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Hybrid Temperature Sensing and Monitoring System With Built In Sanitizer

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Abstract: COVID-19 is a widespread viral disease that has caused enormous loss of the populations around the world. The virus specially targets the respiratory organs like lungs. The main symptom of covid-19 is cough, increased body temperature(fever), breathlessness etc. So as a precautionary measure protecting our nose with face masks is essential, with sanitizing hands and monitoring the body temperature from time to time. As per instructions by the government of India, certain standard operating procedures have to be followed at any public places, organizations, institutes etc. The standard operating procedure includes of the following steps to be performed at the entrance of any buildings; they are: Temperature check for every individual, Compulsory face mask, Hand sanitizing. Although the above steps are currently performed by a person with the help of a temperature gun. Sanitization is done mostly using a hand pump sanitizer or a pedal sanitizer. The main project aims to build a completely automated and a contactless way of approach to follow the standard operating procedures. The design of the model does not involve any human; hence the people are subjected to no risks. Our project also enables a database to store details of individuals' temperature along with their name and time.

Keywords — Hybrid, Mask detection, Message alert, MIT app, Sanitizer, Temperature .

I. INTRODUCTION

On 17 November 2019 a new virus emerged which created a history. No one could ever imagine the virus attack would turn into Pandemic until declared by the World Health Organization (WHO) on 11 March 2020. A massive population has been victimized all over the world. China was the first country with a widespread outbreak, followed by other countries like Italy, USA and more. Countries shut their borders, banned travel and issued orders of Lockdown to safeguard their citizens. In this project we aim to build an all in one and cost-effective contactless monitoring system for any organization with a built-in sanitizer dispenser, mask detecting system and temperature sensing system which records the temperature of every individual and then store into a database. This model eliminates the dependency of a human to monitor standard operating procedures and record the data on a daily basis which can be used for future references for contact tracing, etc. It is a contactless and fully automated system which reduces the risk of the infection spreading. The following figure 1 illustrates how protective measures such as limiting travel, avoiding crowds, social distancing, temperature monitoring, frequent handwashing and contact tracing can slow down the development of new COVID-19 cases and reduce the risk of overwhelming the health care system.

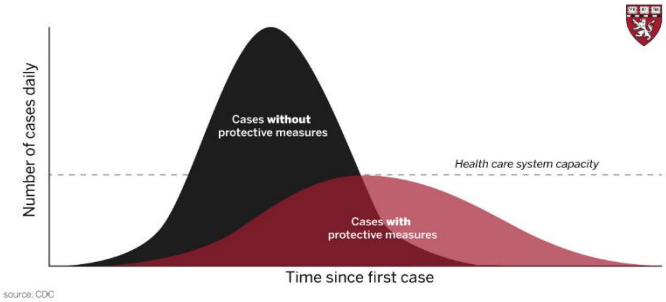

Fig 1.1 Analysis of taking precautions v/s no precautions

II. PROPOSED METHODOLOGY

The prime concern of the project is to provide a fully automated and completely contactless device for thermal scanning, sanitizing, mask detection and a database to store all the necessary information about the individual.

The system built can reduce the spread of infection as it is contactless and automated, no human involvement is required hence can reduce the risk of spreading diseases. Also, a database is provided to trace an infected person and

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his contacts, so early precautions can be taken. Key concepts of this projects are

- Sanitizing the palms of every individual
- Checking the temperature
- Detecting mask
- Reporting to higher authorities in case of irregulates like high temperature
- Updating and recording the data for future reference

Hence every aspect of design is being taken care to make sure that our design satisfies above mentioned criteria to the best extent. Fig 2.1 shows the overall block diagram of the proposed work. The model begins by detecting the face mask, sanitizing the palms sensed by the Ultrasonics sensors followed by temperature sensing and with the help of android application, name and the temperature of the person is recorded and stored for future use. The advantage of this model is it is completely contactless and automatic can be installed in every institution or organization which helps in preventing the infection and reduces the further risk of spread.

Fig 2.2 shows the general flow chart for the proposed work. The working begins with the help of a sanitizer dispenser which pumps the sanitizer on detection of presence of hands using ultrasonic sensors. Once the hands are sanitized, the user is supposed to check their temperature using a non-contact temperature sensor. If an abnormal temperature is detected, an alert message is sent to higher authority of the organization, a red LED and a buzzer is used to indicate the user the same. On detection of normal temperature, a green LED is used to indicate the same. This data has to be stored in the database, here we are making use of an android application to detect the mask. On successful detection of the mask, an OTP is generated which is displayed on the LCD. The user has to enter the OTP in his application to validate it so that the temperature can be saved in the database. Then automatic door control is driven by the servo motors to open the doors for the user.

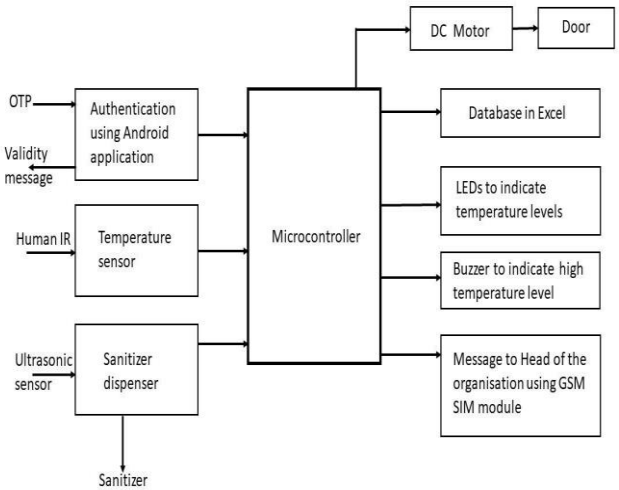

Fig 2.1 General block diagram

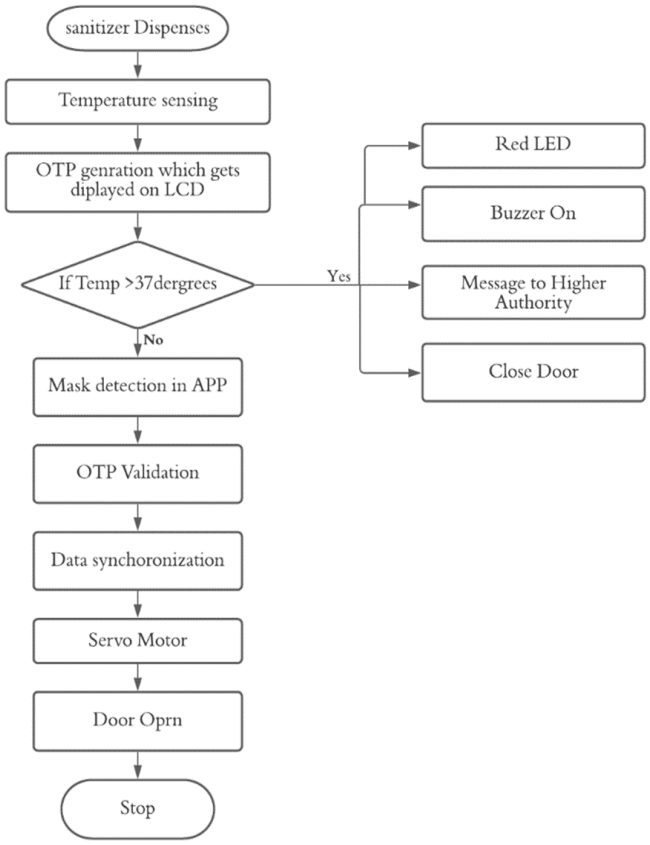

Fig 2.2 General flow chart

III. RESULTS

Automatic hand sanitizer consists of a Node MCU ESP8266, relay module, ultrasonic sensor, Dc pump, batteries. The model is as shown in figure 3.1. The ultrasonic sensor transmits ultrasonic sound waves. If the human hand is detected then the message will be sent to a relay node which will turn on the dc pump for this process, we required Node MCU ESP8266. The 1st component is the microcontroller (Node MCU ESP8266). It is attached to a 2nd component ultrasonic sensor which is used to transmit ultrasonic sound waves and receives back, it measures the distance of the object by transmitting ultrasonic sound waves and converts the reflected sound into electronic signal. The 3rd component is the delay module which acts like a switch. When the presence of hands is detected from ultrasonic sensors, the microcontroller will turn on the dc pump. The 4th component is the dc pump which is used to pump the sanitizer. The 5th component is the portable batteries or external power supply to the system.

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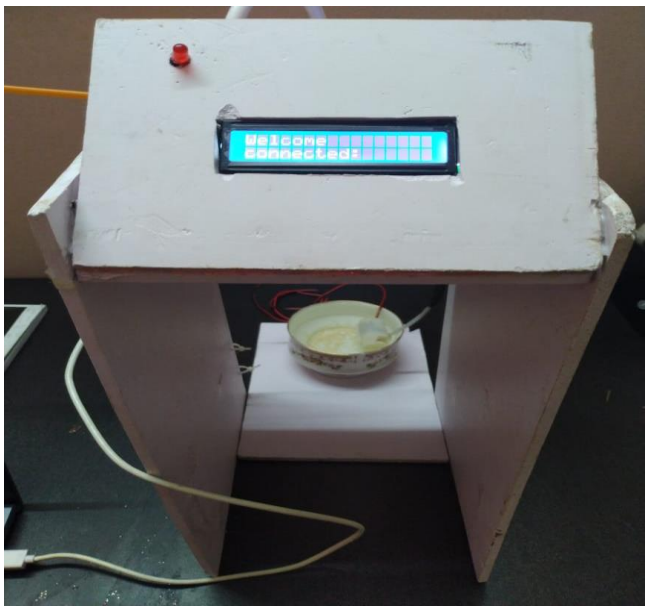

Fig 3.1 Model design

The automatic temperature sensor consists of a Node MCU ESP8266 microcontroller, a non-contact temperature module, human IR sensor, an LCD display, LEDs and buzzer. The user is supposed to check their temperature, the human IR sensor detects the object, on detection the non-contact temperature sensor measures the temperature and displays the temperature on the LCD screen. If an abnormal temperature is detected, an alert message is sent to higher authority of the organization, a red LED and a buzzer is used to indicate the user the same. This is shown in figure 3.2 On detection of normal temperature, the data is saved in the database. Then an automatic door control drives the door to open for the user after a certain delay, the door shuts back to repeat the process. This is shown in figure 3.3.

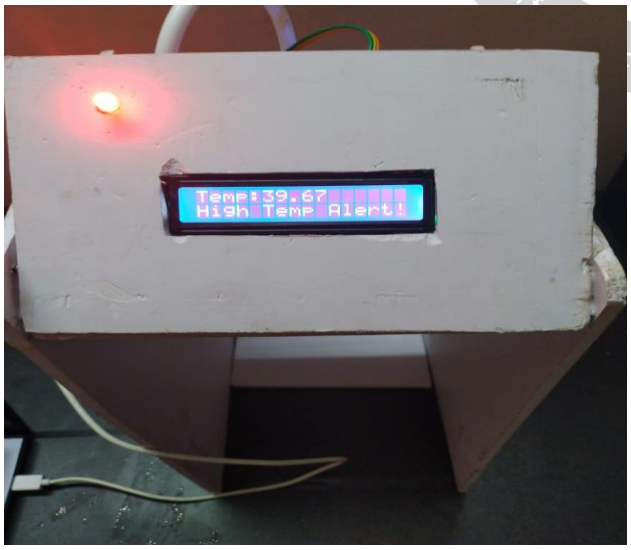

Fig 3.2 Detection of abnormal temperature

Fig 3.2.1 Detection of abnormal temperature

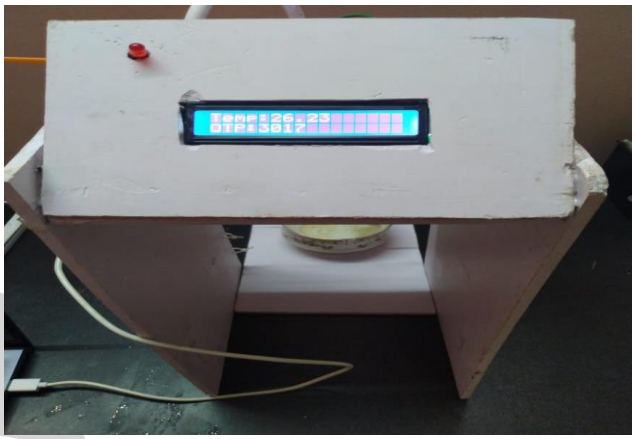

Fig 3.3 Detection of normal temperature

When the person enters the organization, their hands will be sanitized first using Ultrasonic sensors followed by temperature checking and an OTP generation that happens simultaneously, for every new temperature recorded through the sensors, a new OTP is generated and is displayed on the LCD connected to the Node MCU ESP8266 board. Once the temperature is sensed, it is stored in a variable named Temp in the database. For the database Firebase is used which is Google's mobile platform for building applications, Things like analytics, authentication, databases, configuration, file storage etc. these services are hosted in the cloud which is maintained by Google. Next the users click selfies using their phone camera for mask detection.

Fig 3.4 Application home screen

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Figure 3.4 shows the home screen of the application. After the picture is clicked and the mask is successfully recognized the user has to enter the same OTP displayed on the LCD for the first time that is during temperature sensing. This step is authentication.

Fig 3.5 Mask detection result

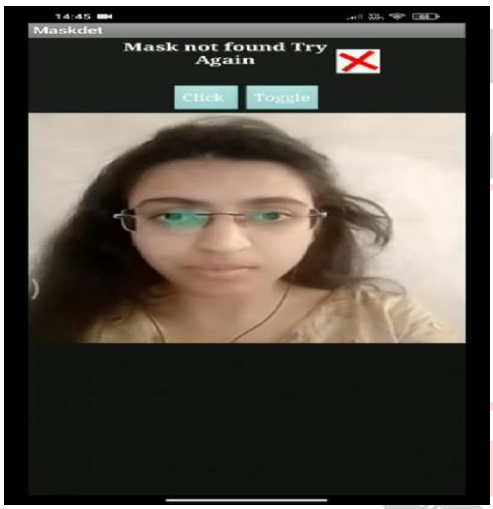


Fig 3.6 Mask not detected

If the mask is not recognized then the user has to click the picture again. The option for entering the OTP for the second time is available only after the mask is detected successfully.

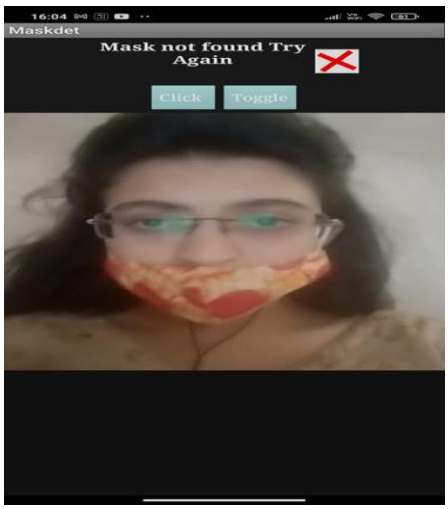


Fig 3.7 Improper mask detection

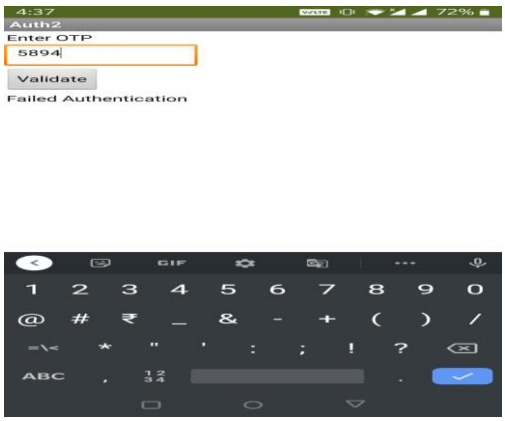
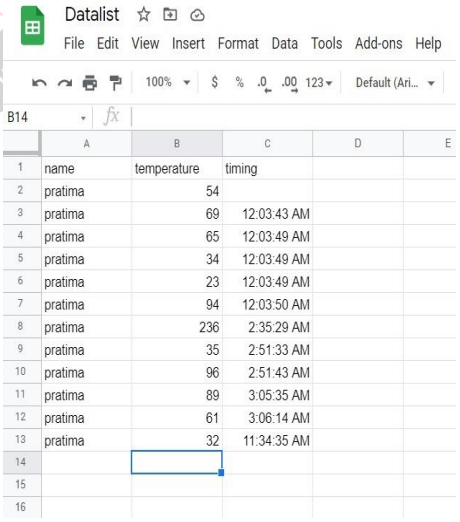


Fig 3.8 OTP validation

Once the OTP is entered for the second time, the data is fetched from the database to match the OTP, with successful authentication a Validity message is sent to the user's phone which says “Successful Authentication”.

Fig 3.9 Successful update of data



	A	B	C	D	E
1	name	temperature	timing		
2	pratima	54			
3	pratima	69	12:03:43 AM		
4	pratima	65	12:03:49 AM		
5	pratima	34	12:03:49 AM		
6	pratima	23	12:03:49 AM		
7	pratima	94	12:03:50 AM		
8	pratima	236	2:35:29 AM		
9	pratima	35	2:51:33 AM		
10	pratima	96	2:51:43 AM		
11	pratima	89	3:05:35 AM		
12	pratima	61	3:06:14 AM		
13	pratima	32	11:34:35 AM		
14					
15					
16					

Fig 3.10 Data in database

After this along with the name of the user, temperature and the time at which the temperature was sensed will be recorded in the database for future. Any mismatch in OTP or connection problems occur when an “authentication failed” message is displayed. In this case the temperature

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will be sensed again with new OTP and the process continues from step one. Once all the processes are successfully completed a door is used for controlling the entry and exit which opens. In case of High temperature sensed the door remains shut but the temperature stills get recorded in the database and a message to higher authority is sent. This entire process is shown from figure 3.1 to 3.10.

IV. CONCLUSION

The proposed work is a significant attempt to reduce the spread of covid 19 infection. As said prevention is better than cure, an automatic hand sanitizer and temperature sensing device is built along with features like mask detection and database is provided. This reduces the risk subjected to a human and also helps in reducing the spread of the deadly disease. This system can be used at the entrance of any organization like Schools, colleges, Private institution, Banks and so on. It can also be implemented at the entrance of shopping malls and hospitals where the crowd is maximum and human monitoring is difficult. We can also use at the entrance of metro stations, railway stations, airports and also in public transportation.

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[20] International Advanced Research Journal in Science, Engineering and Technology Vol. 7, Issue 12, December 2020 DOI 10.17148/IARJSET.2020.71213 Copyright to IARJSET IARJSET 66 This work is licensed under a Creative Commons Attribution 4.0 International License Literature review on “Hybrid temperature sensing and monitoring system with built-in sanitizer” Navin Kumar H.G1, Navya S2, Pratima Agnihotri3, Pratima V Kashyap4, P.N Sudha5.

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