

OPTIMIZED SENSING FOR TEMPERATURE DETECTION AND AS A POSSIBLE APPLICATION FOR COVID SYMPTOM DETECTIN

Sree Ram Sai Nikhil, Varada Harsha sai naga Venkat, kambham Gunavardhan , velishala Nikhil, Shaik Ameen Pasha Dr Sanjay kumar Sahu

School of Electrical and Electronics Engineering , Lovely Professional University.

Abstract:

The outbreak of Coronavirus disease 2019(COVID-19) caused by severe acute respiratory system(SARS) coronavirus 2 (SARA-CoV-2), and its associated coronavirus disease has gripped the entire international community and caused widespread public health concerns. Despite global efforts to contain the disease spread , the outbreak is still on a rise because of the community spread pattern of this infection. This is zoonotic infection diseases to detect this diseases we developed a project to detect the covid-19 by reading temperature . A temperature and PIR sensor are implemented to detect the motion of the person and temperature reading($\geq 100F$) it will detect and the detection will appear on the OLED display and the buzzer will activate to alert the security . The buzzer will be enabled for 15 sec .

INTRTODUCTION:-

Coronavirus, SARS-CoV-2, is spreading across the globe. Most of our work focuses on large problems that humanity has faced for a long time, such as child mortality, natural disasters, poverty, and almost 100 other problems. This article focuses on a new, emerging global problem: the ongoing outbreak of the coronavirus disease (COVID-19). The outbreak started in China in late 2019, and by March 2020 the disease has spread to countries around the world. The number of infections appearing each day has since plummeted in China, owing in large part to containment efforts, but the outbreak is now a global pandemic. Large outbreaks in South Korea, Iran, Italy, and elsewhere have propelled a spike in international cases across more than 180 countries. [2]

The burden of respiratory viral infections in the elderly has been highlighted by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) which has infected millions of people worldwide and had unprecedented impacts on healthcare systems and society as a whole [3]. Age has been found to be the biggest risk factor for the development of severe COVID-19. Furthermore, a large United Kingdom (UK) prospective observation study demonstrated that COVID-19 mortality was over 11 times higher in >80 -year-olds than in <50 -year-olds. [4]

The virus was initially transmitted from animals to humans, but is now transmitting rapidly from human to human. As the origin of the disease is China, but through this human-to-human transmission has now reached other countries such as Germany, Iran, France, Thailand, Japan, South Korea, Vietnam, Canada, the United States and other countries [5]. Suspected patients with coronavirus respiratory syndrome infection should be hospitalized in isolation units to prevent transmission [6]. After the first outbreak, secondary cases were reported after approximately ten days. In addition, new patients had no contact with the seafood market and had only a history of contact with humans [7]. Data on people under 18 years of age indicate that infection is relatively low in these individuals. The prevalence of infection in this age group is 2.4%. [8]

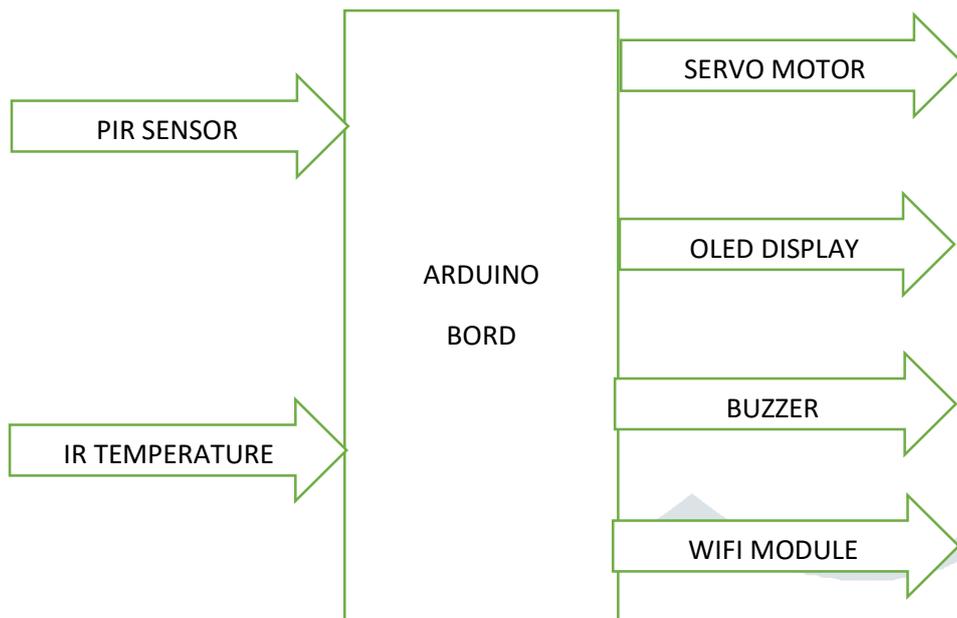
BLOCK DIAGRAM:-

Fig.1 block diagram

→INPUT:-PIR SENSOR , IR TEMPERATURE SENSOR

→OUTPUT:-OLED DISPLAY,SERVO MOTOR,BUZZER,WIFI MODULE

As shown in the above fig 1 block diagram the power supply will given to the Arduino and the inputs pir sensor will detect the motion of a person and IR temperature sensor will read the temperature of a person and send the reading to the Arduino . if the temperature was less than 99.6 then a “ you can go ” statement will display on the OLED display then the servo motor will open the door . if the temperature was above 99.6 then the “you are not allowed ” will display on OLED display and servo motor will stop working and then buzzer will start giving signal to the security officer and alert him.

The wifi module will send the data to the THINGSPEK cloud and at last we will get the result of the process.

ORGANISATION: -

This model is prepared in the following manner such as by discussing the total connections between the components

By keeping the main objective of the model which is useful for the world
Explains the realization of the objective

Realization And Representation of Objectives:-**ALGORITHM:-**

- 1) Detect the Human Entrance using PIR sensor .
- 2) If Human Entrance is Detected , then with the help of IR sensor , Detect the temperature of the person.
- 3) If the temperature is normal (<99F) then the Door will be opened.
- 4) If the temperature is high (>99F) then the buzzer will be enabled and the alerts the nearby security officer and door will not be opened.
- 5) All the temperature readings will be updated in Thingspeak website in the realtime.
- 6) After sometime(10s) the system will again start from the step(1)

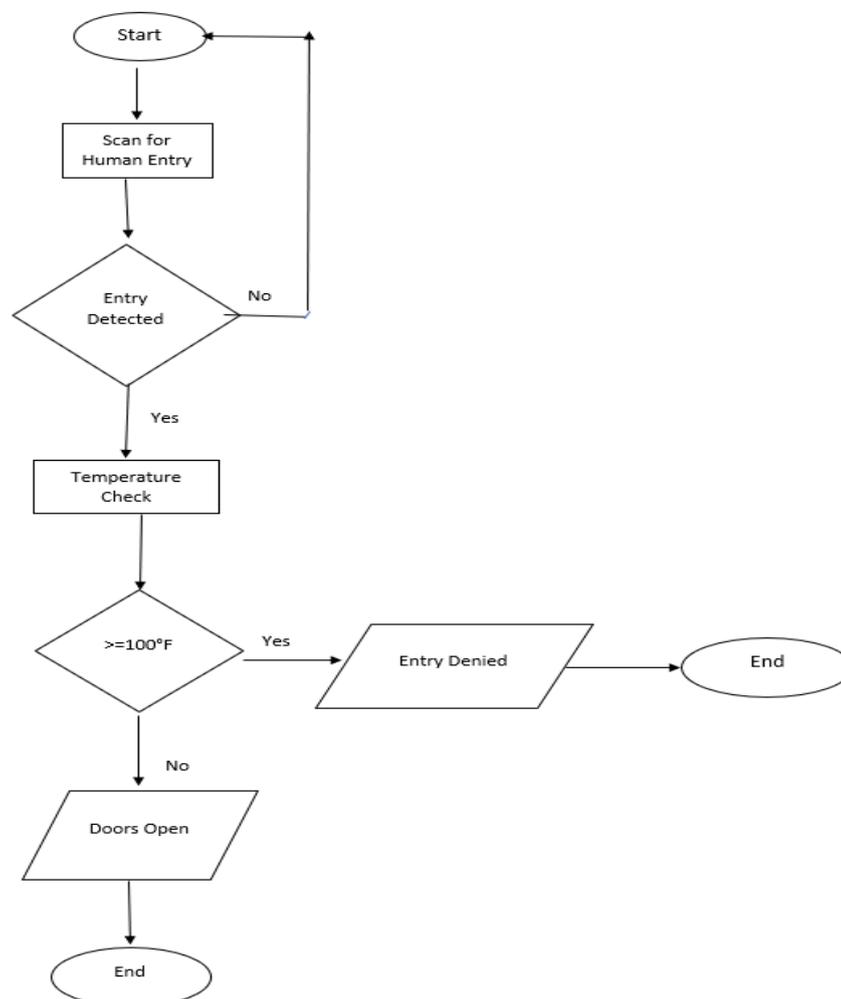
FLOW CHART:-

Fig 2:flow chart of optimized sensing for temperature detection and as a possible application for covid symptom detection

HARDWARE COMPONENTS :-

Arduino
 PIR Sensor (Pyroelectric Infrared Sensor)
 IR temperature sensor
 Servo motor
 Wifi- Module
 OLED Display
 Buzzer

a) Arduino

Arduino/Genuino Uno is a microcontroller board based on the ATmega328P. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16MHz quartz crystal, a USB connection, a power jack, an ICSP header and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started. Every Arduino board needs a way to be connected to power source. The Arduino UNO can be powered from a USB cable coming from computer or a wall power supply that is terminated in a barrel jack

The pins on your Arduino are the places where you connect wires to construct a circuit. They usually have black plastic headers that allow you to plug a wire into board. The Arduino has several different kinds of pins, each of which is labelled on the Board and used for Functions. [9] You can tinker with your UNO without worrying too much about doing something wrong. In the worst case scenario, you can replace the chip for a few bucks and start over again.

"UNO" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Open-Source Arduino Software (IDE) makes it easy to write code and upload it to the board. This Software can be used with any Arduino Board. [10] The boundary between an IDE and other parts of the broader software development environment is not well-defined; sometimes a version control system or various tools to simplify the construction of a graphical user interface (GUI) are integrated. Many modern IDEs also have a class browser, an object browser and a class hierarchy diagram for use in object-oriented software development. [12] The Uno board and version 1.0 of Arduino Software (IDE) were reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards. [13]

b) PIR Sensor

A PIR Sensor is an electronic sensor that measures the light from radiating objects in point of view. The sensors allow us to sense the motion when the objects are moved in or out of the sensor range. By using this sensor, the power consumption and expenses are very low. They are most often used in PIR-based motion detectors. PIR sensors are commonly used in security alarms and automatic lighting applications. [14] The PIR sensor itself has two slots in it, each slot is made of a special material that is sensitive to IR. The lens used here is not really doing much and so we see that the two slots can 'see' out past some distance (basically the sensitivity of the sensor). When the sensor is idle, both slots detect the same amount of IR, the ambient amount radiated from the room or walls or outdoors.

When a warm body like a human or animal passes by, it first intercepts one half of the PIR sensor, causing a positive differential change between the two halves. When the warm body leaves the sensing area, the reverse happens, whereby the sensor generates a negative differential change. These change pulses are what is detected. [15]

PIRs come in many configurations for a wide variety of applications. The most common models have numerous Fresnel lenses or mirror segments, an effective range of about 10 meters (30 feet), and a field of view less than 180°. Models with wider fields of view, including 360°, are available, typically designed to mount on a ceiling. Some larger PIRs are made with single segment mirrors and can sense changes in infrared energy over 30 meters (100 feet) from the PIR. There are also PIRs designed with reversible orientation mirrors which allow either broad coverage (110° wide) or very narrow "curtain" coverage, or with individually selectable segments to "shape" the coverage. [16]

c) IR Temperature

The MLX90614 is an infra-red thermometer for non-contact temperature measurement. It consists of two chips: one is an infrared radiation detector and the other is ASSP (Acoustics Speech and Signal Processing) which is a signal conditioner; it is used for processing the infrared sensor output. It has an amplifier of signal noise, an analog-to-digital converter of 17 bits and a potent DSP component, and all these components provide the exactness and high degree of this thermometer. It is mounted with 10-bit PWM (Pulse Width Modulation) which constantly sends out the calculated temperature in the assortment of -20°C to 120°C by providing a resolution of 0.14°C. [17]

d)OLED Display

An organic light emitting diode(OLED) is a light emitting diode (LED). OLED is controlled by SSD1306 OLED Driver . it can communicate with the microcontroller using I2C interface.

Regardless of the OLED module , the SSD1306 driver has a built in 1KB graphic display Data RAM (GDDRAM) for the screen which holds the bit pattern to be displayed . This 1K memory area is organized in 8 pages(from 0 to 7). Each page contains 128 columns/segments and each column can store 8 bits of data .Each bit represents particular OLED pixel on the screen which can be turned ON or OFF programmatically. We use OLED Display to display the information .[18]

e)Servo motor

A servomotor is a simple electric motor, controlled with the help of servomechanism. This type of motor consists of a control circuit that provides feedback on the current position of the motor shaft, this feedback allows servo motors to rotate with great precision . We use servo motor if we want to rotate an object at a specific angle.

Servo Motor is a closed loop system where it uses a positive feedback system to control motion and the final position of the shaft. Servo motors are controlled by sending an PWM signal through the control wire. The PWM sent to the servo determines the position of the shaft and based on the duration of the pulse sent via the control wire, the servo will turn in the desired direction.[19]

6)ESP8266 Wi-fi Module:

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Working

*Arduino UNO board is the heart and brain of this project. The PIR sensor, IR Temperature sensor, OLED Display, Wi-Fi module are connected to this Arduino board.

*Firstly, we will place the PIR sensor right above the middle of the door. The PIR sensor is used to detect the human motion. Whenever the person will stand in front of door, the PIR sensor will send HIGH value to the Arduino Board.

*As soon as PIR sensor detects the human entry, the Arduino Board will enable the MLX90614 Contactless IR Temperature detection Sensor to detect the temperature of the person standing in front of door.

*The temperature detected by the Contactless IR sensor will be sent to the Thingspeak server through the Wi-Fi module connected to the Arduino Board.

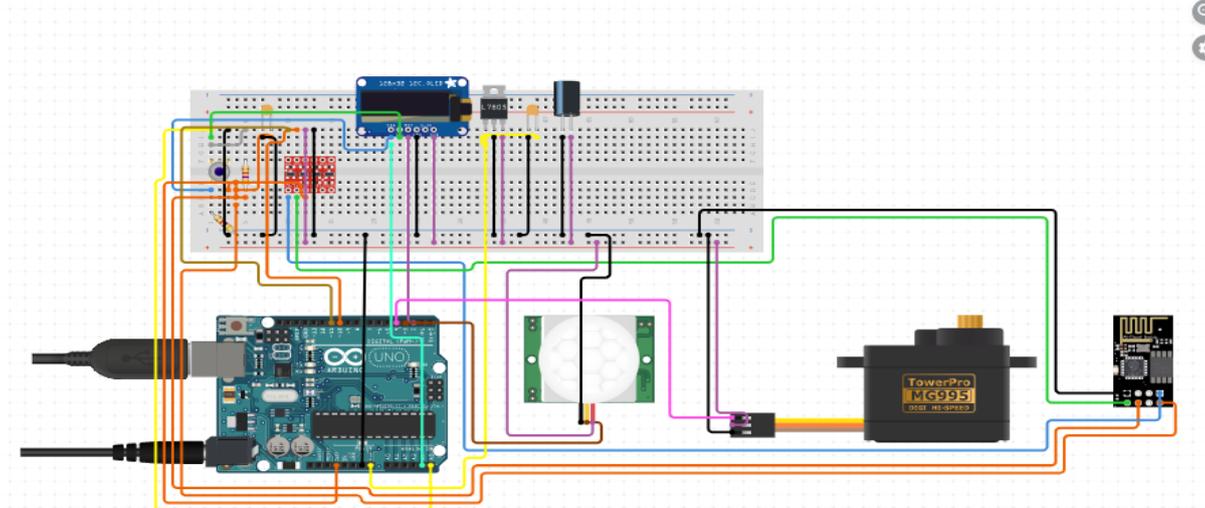
*If the temperature of person standing in front of door is less than 100°F then the Arduino board will start the Servo Motor to open the door for entry.

If the temperature of person standing in front of door is more than or equal to 100°F, then the Arduino Board will activate the Buzzer to alert the nearby security officer. The buzzer will be enabled for 15 seconds.

After 15 seconds the program will start again.

The entire process will be completed within 30 seconds of duration.

The entire readings of Temperature sensor can be monitored remotely from Thingspeak server.



Conclusion:-

The main motive of our project is to reduce the life's of people who are effected with covid-19 .This project will help the government to identify the people who are effected with covid-19 symptoms and it doesn't require any tupe of manpower and it is done at the low cost . The automatic detection system will save the life of the people who are working as the security officers and lot of people and their family too. We can use this system at everywhere like airport, shopping mall ,temples etc.. and this low cost project will also help's the government to save the money . it will help the world to move forward in the feature if we all humans are effected with another virus like as Covid-19 the common symptoms is fever to detect that fever with out manpower . we hope our research will take a great step towards this project. We have developed a business model with a detailed cost analysis of preferred technological option.

References:-

- [1] Coronavirus Disease 19(covid-19) :Implications Clinical Dental Care :JOURNAL OF ENDODONTICS
Amber Ather, BDS,DDS , Biraj Patel BDS, Nikita B. Ruparel,MS,DDS,PhD.
Anibal Diogenes , DDS,MS,PhD Kenneth M.Hargreaves ,DDS,PhD
Published :April 06,2020
- [2] Nasir Mustafa, Istanbul Gelisim University, Turkey.
- [3] McKinnon, T, Watson, A, Richards, L, et al. The Volunteers in Research Programme: supporting COVID-19 research and improving medical training in parallel. Clinical Medicine
- [4] Docherty, AB, Harrison, EM, Green, CA, et al. Features of 20 133 UK patients in hospital with covid-19 using the ISARIC WHO clinical characterisation protocol: prospective observational cohort study. BMJ 2020; 369: m1985.
- [5] Ralph R, Lew J, Zeng T, Francis M, Xue B, Roux M, et al. 2019-nCoV (Wuhan virus), a novel Coronavirus: human-to-human transmission, travel-related cases, and vaccine readiness. Journal of infection in developing countries. 2020;14(1):3-17.
- [6] Bleibtreu A, Jaureguiberry S, Houhou N, Boutolleau D, Guillot H, Vallois D, et al. Clinical management of respiratory syndrome in patients hospitalized for suspected Middle East respiratory syndrome coronavirus infection in the Paris area from 2013 to 2016. BMC Infectious Diseases. 2018;18(1):331.
- [7] Riza S, ErdoganAysegul, AgaogluPelin M, DineriYeliz, Yusuf C, SenelMahmut E, et al. 2019 Novel Coronavirus (COVID- 19) Outbreak: A Review of the Current Literature. EJMO. 2020;4(1):1-7.
- [8] Report of the WHO-China Joint Mission on Coronavirus Disease 2019 (COVID-19) 16-24 February 2020.
- [9] <https://learn.sparkfun.com/tutorials/what-is-an-arduino/all>
- [10] <https://www.arduino.cc/en/software>
- [11] https://en.wikipedia.org/wiki/Integrated_development_environment.
- [12] [Arduio.cc/en/pnwiki.php?n=Main/arduinoBoardUno](https://www.arduino.cc/en/pnwiki.php?n=Main/arduinoBoardUno)

- [13] [https://en.wikipedia.org/wiki/Passive_infrared_sensor#:~:text=A%20passive%20infrared%20sensor%20\(PIR,alarms%20and%20automatic%20lighting%20applications.](https://en.wikipedia.org/wiki/Passive_infrared_sensor#:~:text=A%20passive%20infrared%20sensor%20(PIR,alarms%20and%20automatic%20lighting%20applications.)
- [14] <https://learn.adafruit.com/pir-passive-infrared-proximity-motion-sensor/how-pirs-work>
- [15] https://en.wikipedia.org/wiki/Passive_infrared_sensor#Operation
- [16] [theengineeringprojects.com publish:05/2019 introduction -of-mlx90614.html](https://theengineeringprojects.com/publish/05/2019/introduction-of-mlx90614.html)
- [17] electronicwings.com/sensors-modules/ssd1306-oled-display
- [18] circuitdigest.com/article/servo-motor-working-and-basics
- [19] sparkfun.com/product/17146
- [20] [circuits making-https://www.circuits.io/](https://www.circuits.io/)

