IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

# Temperature and Mask Scan Entry System

N.Saibabu[1], P. Chandra Shekar[2], R.Dineshreddy[3], K.Snehalatha[4]

(Assistant Professor [4], ECE Students [1,2,3])

Department of Electronics and Communication Engineering, JB institute of engineering and technology, Bhaskar Nagar, Moinabad, Hyderabad, Telangana, 500075, India

**Abstract:**

The main aim of the project is to build a Raspberry pi based safety device for covid-19 safety rules to reduce the disease spread. We focus on most common indoor measurement system to allow the people. This project makes a use of MLX90614 contactless temperature sensor to detect the body temperature and pi camera, openCV to detect the mask whether the person is wearing a mask or not. We introduce an affordable COVID-19 indoor safety system. All modules and sensor are interfaced to the raspberry pi3 processor.

**Keywords:**

Raspberry pi3 Processor, MLX90614, Pi camera, LCD display, DC motor along with motor driver, Buzzer.

## 1. Introduction:

Recently India along with almost all big and small countries stated emergency conditions for the novel coronavirus (COVID-19). Practically, the whole population of the world is under lockdown and people are wearing a mask as suggested by the World Health Organization (WHO).

Precaution is always better than cure. But since there isn't any cure yet available, the only option we are left with is to follow the precautions. And failing to do so may has severe consequences.

Since there is no vaccine yet available in the market, the only way to be safe is by taking precautions. It is suggested to wear a face mask that masks help in slowing down the spread of infection as the virus mainly gets transmitted with the aerosols which come out of an infected person's nose or mouth while coughing or sneezing. Currently, Temperature Checkups are done manually using Contactless Thermometer. Manual Checkups can be Inefficient, Impractical, and Risky.

To solve these problems, we have designed a raspberry pi based contact less body temperature measurement and face mask detector which detects whether the person is wearing a mask or not. We focus on most common indoor measurement system to allow the people in.

For implementation of mask detection using an OpenCV and pi camera interfaced to the Raspberry Pi. **OpenCV** is a cross-platform library using which we can develop real-time computer vision applications. It mainly focuses on image processing, video capture and analysis including features like face detection and object detection.

For detection of person's temperature using contactless IR sensor. The persons pass one by one. In case that person's temperature exceeds average human body, and then raspberry pi3 processor generates signal to lock the door and gives the audible alert through Buzzer. Otherwise, the door is opened to let the person in.

The main controlling device of the project is Raspberry pi3 processor. Here we are using DC

motor as door. The **SD card is** a key part of the **Raspberry Pi**; it provides the initial storage for the Operating System and files. The status of the project will be displays on LCD module. Here we are using two (RED, GREEN) LEDs for working indication of the project.

**2. LITERATURE SURVEY:**

Rehman et al [6] proposed a system that restrict the growth of COVID-19 by finding out people who are not wearing any facial mask in a smart city network where all the public places are monitored with Closed-Circuit Television (CCTV) cameras. While a person without a mask is detected, the corresponding authority is informed through the city network. A deep learning architecture is trained on a dataset that consists of images of people with and without masks collected from various sources. The trained architecture achieved 98.7% accuracy on distinguishing people with and without a facial mask for previously unseen test data. It is hoped that our study would be a useful tool to reduce the spread of this communicable disease for many countries in the world.

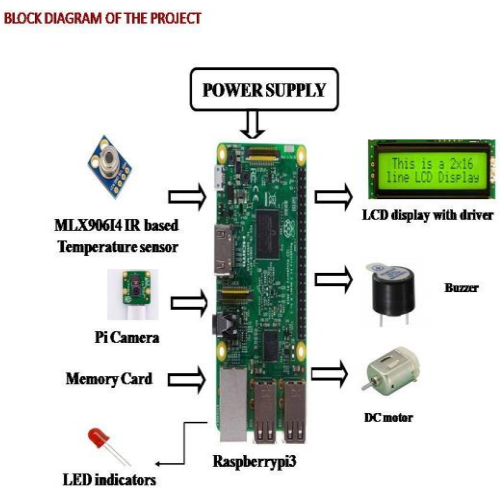
Toshanlal Meenpal et al [7] designed in such a way that it use a binary face classifier which can detect any face present in the frame irrespective of its alignment. We present a method to generate accurate face segmentation masks from any arbitrary size input image. Beginning from the RGB image of any size, the method uses Predefined Training Weights of VGG – 16 Architecture for feature extraction. Training is performed through Fully Convolutional Networks to semantically segment out the faces present in that image. Gradient Descent is used for training while Binomial Cross Entropy is used as a loss function. Further the output image from the FCN is processed to remove the unwanted noise and avoid the false predictions if any and make bounding box around the faces. Furthermore, proposed model has also shown great results in recognizing non-frontal faces. Along with this it is also able to detect multiple facial masks in a single frame. Experiments were performed on Multi Parsing Human Dataset obtaining mean pixel level accuracy of 93.884 % for the segmented face masks.

Hamidreza et al [8] presented an algorithm for processing infrared images and accomplishing automatic detection and path tracking of moving subjects with fever. The detection is based on two main features: the distinction between the geometry of a human face and other objects in the field of view of the camera and the temperature of the radiating object. These features are used for tracking the identified person with fever. The position of camera with respect to direction of motion the walkers appeared to be critical in this process. Infrared thermography is a remote sensing technique used to measure temperatures based on emitted infrared radiation. This application may be used for fever screening in major public places such as airports and hospitals.

Po-Wei Huang et al [9] developed a Neural Network Regression not only to reduce the error from 0.6 degree to 0.12 degree, which is close to the medical instrument level, but as well to lengthen the valid distance to the range between 50 cm and 100 cm. Furthermore, this study developed an embedded automatic body temperature estimation system which could continuously and unconsciously measure the human temperature in real-time. Integrated with face tracking and fuzzy-control of Pan-tilt unit, the system ensures that human face is focused while measuring. With wireless communication techniques, users can review their physiological Information via App and Web, which is beneficial to remote healthcare.

Nenad Petrović et al [10] proposed a IoT-based system aiming to help organizations respect the COVID-19 safety rules and guidelines in order to reduce the disease spread is presented. It focus on most common indoor measures - people with high body temperature should stay at home, wearing mask is obligatory and distance between persons should be at 11 least 1.5-2 meters. For the first scenario, Arduino Uno microcontroller board with contactless temperature sensor is used, while we rely on Raspberry Pi single-board computer equipped with camera making use of computer vision techniques for other two scenarios. Python version of OpenCV, open-source computer vision library was used for implementation of mask detection and social distance check algorithms.

**3. Implementation:**



### 3.1 Block diagram of Temperature and Mask Scan Entry System

The main controlling device of the project is Raspberry pi3 processor .pi camera, temperature sensor, DC motor, LCD display, Buzzer and RED, GREEN LEDs is interfaced to the raspberry pi processor. The processor continuously read the data from sensor and camera. In case that person's temperature exceeds average human body or if the person does not contain a mask then raspberry pi processor generates signal to lock the door and gives the audible alert through buzzer along with LED indication. Otherwise, the door is opened to let the person in. Mask detection: The processor interfaced with pi camera and opevCV. If the face was detected then mouth and nose detection are further applied to the corresponding camera frame version. In case that image does not contain mouth and nose, it means that person wears mask properly and corresponding door will be opened.

**4. Related Work:**

The brief introduction of different modules used in this project is discussed below:

**4.1. Raspberry pi3 processor:**

Fig: Raspberry pi3

The Raspberry Pi 3 Model B is the latest single-board computer from the Raspberry Pi Foundation. In this version, they've upgraded to a 1.2 GHz 64-bit quad-core ARM processor and added 802.11n Wireless LAN, Bluetooth 4.1 and Bluetooth Low Energy.

Like the previous version (the Pi 2) it has 1 GB of RAM, 4 USB ports, and full HDMI support. The Raspberry Pi 3 also has the same form factor as the Pi 2 (and Pi 1 Model B+).

The Raspberry Pi runs Raspbian and/or NOOBS (both Linux-based operating systems) which boot from the removable SD card. A host of third-party operating systems are also supported, including Ubuntu Mate, Windows 10 IoT Core, and OSMC.

The Raspberry Pi 3 is a credit-card sized computer capable of doing just about anything a desktop PC does. From web surfing and word processing, to playing Mine craft or acting as a media player, the Raspberry Pi's capabilities are extensive. With plenty of graphics processing power, the Raspberry Pi 3 is capable of streaming BluRay-quality video. If you're looking to incorporate the Pi into your next embedded design, the 0.1" spaced 40-pin GPIO header gives you access to 27 GPIO, UART, I2C, SPI as well as both 3.3V and 5V power sources.

Raspberry Pi processor is programmed using embedded 'Linux'. Linux is the best-known and most-used open source operating system. As an operating system, Linux is software that sits underneath all of the other software on a computer, receiving requests from those programs and relaying these requests to the computer's hardware.

**4.2. Pi Camera module:**

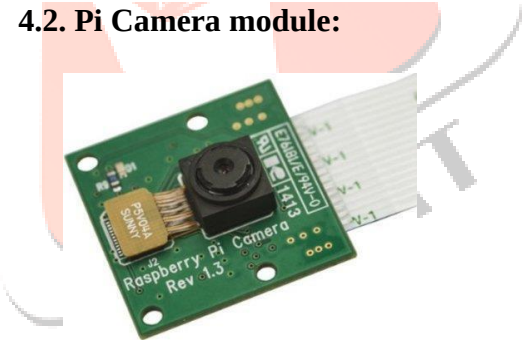



Fig. Raspberry Pi camera module

The Raspberry Pi camera module can be used to take high definition video, as well as stills photographs. The module has a five megapixel fixed-focus camera that supports 1080p30, 720p60 and VGA90 video modes, as well as stills capture. It attaches with a 15cm ribbon cable to the CSI port onto the Raspberry Pi Processor.

### 4.3 MLX90614 IR Based contactless temperature sensor:


Fig: MLX90614 sensor

MLX90614 is a contactless temperature sensor used to measure temperature without touching the object using Infrared Rays. MLX90614 non-contact infrared temperature sensor can measure temperature in the range of -40°C to 380°C. MLX90614 Sensor can measure the temperature of an object which is 2-5 cm for from the sensor. The sensor has a field of view of 90 degrees and returns the average temperature value of all objects within this field of view. The module has an internal 17 bit ADC and DSP which provides high resolution and accuracy.

### 4.3. DC motor:

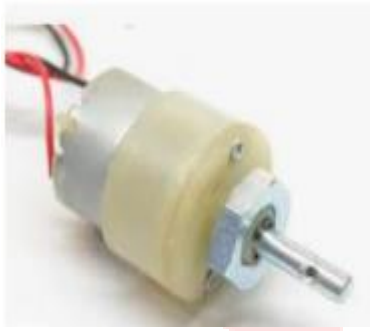


Fig. DC motor

An electric **motor** is an electrical machine which converts electrical energy into mechanical energy. The basic working principle of a **DC motor** is: "whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force". In this project we are using DC motor as a gate.

### 4.4 LCD Display:

One of the most common devices attached to a micro controller is an LCD display. Some of the most common LCD's connected to the many microcontrollers are 16x2 and 20x2 displays. This means 16 characters per line by 2 lines and 20 characters per line by 2 lines, respectively.

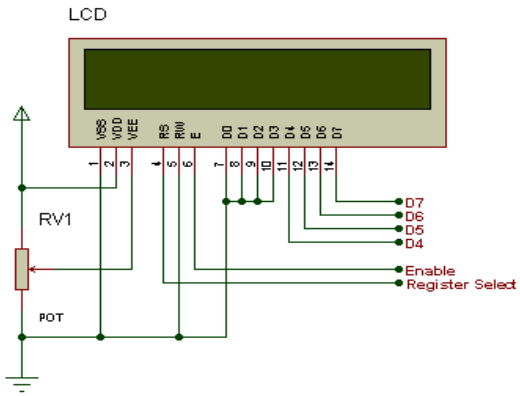



Fig : LCD display

The LCD requires 3 control lines as well as either 4 or 8 I/O lines for the data bus. The user may select whether the LCD is to operate with a 4-bit data bus or an 8-bit data bus. If a 4-bit data bus is used the LCD will require a total of 7 data lines (3 control lines plus the 4 lines for the data bus). If an 8-bit data bus is used the LCD will require a total of 11 data lines (3 control lines plus the 8 lines for the data bus).

### 4.5 BUZZER:

Fib : Buzzer

The vibrating disk in a magnetic buzzer is attracted to the pole by the magnetic field. When an oscillating signal is moved through the coil, it produces a fluctuating magnetic field which vibrates the disk at a frequency equal to that of the drive signal.

### 5. CONCLUSION:

The existing model presents an Integrating feature of all the hardware components which has been used and developed in it with Arduino. The Presence of each and every module has been reasoned out and placed very carefully. Hence the contributing to the best working unit for "**Temperature and Mask Scan Entry System**" has been designed perfectly. Secondly, using OpenCV for mask detection and python language. And also the system able to detects the body temperature without any contact using MLX90614 IR sensor. Based on the temperature and mask the system allow the people. By using

this project we can reduce the spread of the covid19 virus. Thus, the project has been successfully designed and tested.

**6. ACKNOWLEDGEMENT**

We would like to thank all the authors of different research papers referred during writing this paper. It was very knowledge gaining and helpful for the further research to be done in future.

## 7. RESULTS:

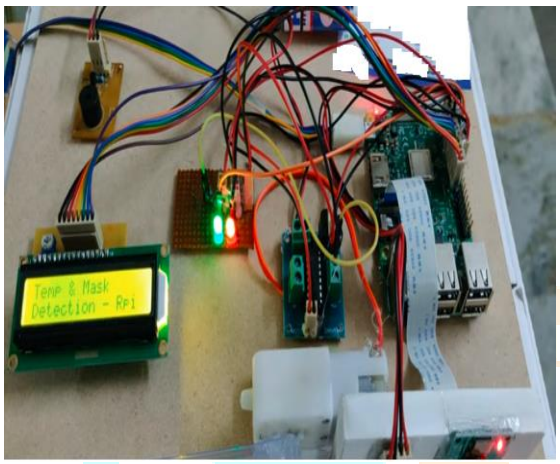



**Fig: 7.1 overall project**

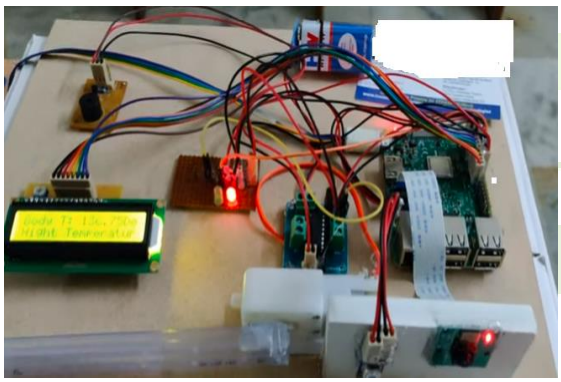


**Fig: 7.2 High temperature alert and gate closed**

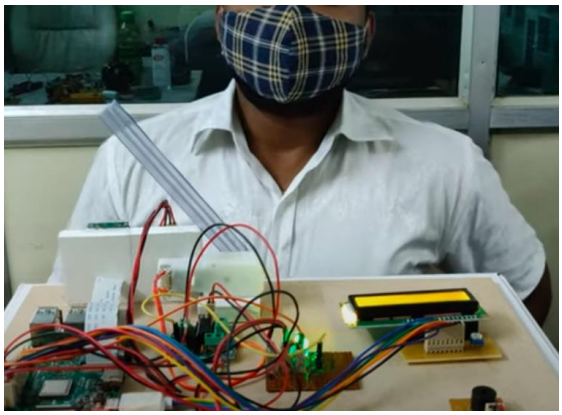


**Fig: 7.3 Temperature normal, Mask detection and gate will be open**

**REFERENCES:**

[1]. Karimpour, N., Karaduman, B., Ural, A., Challenger, M., & Dagdeviren, O. (2019, June). IoT based hand hygiene compliance monitoring. In 2019 International Symposium on Networks, Computers and Communications (ISNCC) (pp. 1-6). IEEE.

[2]. Sorto, A., Marquez, T., Carrasco, A., & Ordoñez, J. (2020, November). Face Recognition and Temperature Data Acquisition for COVID-19 Patients in Honduras. In Journal of Physics: Conference Series (Vol. 1710, No. 1, p. 012009). IOP Publishing.

[3]. Huang, Z., Huang, J., Gu, Q., Du, P., Liang, H., & Dong, Q. (2020). Optimal temperature zone for the dispersal of COVID-19. Science of The Total Environment, 736, 139487.

[4]. Bal, M., & Abrishambaf, R. (2017, March). A system for monitoring hand hygiene compliance based-on internet-of-things. In 2017 IEEE International Conference on Industrial Technology (ICIT) (pp. 1348-1353). IEEE.

[5]. Eddy, Y., Mohammed, M. N., Daoodd, I. I., Bahrain, S. H. K., Al-Zubaidi, S., Al-Sanjary, O. I., & Sairah, A. K. (2020). 2019 Novel Coronavirus Disease (Covid-19): Smart Contactless Hand Sanitizer-Dispensing System Using IoT Based Robotics Technology. Revista Argentina de Clínica Psicológica, 29(5), 215.

[6]. Mohammad Marufur Rahman, Md. Motaleb Hossen Manik, Md. Milon Islam, Saifuddin Mahmud, Jong-Hoon Kim, “An Automated System to Limit COVID-19 Using Facial Mask Detection in Smart City Network”, IEEE Xplore, 18 Octobre 2020.

[7]. Toshanlal Meenpal, Ashutosh Balakrishnan, Amit Verma, “Facial Mask Detection using Semantic Segmentation”, 4th International Conference on Computing, Communications and Security (ICCCS) 2019.

[8]. Hamidreza Fallah-Haghmohammadi, Dan-Sorin Necsulecsu, “Fever Detection for Dynamic Human Environment Using Sensor Fusion”, IEEE 2017 .

[9]. Po-Wei Huang, Tzu-Hsuan Chang, Meng-Ju Lee1, Tzu-Min Lin2 , Meng-Liang Chung, Bing-Fei Wu, “An Embedded Non-Contact Body Temperature Measurement System with Automatic Face Tracking and Neural Network Regression”, International Automatic Control Conference (CACS), 09 November 2016.

[10]. Nenad Petrović and Đorđe Kocić, “IoT-based System for COVID-19 Indoor SafetyMonitoring”, Conference Paper, 20 September 2020.

[11]. Enerst Edozie, Wantimba Janat, Zaina Kalyankolo, “Design and Implementation of a Smart Hand Sanitizer Dispenser with Door Controller using ATMEGA328P”, International Journal of Engineering and Information Systems (IJEAIS), Volume: 04 Issue: 6 June 2020.