completely safe as the first process itself is Automatic hand sanitization. The accuracy of mask/shield detection can be increased by training with more number of images. This COVID-19 safety kit we tried to implement has various additional features and we have ensured that safety is given priority.

8. REFERENCES

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