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IOT Enabled Covid-19 Barrier

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ABSTRACT: The world still revolves around the fear of Covid-19 even after the outbreak of three waves. The ghastly period may get prolonged if the prevention is not in its early phase. The nation has done its best to control the virus. Well, the prevention measures are indeed an ongoing process. Every individual must realize that “Prevention is better than cure”. Therefore, the new routine in the world is to wear face masks in public spaces. And alwaysequip yourself to maintain social distancing. Indeed, monitoring the body temperature has become vital and thecommon symptom of Covid-19. Hence, satisfying the duplicity, we have built a multi-purpose entrance barrier.This barrier provides contactless, human error-free, safe, automatic temperature and face mask detection inpublic spaces. The bar gets flagged with a green signal if all conditions are satisfied, or else a red light blinks.The barrier is designed using Arduino, MLX90614 temperature sensor, ESP32-camera, and LCD.

KEYWORDS: Arduino, MLX90614 temperature sensor, ESP32-camera, and LCD.

I. INTRODUCTION

A novel Coronavirus can also be called Covid-19(by WHO) or 2019-n CoV. Covid-19 is an infectious and contagious disease caused by the SARS-CoV-2 virus. The origin of this virus began in the initial weeks of December 2019 near Wuhan City in China. Well, the outbreak in 2019 is still ongoing at the current 2022. Indeed, it is a well-definedpandemic. The virus holds a record of more than 453 million infections and over 6 million death. The objective of our proposed prototype is to reduce the chances of the spread of COVID-19 carriers. The spread of the virus can be categorized into two types. Firstly, fast-spreading, and secondly, slow-spreading. To control this situation, we need to maintain a constant rate of spread in the graph. This eventually leads to slow spreading. Precisely, this can be activated only in its early phase. Here comes, the invention of our prototype, "IoT enabled covid-19 barrier." MLX9016 Temperature sensor, ESP32 Camera, servo, and LCD screen are connected to the Arduino board. We tend to put in Arduino IDE code where the required adafruit.io libraries are to be imported. Then the code is compiled once the Arduino is connected to the laptop connected with the USB cable. It shows the person`s temperature and verifies the person's mask. The servo barrier opens when the individual has an ideal temperature and wears a mask, Otherwise, it doesn't permit. Thus, this is a precise architecture of our prototype.

II. THE RESEARCH METHOD

1. In this paper The working principle of Arduino, we can learn a lot about its applications. It is very helpful for young talents to build a prototype using Arduino. Adding to the statement, it can make wonders in all fields. The ideas with Arduino are endless, with the help of this paper we have learned to build new devices of our own to create and implement innovative things. Though it does have its limitations, it is a great tool that can be used in learning and also shows how to write sketches for Arduino in its IDE (software).

2. In this paper Real-Time Face Mask Detection and Thermal Screening with Audio Response, they propose a system that uses TensorFlow, Keras, MobileNetV2, and OpenCV libraries. These libraries make it easier for face mask detection. A dataset contains images of individuals with and without masks obtained from different sources. The proposed system checks whether the face mask is present or not and the person's body temperature. It also communicates with the individual with a voice note.

3. In the ESP32-CAM for Face Mask Detection paper, the detection system offers great accuracy and can enable devices via IoT. A cost-effective face mask detector using ESP-32 CAM and Arduino Uno can be connected easily and an accurate face mask detection system can be obtained.

4. In the paper Face detection door lock system using ESP32-CAM, has its significance by capturing images using a high-performance wireless camera i.e. ESP32-CAM connecting other devices and sensors in an IoT network. This

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acted as a game changer providing incredible results like zero error, real-time response, and fast performance, viable, smart, and feasible. For other tasks like controlling electronic door lock remotely, clicking more pictures as well as getting notifications a cloud server application “Blynk” was used over the smartphone. Indeed, this paper gave us another dimension of ESP32-CAM.

5. In the paper Design of Non-Contact Infra-Red Thermometer Based on the Sensor of MLX90614, the completed the hardware circuit, made the PCB plate, programmed the software with Keil C, and debugged it by Keil uVision4 MDK V4.22. Then, the effects of the results of the temperature were measured by different bottles with different shapes, materials, sizes, and wall thicknesses at various measuring distances. The paper was designed based on the sensor of MLX90614 and the microprocessor STM32F107 for the non-contact liquid security identification system. The system works efficiently and meets the demands of the non-contact liquid security identification system. It meets the requirements of high reliability and low power consumption with real-time response.

III.PROPOSED SYSTEM

A) DESIGN CONSIDERATION:
-The camera is employed to scan for detecting face mask
-The temperature sensor is used to detect an individual's body temperature.
- The Arduino processes the sensor’s inputs and decides whether the person is to be allowed.
-If the person has a normal temperature and wearing a face mask then the system operates a motor to open the barrier for the person to enter
- If an individual is flagged by the system for high temperature or no mask the system glows red light and bars the person from entry.
-Also an alert message will be displayed on the LCD.
- Also the details face and temperature of an individual are sent out over IOT to the server for authorities to wish action.

FLOW CHART REPRESENTATION:

Figure 1.1 represents the proposed prototype build. This barrier provides contactless, human error-free, safe, automatic temperature and face mask detection in public spaces.

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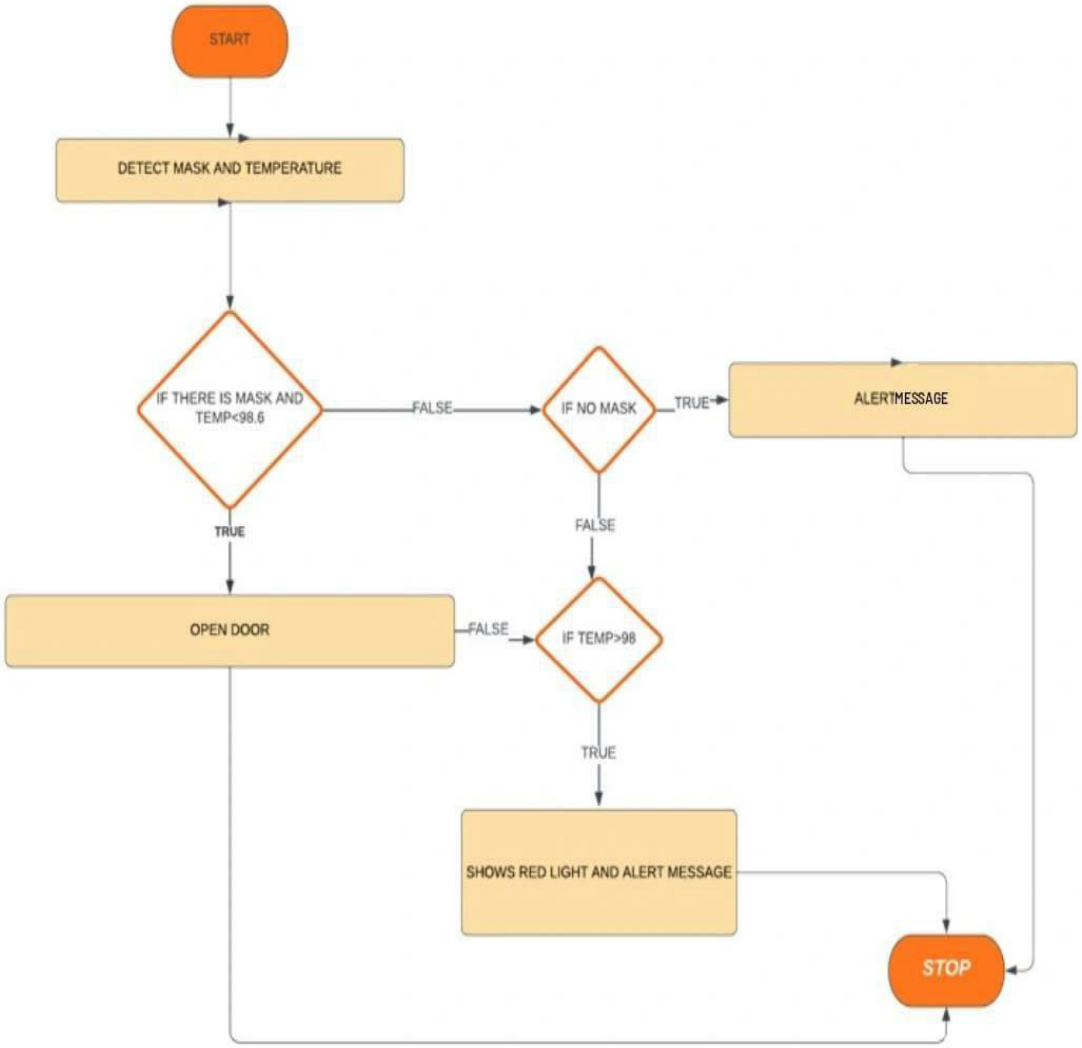

B) DESCRIPTION OF THE PROPOSED SYSTEM:

Our proposed Covid-19 barrier provides contactless, human error-free, safe, automatic temperature and face mask detection in public spaces.

The primary purpose is to break the chain of local transmission of COVID-19 at every populated place's entrance.

Components used in the proposed system are,

a) Arduino
b) MLX90614
c) ESP32-camera
d) LCD
e) USB Cable
f) Red and Green LED lights
g) Servo (Barrier)
h) LM2596

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The below table represents the connections between Ardunio UNO and MLX90614 IR Sensor.

ARDUNIO UNO	MLX90614 IR SENSOR
5V	VCC
GND	GND
SDA	A4
SCL	A5

- ESP32-camera consumes low power, is cheap, with inbuilt wifi and, Bluetooth features.

The below table represents the connections between Ardunio UNO and ESP-32 Camera.

ARDUNIO UNO	ESP-32 CAMERA
TX-1	GPIO 14
RX-0	GPIO 2

C) MODULES:

- IR TEMPERATURE SENSOR:The MLX90614 IR Sensor is used for detecting the temperature of the user. The range set for our prototype is between 35C-39C. If the user does not have the proposed body temperature, then an alert message gets displayed over the LCD.

The MLX90614 temperature sensor can be able to read
temperature between -95 and 720F with high precision and it is non- contact sensor

i)Adafruit_MLX90614 library is used for the MLX90614 temperature sensor

```
#include <Wire.h>#include <Adafruit_MLX90614.h>
Adafruit_MLX90614 mlx = Adafruit_MLX90614();
```

- MASK DETECTION: The ESP-32 Camera is used for accuracy in face mask detection. The user needs to stand between 35 to 60cm from the camera for the detection process. Once, the user is detected with the mask, the barrier gets flagged with Green Light. In neither case, the barrier gets flagged with Red Light.

ii) ESP32 library is used by the camera to detect face mask

```
#include<esp32cam.h>
```

IV. PSEUDOCODE

Step 1: Allow the individuals to enter via the IoT-enabled barrier.
Step 2: StartCheck if (temperature sensor range(35'C-39'C)&&Monitor face mask)
Then(Barrier is flagged with a green light)
Else(Barrier is flagged with a red light)
End.
Step 3: If both the duality gets satisfied(i.e) individual with required face mask and proper body temperature. Then the individual is flagged with a green light.
Step 4: Even if one condition is satisfied, the person gets flagged with a red light. And an alert message gets displayed on the LCD.
Step 5: Go to step 1.
Step6: End

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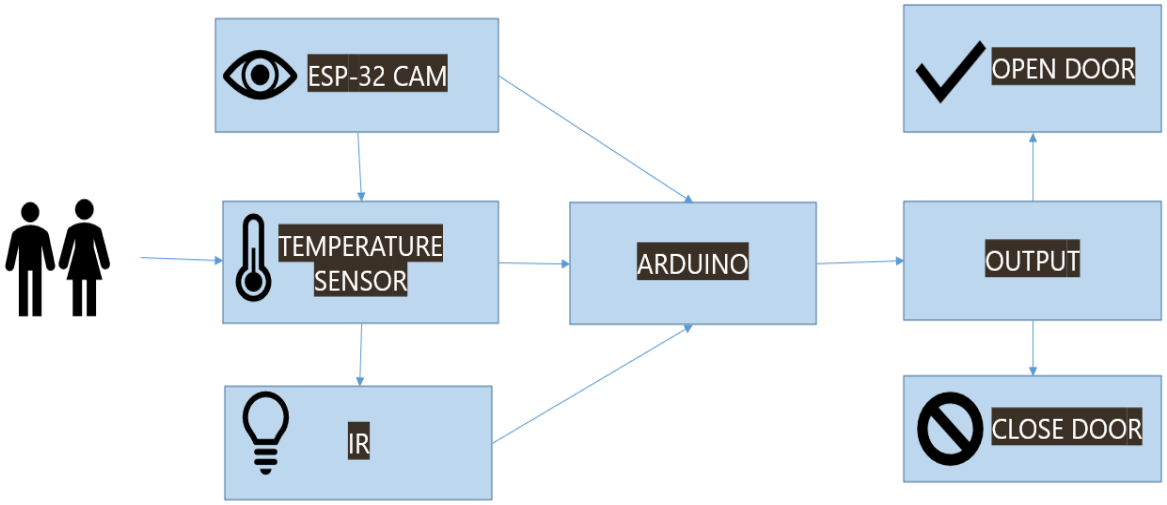

V. EXPERIMENT RESULTS

The simulation studies of the proposed prototype are making complicated things look easier and simple to implement. The Arduino used has a faster interface and user friendly. It can build using C and C++. And especially, it is cost-efficient. Adding to the statement, the MLX90614 temperature sensor can be able to read temperatures between -95 and 720F with high precision and it is a non-contact sensor. No less than others, the ESP32-camera consumes low power, is cheap, with inbuilt Wifi and, Bluetooth features. Compiling all these factors, our expected output is incredible and accurate. The lifetime of this proposed prototype is also good. Therefore, the working of this prototype is more efficient and it provides accurate results. It also provides an alert message to the users. Therefore, this prototype proposed makes complicated things look simple and interesting.

Figure 1.3 represents the simulation output of face mask detection.

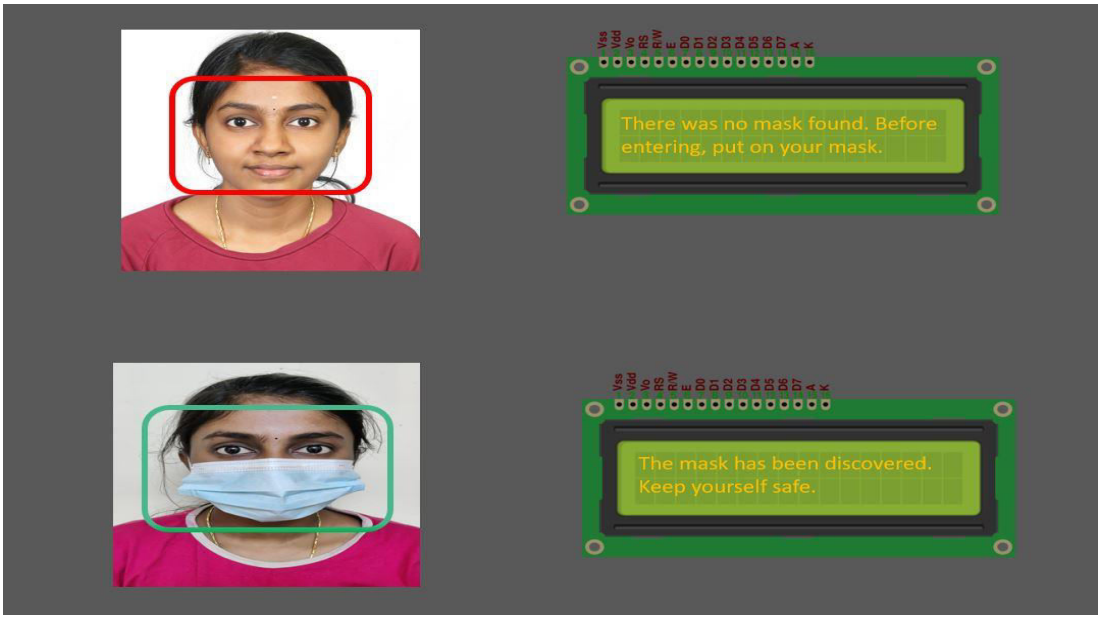

Figure 1.3

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Figure 1.4 represents the simulation output of temperature detection.

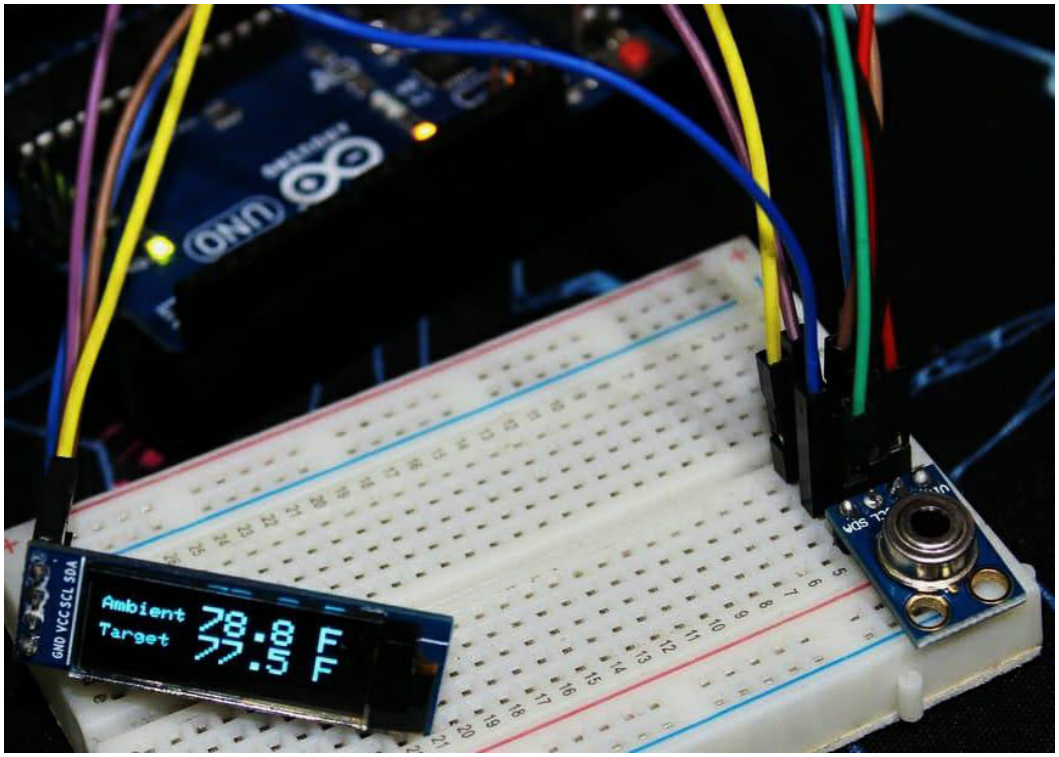

Figure 1.4

V. CONCLUSIONS AND FUTURE WORKS

The simulation results are enough to prove the working condition of our prototype. In the future, we are planning to connect database to the iotserver .Adding this feature enhances our system. We can have a record of all the user's data like their time of entering and face can be recorded. This can help us track the infected person, and thus the local transaction chain can be broken. Therefore, the spread of the virus can be controlled at its early phase. Precisely, "Prevention is better than cure". Moreover, contactless error-free is more efficient and users also will feel comfortable with the system. Indeed, 2020 and 2021 are the so-called pandemic period. Let us make sure that this ghastly period may not get prolonged and let's end it with our Prevention Measures.

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