

# Thermal Controlled Contactless Smart Door System and Touchless Sanitizer

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**Abstract:** The COVID-19 pandemic has pushed us to accept certain changes and has made us more vigilant. With no infection specific and evidence-based remedy available as yet with all public places opening, prevention is only option we are left with. Sanitizers have become the most significant commodities right now. By the new rules and regulations given by WHO vigorous sanitization is needed to survive. The paper gave the solution for the problem stated. The paper introduces an automatic hand sanitizer and temperature sensing system, to keep the hand sanitized whenever a person wants to do it, without a contact with the sanitizing machine. The temperature sensor on touching gives the body temperature of the person. If the body temperature is normal then the door is automatically opened else the door will remain closed.

**Keywords:** Thermal Sensor, MLX90614, HC-SR04, microcontroller, I2C protocol, COVID19.

## I. INTRODUCTION

The COVID - 19 pandemic has changed the human existence. This paper alludes to building a keen gadget which assists with playing out a contact less temperature detecting entryway opening framework. This decreases the reliance of individuals on the watch and guarantees the wellbeing of the watchmen and furthermore accelerates the cycle. This paper expects to give the detail clarification of contact less entryway opening instrument and the advantages of utilizing something similar. The design depicted shows the preventive measure that can be taken during the COVID-19 pandemic in the whole world.

Since the time the lockdown has been lifted, individuals have begun voyaging and gauges have been taken to stop the spreading of the contamination. Social removing and temperature screening are being received all over the place. The temperate screening is at present being done physically and there is a high possibility of cross disease. In places where huge number of individuals venture to every part of the manual framework can't be overseen effectively and it is a burden. Besides, manual temperate screening requires human force and there is likewise a danger that the individual leading the temperature screening may get contaminated. This paper provides solution to this issue.

Rest of the paper is organized in the following Sections. Section II provides the relevant literature review and problem statement and objectives of this paper. Section III explains about the experimental work, Methodology and result discussion. Section IV focuses on the Conclusion and some future work directions

## II. LITERATURE REVIEW

Automatic entrance/exit door control is widely used in public places such as grocery stores, businesses, transportation stations, airports, and wholesale department stores to eliminate the need of manually opening and closing actions. Contemporary sensor-based automatic door control technologies include infrared, ultrasonic/radio, or other wireless sensing methods.

[1]-has reported "Temperature Detection and Automatic Sanitization and Disinfection Tunnel-COVID 19" They have implemented this system using In our paper we designed and implemented an efficient temperature detection and sanitization that can function in an automated way using Arduino UNO. The experimental results were tested for different values of temperatures and found working with good accuracy. [2] has reported "Automatic opening and closing of door." They implemented system using PIC(16F72) and PIR sensor. [3]-has reported "Motion Based Automatic Garage Door Opener" This project gave an insight into designing of an automated door just by using IR sensors This helped in reducing the cost spent in construction of automated doors.

After the relevant literature review, the need of contactless sanitizer and door opener is understood. The pandemic situation relies on a contact less temperature estimating and door (gate) access framework utilizing the MLX90614 sensor alongside Arduino. Consequently limiting the dangers of spread of infection utilized in the current strategies for screening. The MLX90614 sensor utilizes IR energy to recognize the temperature of an person. The framework is easy to understand. Carrying out this framework in air terminals, rail route stations, shopping centers and different spots assists the client with confining the section of the individual having fever and keeping away from the conceivable spread of contamination.

While implementing the system some assumptions were made as follows:

- It is assumed the ultrasonic sensor is mounted in such a way that it will detect the arrival of a person.
- There is a suitable delay between successive temperature measurement cycle.
- The person stands close to sensor to perform the function.

### III. METHODOLOGY AND RESULTS DISCUSSION

In the case of the COVID-19 (Corona Virus Disease) pandemic, the most important preventive steps for good health and hygiene are to wash hands and sanitize them with alcohol sanitizers. The smart door thermal scanner with touch less sanitizer is a technique that can be used before and after a pandemic. Nowadays, in shopping centers, factories, and other places these systems are implemented. Figure 1 provides the block diagram of the system. The system is comprised of three modules as discussed in the following subsection. The first module is automatic sanitizer by sensing the person. Second module is for checking the temperature using touch less thermal sensor and third module is decisioning about the door opening. The same has been represented in the flowchart given in Figure 2. The communication between thermal sensor and ATMEGA 328 is through the I2C communication. The details of the modules are given in the following subsections:

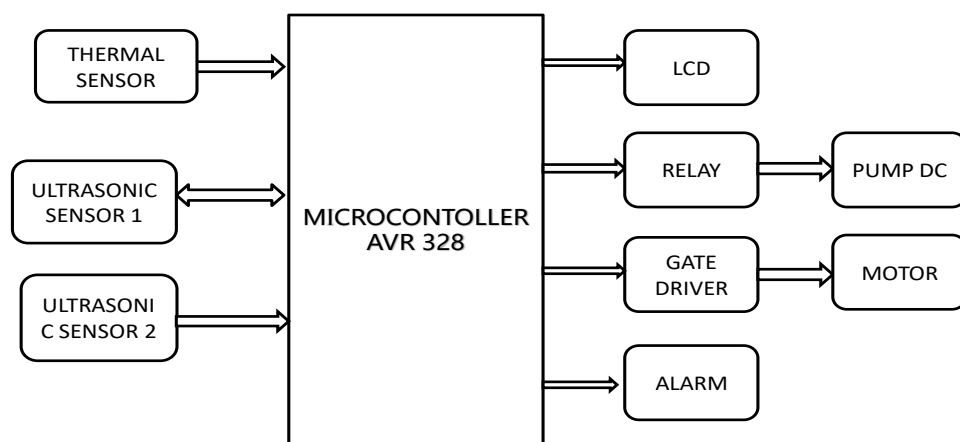


Fig.1. Block diagram of the system

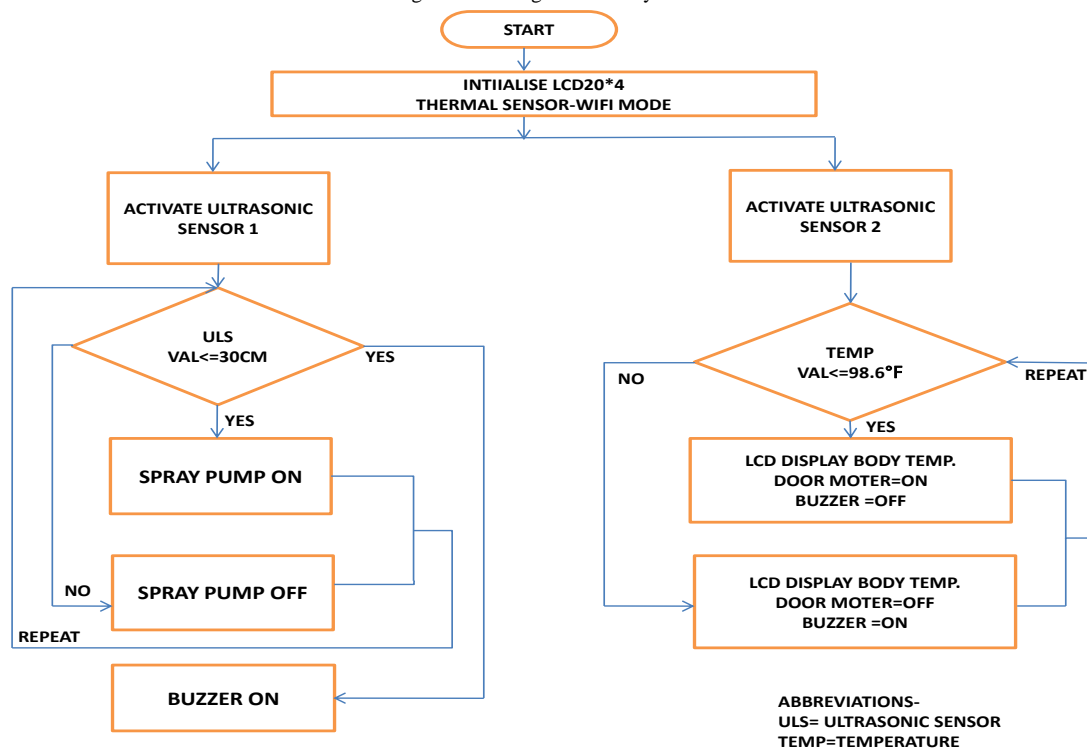


Fig.2. Process Flow

**A. Human Presence Detection System:** This subsystem comprises of a HC-SR04 ultrasonic sensor which is utilized here to measures distance. HC-SR04 Ultrasonic sensor is a 4pin module, whose pin names are VCC, trigger, reverberation and ground separately. The module has two eyes projecting in the front which frames the Ultrasonic Transmitter and Receiver. By the assistance of this sensor we can gauge the distance of the article set in the scope of the sensor. The transmitter communicates a ultrasonic rush of known speed, this wave goes in air and when it gets protested it is reflected back towards the sensor which is gotten by the reverberation of the sensor. The microcontroller continues to send a heartbeat to the trigger pin of the sensor. On the falling edge of the beat the sensor begins transmitting the ultrasonic sound waves. These sound waves skip back when they hit the item and is detected by the reverberation (recipient) of the sensor. The reverberation pin of the sensor conveys back a heartbeat message to the microcontroller which makes some ON memories equivalent to the time taken by the waves to travel and ricochet back. By estimating the beat on schedule, we can ascertain object distance. Further by distinguishing the adjustment of the distance we can detect a passage of the individual. Thus, at whatever point an individual enters the microcontroller turns on the temperature sensor for additional activity by showing a message requesting that the individual face towards the temperature sensor.

At the point when no passage is detected the temperature sensor (MLX90614) is set to control saving mode by the microcontroller.



Fig.3. Ultrasonic Sensor to Detect Human Presence

**B. Temperature Measurement System:** Contactless temperature estimation should be possible by the MLX90614 sensor. It has two devises inserted in it, one is the infrared thermopile finder (detecting unit) and the other is a sign molding DSP gadget (computational unit). It works bases on Stefan-Boltzmann law which expresses that all articles produce IR energy and the force of this energy will be straightforwardly relative to the temperature of that object. The detecting unit estimates the amount IR energy is discharged by an objective item and the computational unit changes over it into temperature esteem utilizing an implicit ADC and yields the information through I2C correspondence convention. With the joining of on chip ADC, it requires insignificant outside hardware and possess negligible PCB territory. The sensor utilizes both the article temperature and the encompassing temperature to align the item temperature esteem. It works with a 5V stock. It can quantify object temperatures in the reach -  $70^{\circ}\text{C}$  to  $380^{\circ}\text{C}$  and the surrounding temperature in the reach -  $40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  with an exactness of  $0.5^{\circ}\text{C}$  and a goal of  $0.02^{\circ}\text{C}$ . The framework estimates the temple temperature of the individual and sends it to the microcontroller through SDA pin of the sensor utilizing I2C convention. The MLX90614 has an on-chip RAM where the deliberate worth is put away and it has EEPROM whose pieces can be modified to set the method of the sensor.

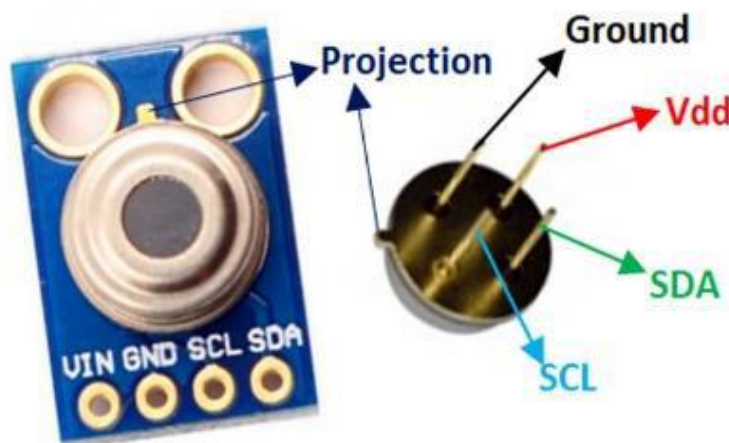


Fig.4. Temperature sensor MLX90614

**C. I2C Protocol:** This convention utilizes two-line SDL and SCL, one for the clock and another is for information transmission at whatever point the microcontroller conveys the clock message through SCL. To recognize the gadgets associated it sends the location pieces to the specific gadget which is required. The location is 7 digit long and the last eighth bit is utilized to show peruse or compose activity. The microcontroller sends a compose order to begin a temperature perusing of the individual before

the sensor. The sensor stores the deliberate worth in the RAM. The RAM address must be perused and can't be modified by the client. At that point the microcontroller conveys a read message to peruse the deliberate worth. The EEPROM locations can be composed by the microcontroller to pick the working method of MLX90614.

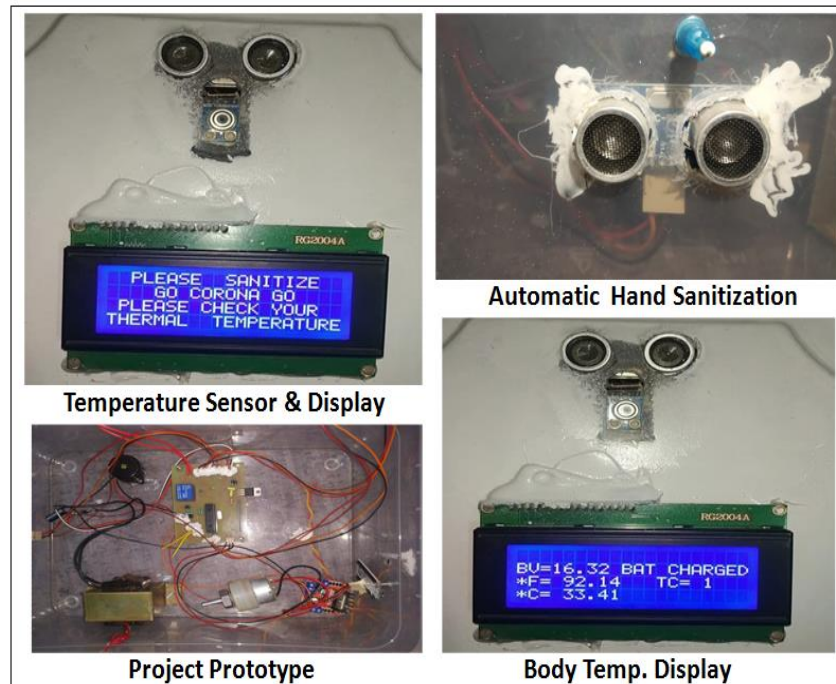


Fig. 5: The Framework for the System

**D. Automatic Door Access:** The microcontroller performs computations on the temperature estimated and it either allows the entryway access by conveying fitting message to the entryway hardware, or denies the entrance by showing a message and ringing a caution. The entire framework that was implemented is as shown in Figure 5.

#### IV. CONCLUSION

The COVID-19 pandemic is considered as the most critical worldwide wellbeing disaster of the century and the best test that the mankind looked since the Second World War. The normal side effects of disease are Fever and if a temperature screening is done the conceivable spread of the infection can be controlled partly. This framework empowers a completely programmed contactless temperature evaluating for a door (gate) access. Right now the temperature screening is done physically and it not just turns out to be exceptionally troublesome with regards to enormous scope yet there can be carelessness of the gatekeepers as well. In places like air terminals, rail line stations and metro stations a large number of individuals show up and leave which are focal points for spreading of infection. In the event that the computerized temperature screening measure is utilized in such spot, it makes the screening cycle quick as well as stops the conceivable spread of contamination generally. This framework can likewise be carried out in the shopping centers, film, and grocery store and so forth. This framework can be implanted into previously existing programmed entryways (glass entryways) with an extremely less adjustments. The manual framework wherein observing was required, required heaps of cash to keep up and were costly, utilizing the above framework the clients can reduce the expense and reliance on the manual framework.

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