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CONTACTLESS TEMPERATURE SENSOR WITH DOOR ACCESS

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Abstract. The goal of this project is to build a project for monitoring the temperature of the person, Conventional doors usually consist of key housing and a key saddle to open it in the current pandemic situation that has arisen due to disease spreading, so every human being is required to take precautions such as wearing a mask, keeping a distance, washing hands, not touching anything if not unnecessary. Research method literature study, collection of supporting materials and tools, program Design and Realization, testing and Analysis of program Results, making final Report. The automatic door control system with a body temperature sensor is a prototype made to prevent the spreading of diseases like covid-19 by reducing direct physical contact that is spread through droplets attached to conventional door knobs. Technology can be implemented in crowded areas such as shopping malls, offices, and restaurants that are placed in indoor areas that are not exposed to direct sunlight. The COVID-19 pandemic outbreak has made it necessary to take visitors' temperatures to check for fever before they enter the city through airports, train stations, or even at toll booths on the highway. Before allowing guests entrance, thermal screening is necessary at supermarkets, multiplexes, shopping centers, and several other locations. Manual testing carries the danger of cross-infection. A high-performance infrared temperature sensor called the MLX90614 can be used to assess the temperature automatically and determine whether to open the door. The three subsystems that make up the bulk of this article are the Human Presence Detection System, the Temperature Measurement System, and the automatic door access control with display.

Keywords-Temperature sensor, Automatic door control, covid-19, Microcontroller, MLX90614.

1. INTRODUCTION

In today's era, Disease control is the implementation of various measures and strategies to prevent, manage, and contain the spread of infectious diseases within a population. It involves the use of different tools such as vaccination, quarantine, contact tracing, isolation, public health education, and early detection and treatment of infected individuals. Disease control is important to limit the impact of outbreaks and epidemics, and to protect the health and well-being of individuals and communities. The process of disease control involves collaboration between healthcare professionals, government agencies, public health organizations, and community members. The specific strategies used to control diseases may depend on factors such as the type of disease, the mode of transmission, and the demographics of the affected population. Disease control is an ongoing process that requires continuous monitoring, assessment, and adaptation of strategies as the situation evolves. The development of science and technology plays an important role in human civilization. With the increase in knowledge and technology that is mastered or applied, it is hoped that humans can improve overall welfare, although a negative impact always appears

along with human technological advances. Effective disease control efforts have led to significant reductions in the incidence and mortality of infectious diseases globally. However, challenges remain, such as emerging infectious diseases, increasing antimicrobial resistance, and inequalities in access to healthcare services. Disease control efforts are crucial to ensuring the health and well-being of individuals and communities and are a priority for governments and public health organizations worldwide. The strategies employed in disease control depend on factors such as the type of disease, the mode of transmission, and the demographics of the affected. population. On-going monitoring, assessment, and adaptation of strategies are critical to the success of disease control efforts. While significant progress has been made in reducing the incidence and mortality of infectious diseases globally; new challenges continue to emerge, including emerging infectious diseases and increasing antimicrobial resistance. Disease control remains a crucial priority for governments and public health organizations worldwide to ensure the health and safety of individuals and communities Effective disease management and prevention measures are critical to maintaining good health and quality of life. These can include vaccinations, medications, lifestyle changes, and environmental interventions. Early detection and treatment of diseases are also important in preventing complications and reducing the risk of long-term disability or death.

Many different types of diseases can affect humans, including infectious diseases, chronic diseases, autoimmune diseases, genetic disorders, mental health disorders, and lifestyle diseases. Understanding the causes and symptoms of diseases can help individuals take steps to prevent them or seek appropriate treatment when necessary.

1.2 DISEASE

Disease refers to an abnormal condition or disorder that affects the body or mind of an organism, resulting in impaired functioning of the affected system or organ. Diseases can be caused by a variety of factors, including infectious agents such as bacteria, viruses, and parasites, genetic mutations, environmental factors, and lifestyle choices.

Infectious diseases:

These are diseases caused by microorganisms such as bacteria, viruses, fungi, and parasites, and can spread from one person to another. Examples include the flu, HIV/AIDS, tuberculosis, malaria, and COVID-19.

Chronic diseases:

These are long-term diseases that often develop over time and can be caused by a combination of genetic, environmental, and lifestyle factors. Examples include heart disease, diabetes, cancer, and chronic obstructive pulmonary disease (COPD).

1.3 TYPES OF DISEASE

There are many types of diseases, and they can be classified in different ways based on various factors, including their causes, symptoms, and how they affect the body.

Autoimmune diseases: These are caused by the immune system attacking healthy cells and tissues in the body. Examples include rheumatoid arthritis, lupus, multiple sclerosis, and type 1 diabetes. Neurological diseases: These affect the nervous system and can cause problems with movement, sensation, and cognition. Examples include Alzheimer's disease, Parkinson's disease, epilepsy, and multiple sclerosis.

Cardiovascular diseases:

These affect the heart and blood vessels and can lead to heart attacks, strokes, and other complications. Examples include hypertension, coronary artery disease, and congestive heart failure. Respiratory diseases: These affect the lungs and respiratory system and can cause breathing problems. Examples include asthma, chronic obstructive pulmonary disease (COPD), and pneumonia. Mental health disorders: These affect mental and emotional well-being and can cause a range of symptoms like anxiety, depression, bipolar disorder, and schizophrenia.

1.3.1 COMMUNICABLE DISEASE

Communicable diseases, also known as infectious diseases, are illnesses caused by microorganisms like bacteria, viruses, fungi, or parasites that can spread from one person to another or from animals to humans. The transmission of communicable diseases can occur through various means, including direct contact, contaminated food or water, or through the air. Preventing the spread of communicable diseases involves measures such as vaccination, regular hand washing, covering your mouth and nose when coughing or sneezing, avoiding close contact with sick individuals, and properly cooking and handling food. Treatment may include medications, isolation or quarantine, and supportive care to manage symptoms and prevent complications.

1.3.1.1 COVID-19

Coronaviruses (CoV) are a large family of viruses that cause illnesses ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS-CoV) and Severe Acute Respiratory Syndrome (SARS-CoV). A novel coronavirus (nCoV) is a new strain that has not been previously identified in humans. Coronaviruses are zoonotic, meaning they are transmitted between animals and people. It was first discovered in Wuhan, China, in 2019. However, the World Health Organization (WHO) proclaimed it a pandemic in March 2020, claiming that it has spread throughout the globe like wildfire.

1.3.1.4 HIV/AIDS

Acquired Immune Deficiency Syndrome or better known as AIDS is a life-threatening disease. It is one of the most dreaded diseases of the 20th century. AIDS is caused by HIV or Human Immunodeficiency Virus, which attacks the immune system of the human body. It has, so far, ended more than twenty-nine million lives all over the world. Since its discovery, AIDS has spread around the world like wildfire. The incubation period for AIDS is much longer compared to other diseases. It takes around 0-12 years for the symptoms to appear promptly. A few of the common symptoms of AIDS include fever, fatigue, loss of weight, dysentery, swollen nodes, yeast infection, and herpes zoster. some of the uncommon infections namely persistent fever,

night sweating, skin rashes, lesions in the mouth, and more.

1.3.1.3 MALARIA

Malaria is a common disease in tropical countries where children and pregnant women are the main victims. It is a parasitic infection caused by plasmodium, which can be deadly to these vulnerable sections. As children are more prone to this disease, it is important to create awareness in them. So, this essay on malaria awareness will be beneficial for them to know more about it. The main symptom of malaria is a high fever with chills. So, people may confuse it with a viral fever, and malaria gets untreated, leading to other serious consequences. This short essay on malaria awareness will alert both children and elders on how to tackle this life-threatening disease.

1.3.2 NON -COMMUNICABLE DISEASE

Non-communicable diseases, also known as chronic diseases, are medical conditions that are not caused by infectious agents and are not contagious. These diseases tend to develop slowly over time, often due to lifestyle factors, genetic predisposition, or environmental factors. Non-communicable diseases can have a significant impact on quality of life and can lead to complications of premature death if left untreated. Prevention and management of non-communicable diseases involve measures such as maintaining a healthy diet, engaging in regular physical activity, avoiding tobacco use and excessive alcohol consumption, and managing stress. Treatment may involve medications, lifestyle modifications, and supportive care to manage symptoms and prevent complications.

1.3.2.1 CARDIOVASCULAR DISEASES (HEART DISEASE, STROKE)

A cardiovascular disease is a group of diseases affecting your heart and blood vessels. These diseases can affect one or many parts of your heart and/or blood vessels. A person may be symptomatic (physically experiencing the disease) or asymptomatic (not feeling anything at all). Cardiovascular disease symptoms can vary depending on the cause. Older adults and people assigned females at birth may have more subtle symptoms. However, they can still have serious cardiovascular disease.

1.3.2.2 CANCER

Cancer is a disease in which some of the body's cells grow uncontrollably and spread to other parts of the body. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and multiply (through a process called cell division) to form new cells as the body needs them. When cells grow old or become damaged, they die, and new cells take their place. Sometimes this orderly process breaks down, and abnormal or damaged cells grow and multiply when they shouldn't. These cells may form tumors, which are lumps of tissue. Tumors can be cancerous or not cancerous (benign). Cancerous tumors spread into or invade nearby tissues and can travel to distant places in the body to form new tumors (a process called metastasis). Cancerous tumors may also be called malignant tumors. Many cancers form solid tumors, but cancers of the blood, such as leukemias, generally do not.

1.3.2.3 DIABETES

Diabetes is a chronic, metabolic disease characterized by elevated levels of blood glucose (or blood sugar), which leads over time to serious damage to the heart, blood vessels, eyes, kidneys, and nerves. The most common is type 2 diabetes usually in adults, which occurs when the body becomes resistant to insulin or doesn't make enough insulin. In the past 3 decades, the prevalence of type 2 diabetes has risen dramatically in countries of all income levels. Type 1 diabetes, once known as juvenile diabetes or insulin-dependent diabetes, is a chronic condition in which the pancreas produces little or no insulin by itself.

1.4 SPREADING DISEASE

Spreading diseases can also be spread from person to person through close contact with an infected individual or through contact with contaminated objects or surfaces. Some spreading diseases can also be transmitted through air, food, or water. Prevention measures like vaccination, hand hygiene, wearing masks, social distancing, and avoiding contact with sick individuals can help reduce the spread of diseases.

1.4.1 CAUSES

Direct contact Infectious diseases are often spread through direct contact. Types of direct contact include the following.

1. Person-to-person contact

Infectious diseases are commonly transmitted through direct person-to-person contact. Transmission occurs when a person with an infectious disease touches or exchanges body fluids with someone else. This can happen before they are aware of the illness. Sexually transmitted diseases (STDs) and gastrointestinal infections can be transmitted this way. Pregnant people can also transmit infectious diseases to their unborn fetuses via the placenta. Some STDs, including gonorrhea, can be passed from gestational parent to baby during childbirth.

2. Droplet spread

The spray of droplets during coughing and sneezing can spread an infectious disease. You can even infect another person through droplets created when you speak. Since droplets fall to the ground within a few feet, this type of transmission requires proximity. Airborne transmission: Some infectious agents can travel long distances and remain suspended in the air for an extended period. You can catch a disease like measles by entering a room after someone with measles has departed. Contaminated objects: Some organisms can live on objects for a short time. If you touch an object, such as a doorknob, soon after a person with an infectious disease, you might be exposed to infection. Transmission occurs when you touch your mouth, nose, or eyes before thoroughly washing your hands.

3. Food and drinking water

Infectious diseases can be transmitted via food and water containing the virus or bacteria.E. coli is often transmitted through improperly handled produce or undercooked meat. Improperly canned foods can create an environment ripe for Clostridium botulinum, which can lead to botulism.

4. Animal-to-person contact

Some infectious diseases can be transmitted from an animal to a person. This can happen when an animal with infection bites or scratches you, or when you handle animal waste. The Toxoplasma parasite can be found in cat feces. Pregnant people and people with compromised immune systems should take extra care (disposable gloves and good handwashing) when changing cat litter, or avoid it altogether.

2. LITERATURE REVIEW

Out of the 122 admitted patients, a maximum number of patients were in the age group of 31–40 years (30.3%), followed by 21–30 years (23%). Out of the 122 patients, 79 were male (64.8%) and 43 were female (35.2%). The length of stay in the ward was 2–28 days with a mean of 6.61 days.

Out of all febrile patients, 16 (13.1%) patients had a continuous fever, and 106 (86.9%) patients had intermittent fever. About 65 (53.3%) patients had chills/rigors and 13 (10.7%) patients had an evening rise in temperature. Besides fever, the other presenting symptoms were myalgia (46.7%), cough (33.6%), anorexia and vomiting (30.3% each), pain abdomen (20.5%), nausea (18%), headache (13.9%) and weight loss (12.3%)

Fever is one of the familiar symptoms of all diseases. When a new antibody enters our body, every individual suffers from a fever. Its nature. Since it is contagious. It should be prevented at the initial stage. For that, fever must be identified. The rise of body temperature has to be monitored for all the people in most public places. By doing so, we can reduce its severity.

For this purpose, we have conventional thermometers to know the temperature of the body. In this developing era, we come across many technologies used to know the temperature in a non-contact manner. The present industry is increasingly shifting towards automation.

2.1 RELATED WORK OF CONTACTLESS TEMPERATURE SENSOR

Body temperature can be measured in several ways. Traditionally, body temperature has been measured using contact thermometers that are placed on the forehead or in the mouth, ear, armpit, or rectum. For children in particular, rectal temperature measurement is often considered to be the gold standard. Non-contact thermometers allow a person's temperature to be taken with minimal (tympanic) or no (Non-contact infrared thermometer [NCIT], thermal scanner) contact with the person. This means the temperature can be measured without the discomfort of having to sit still with a thermometer in the mouth, armpit, or rectum long enough to obtain a correct temperature reading. The lack of contact also means the disinfection process between patients for the thermometers is minimal or unnecessary, allowing for easier and faster use when screening large numbers of people in settings like airports or border crossings.

The main types of non-contact thermometers are non-contact infrared thermometers, tympanic thermometers, and thermal scanners. Non-contact infrared thermometers are held three to 15 cm away from the patient and typically measure temperature on the forehead or temple. Tympanic thermometers measure the thermal radiation from the tympanic membrane and within the ear canal. Handheld thermal scanners can be used to take a person's temperature from a greater distance than other non-contact thermometers, which may make them a good candidate for use in mass screening situations. The optimal cut-off temperature for determining fever differs for each device. However, not everyone who has an infection or is infectious will have a fever. Additionally, fevers can be lowered by using antipyretic medications.

2.2 DIFFERENT METHODOLOGIES

The contactless temperature detector works on the principle of Stefan Boltzmann's Theory. According to Stefan Boltzmann, "Everybody radiates Infrared (IR) Radiation proportional to its temperature". As a result, the optical analysis of the measuring object's IR radiation is used[1]

1. Human presence detection system

The HC-SR04 ultrasonic sensor, which is used to gauge distance in this subsystem, detects the presence of humans. VCC, trigger, echo, and ground are the respective pin names for the four pins that make up the HC-SR04 ultrasonic sensor module. Ultrasonic Transmitter and Receiver are formed by the module's two eyeballs that are protruding from its front. This sensor allows us to determine how far an object is from the sensor by placing it inside its detection range. An ultrasonic wave with a defined speed is sent out by the transmitter. As the wave travels through the air and encounters objects, it is reflected towards the sensor, where it is picked up by the sensor's echo. At the sensor's trigger pin, the microcontroller continuously sends pulses. The sensor begins to generate ultrasonic sound waves on the leading edge of the pulse. When sound waves strike an object, they reverberate and are picked up by the sensor's echo (receiver). The microcontroller receives a pulse signal from the sensor's echo pin that has an ON time equal to the time it takes for waves to travel and bounce back. We can determine an object's distance by measuring the pulse over time. Moreover, we can perceive a person's entry by observing a shift in the distance. When no entry is sensed the temperature sensor (MLX90614) is set to the power-saving mode by the microcontroller.

Fig.3. Ultrasonic sensor to detect human presence

2. Mechanism for Measuring Temperature

The MLX90614 sensor is capable of measuring temperature without making contact. It contains two embedded devices: a signal conditioning DSP device and an infrared thermopile detector (sensing unit) (computational unit). It is based on the Stefan-Boltzmann law, which asserts that all objects radiate infrared radiation and that the intensity of this energy is directly inversely proportional to the temperature of the object. The computational unit translates the amount of IR energy that a target object emits into a temperature value using the sensing unit's measurements. Utilises an integrated ADC and transmits the information using the I2C protocol. It requires less additional circuitry and takes up little space on the PCB thanks to the inclusion of an on-chip ADC. The sensor calibrates the object temperature value based on both the object temperature and the ambient temperature. A 5V supply is required for operation. It has an accuracy of 0.5 C and a precision of 0.02 C, and it can measure object temperatures in the range of -70 C to 380 C as well as the ambient temperature in the range of -40 C to 125 C. The system takes a person's forehead temperature and transmits it using the I2C protocol to the microcontroller through the sensor's SDA pin. The measured value is kept in an on-chip RAM in the MLX90614 as well as an EEPROM, whose bits can be changed to set the sensor's mode.

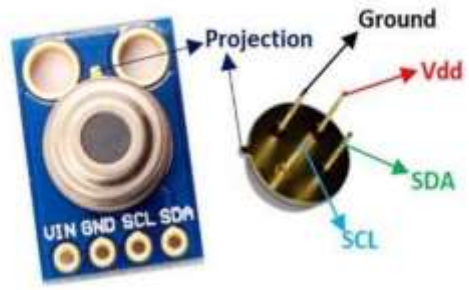


Fig.4. Temperature sensor MLX**90614**

3. I2C Protocol

When the microcontroller transmits the clock signal through SCL, this protocol uses two-line SDL and SCL, one for the clock and one for data transfer. It delivers the address bits to the specific device that is needed to identify the connected devices. A read or write operation is indicated by the last eight bits of the address, which is seven bits long. To begin taking the subject's temperature in front of the sensor, the microcontroller sends a write command. The sensor records the value it has measured in the RAM. The user cannot change the Memory address; they can only read it. The microcontroller then transmits a read signal so that the measured value may be read. The MLX90614's operation mode can be selected by writing the EEPROM addresses by the microcontroller.

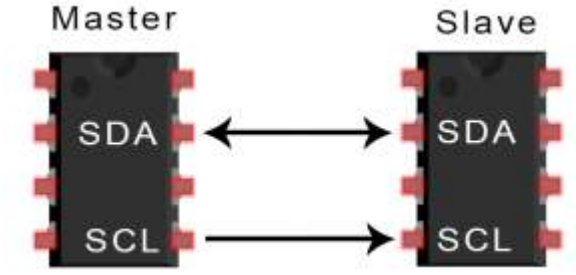
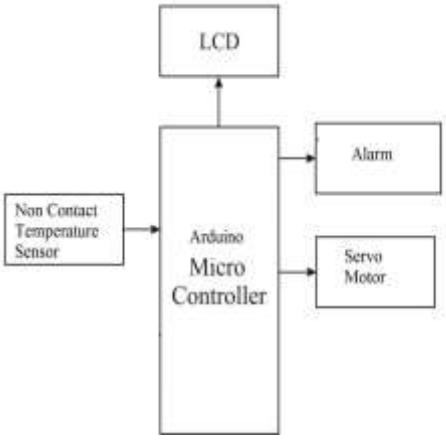


Fig.5. Basics of 2IC Communication Protocol

3.1BLOCK DIAGRAM



The microcontroller can also be programmed to trigger an alarm if the measured temperature is above a certain threshold. The display is used to show the temperature reading to the user and can be a simple LED display or a more sophisticated LCD. The door access mechanism can be a simple electromagnetic lock or a more complex motorized mechanism that opens the door when authorized access is granted.

The alarm can be audible, a visual alarm, or both, and is activated if the measured temperature is above the threshold. The alarm can alert security personnel to take action and can also be used to notify individuals in the area that there may be an individual with a high temperature present. The power supply provides the necessary power to operate the temperature sensor, microcontroller, display, door access mechanism, and alarm

3.1BLOCK DIAGRAM DESCRIPTION

Arduino 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 16 MHz 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 an AC-to-DC adapter or battery to get started. You can tinker with your UNO without worrying too much about doing something wrong, worst case scenario you can replace the chip for a few dollars and start over again.

Fig.6 Arduino Board

Microcontroller	ATmega328P
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limit)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
PWM Digital I/O Pins	6
Analog Input Pins	6
DC Current per I/O Pin	20 mA

"Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0. The Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, which 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.

The Arduino integrated development environment (IDE) is a cross-platform application written in Java, and is derived from the IDE for the Processing programming language and Wiring projects. It is designed to introduce programming to artists and other newcomers unfamiliar with software development. It includes a code editor with features such as syntax highlighting, brace matching, and automatic indentation, and is also capable of compiling and uploading programs to the board with a single click. A program or code written for Arduino is called a "sketch". Arduino programs are written in C or C++. The Arduino IDE comes with a software library called "Wiring" from the original Wiring project, which makes many common input/output operations much easier. Users only need to define two functions to make a runnable cyclic executive program:

setup(): a function run once at the start of a program that can initialize settings

loop(): a function called repeatedly until the board powers off

A typical first program for a microcontroller simply blinks an LED on and off. In the Arduino environment, the user might write a program like this: The integrated pin 13 LED

```
#define LED_PIN 13

void setup () {
pinMode (LED_PIN, OUTPUT); // Enable pin 13 for digital output

}

void loop () {

digitalWrite (LED_PIN, HIGH); // Turn on the LED

delay (1000); // Wait for one second (1000 milliseconds)

digitalWrite (LED_PIN, LOW); // Turn off the LED

delay (1000); // Wait for one second

}
```

It is a feature of most Arduino boards that they have an LED and load resistor connected between pin 13 and the ground; a convenient feature for many simple tests.[11] The previous code would not be seen by a standard C++ compiler as a valid program, so when the user clicks the "Upload to I/O board" button in the IDE, a copy of the code is written to a temporary file with an extra include header at the top and a very simple main() function at the bottom, to make it a valid C++ program. The Arduino IDE uses the GNU toolchain and AVR Libc to compile programs and uses Avrdude to upload programs to the board. As the Arduino platform uses Atmel microcontrollers, Atmel's development environment, AVR Studio, or the newer Atmel Studio, may also be used to develop software for the Arduino.[12][13]

4. HARDWARE DESCRIPTION

Transformer
Bridge Rectifier
Temperature Sensor
Arduino
Lcd Display
Alarm
Buzzer
PCB Design

4.1LIQUID CRYSTAL DISPLAY

A liquid crystal display (LCD) can be used in a temperature sensor as a means of displaying temperature readings. LCDs are commonly used in temperature sensors due to their low power consumption, compact size, and ability to display temperature readings with high accuracy. The LCD works by using liquid crystal cells that change their optical properties when an electric current is applied to them. The LCD is made up of multiple layers, including a layer of liquid crystal cells sandwiched between two layers of conductive material. When an electric current is applied to the conductive material, it causes the liquid crystal cells to align in a specific direction, which changes the way that light passes through the LCD

4.2 TEMPERATURE SENSOR

A Thermistor is a type of resistor used to measure temperature changes, relying on the change in its resistance with changing temperature. The thermistor is a combination of the words thermal and resistor

In this circuit, the thermistor is used to measure the temperature. A Thermistor is nothing but a temperature-sensitive resistor. There are two types of thermistors available such as positive temperature coefficient and negative temperature coefficient. Here we are using a negative temperature coefficient in which the resistance value is decreased when the temperature is increased. A thermistor is a type of resistor that changes its resistance with a temperature change. The name thermistor is a combination of "thermal" and "resistor". Thermistors are commonly used in temperature sensing and control applications, as they are highly sensitive to temperature changes and can provide accurate temperature measurements over a wide range of temperatures.

4.3 ALARM

An alarm can be used in a contactless temperature sensor with door access as a means of alerting individuals when someone with an abnormal body temperature attempts to enter a restricted area. The alarm can be triggered when the temperature reading exceeds a pre-set threshold, indicating that the individual may have a fever or other medical condition. The contactless temperature sensor can be placed near the entrance to a restricted area, such as a hospital, school, or workplace. The sensor can use infrared technology to measure the body temperature of individuals as they pass by, without the need for physical contact. The temperature reading can be displayed on a digital display or transmitted wirelessly to a central monitoring system.

5. RESULT

In this chapter, we have discussed the Contactless Temperature Sensor with Door Access and how the system works with the help of all integrated parts. And in this chapter, we have seen briefly every part with their block diagram and their uses and their pros, cons, and applications. Every sensor is briefly explained with its diagram and this chapter helps you with a good understanding of our sensors and how they work to sense a person's presence and temperature. The PCB design is explained briefly so it helps the viewers to understand our project in a better manner and they can ensure the working of the project by reading this chapter. This chapter gives a clear vision of how the entire device works and detailed information about every internal part...

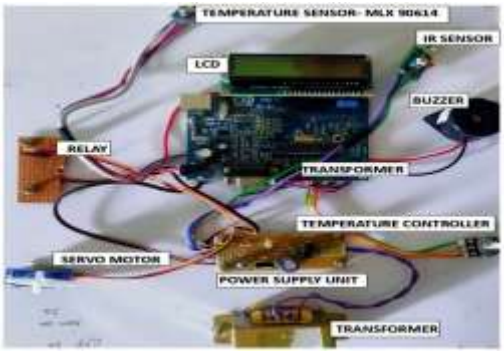


Fig 7 Developed System Of Project

6. CONCLUSION

This paper presented a Contactless Temperature sensor with door access for people to avoid the spreading of diseases with symptoms like fever and this paper developed a device that mainly focuses on avoiding high-temperature people on the doorstep while entering. In crowded areas like airports, supermarkets, railway stations, and theaters we can't check the temperature for all the people at the same time with the help of our devices. It is possible to check the temperature of all people without a third person's help and there will be no cross-infection. The device is user-friendly and there is no direct contact with the temperature device. Automatic door access is there and it works based on a person's temperature. With the help of these devices, we can reduce the spreading of diseases as much as possible.

A contactless temperature sensor, also known as a non-contact temperature sensor or infrared temperature sensor, is a device that can measure the temperature of an object without physically touching it. It works by detecting the infrared radiation emitted by the object and converting it into a temperature reading. One of the main advantages of contactless temperature sensors is that they can measure the temperature of an object from a distance, making them ideal for use in situations where physical contact with the object is not possible or desirable. For example, they can be used to measure the temperature of moving objects, such as conveyor belts or rotating machinery, or to measure the temperature of hazardous materials or in environments where the temperature is too high or too low for humans to safely approach.

Contactless temperature sensors are also very accurate and reliable, with many models capable of measuring temperatures within a range of ±0.1°C. They are also very fast, typically providing temperature readings in a matter of seconds or even milliseconds. Another advantage of contactless temperature sensors is that they are very versatile and can be used in a wide range of applications, from industrial manufacturing to medical diagnostics to food safety and quality control. They are also relatively easy to use, with many models featuring simple controls and displays that make them accessible to non-experts.

However, contactless temperature sensors do have some limitations. For example, they may not be able to measure the temperature of very small or very thin objects accurately, and they may be affected by factors such as the emissivity of the object being measured or the presence of dust or other particles in the air. Contactless temperature sensors are a valuable tool for measuring temperature in a variety of applications. They offer many advantages over traditional contact-based methods, including speed, accuracy, and versatility. However, it is important to understand their limitations and to choose the right model for the specific application in question.

The automatic door control system with the body temperature sensor has been completed. The design of this prototype uses an Arduino microcontroller using the C programming language. The accuracy of the MLX90614 temperature sensor compared to a thermos gun is 95%, so the sensor can be used as a body temperature measuring device. The test results on the prototype prove that all systems and components of the automatic door control system with body temperature sensors can work with a

percentage level of 100%. Therefore, an automatic door control system with a body temperature sensor can be implemented in crowded areas such as shopping areas, offices, and restaurants that are placed in indoor areas, or indoor areas that are not exposed to direct sunlight. This study has shown significant results. The accuracy of the MLX90614 temperature sensor compared to a thermos gun is 95%.

A contactless IR temperature sensor with door access combines the features of a contactless temperature sensor with the ability to control access to a space based on the temperature of individuals entering it. This technology has become increasingly popular in recent times as a means of controlling the spread of infectious diseases such as COVID-19. The contactless IR temperature sensor with door access works by using an infrared sensor to measure the temperature of a person's forehead or wrist as they approach a door. If their temperature is within a predetermined range, the door is unlocked and they are allowed to enter the space. If their temperature is outside of the acceptable range, the door remains locked and they are denied entry. One of the main advantages of this technology is that it allows for a completely touchless experience, reducing the risk of transmission of infectious diseases. It is also fast and efficient, providing a temperature reading in a matter of seconds and allowing for quick and easy screening of large numbers of people.

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