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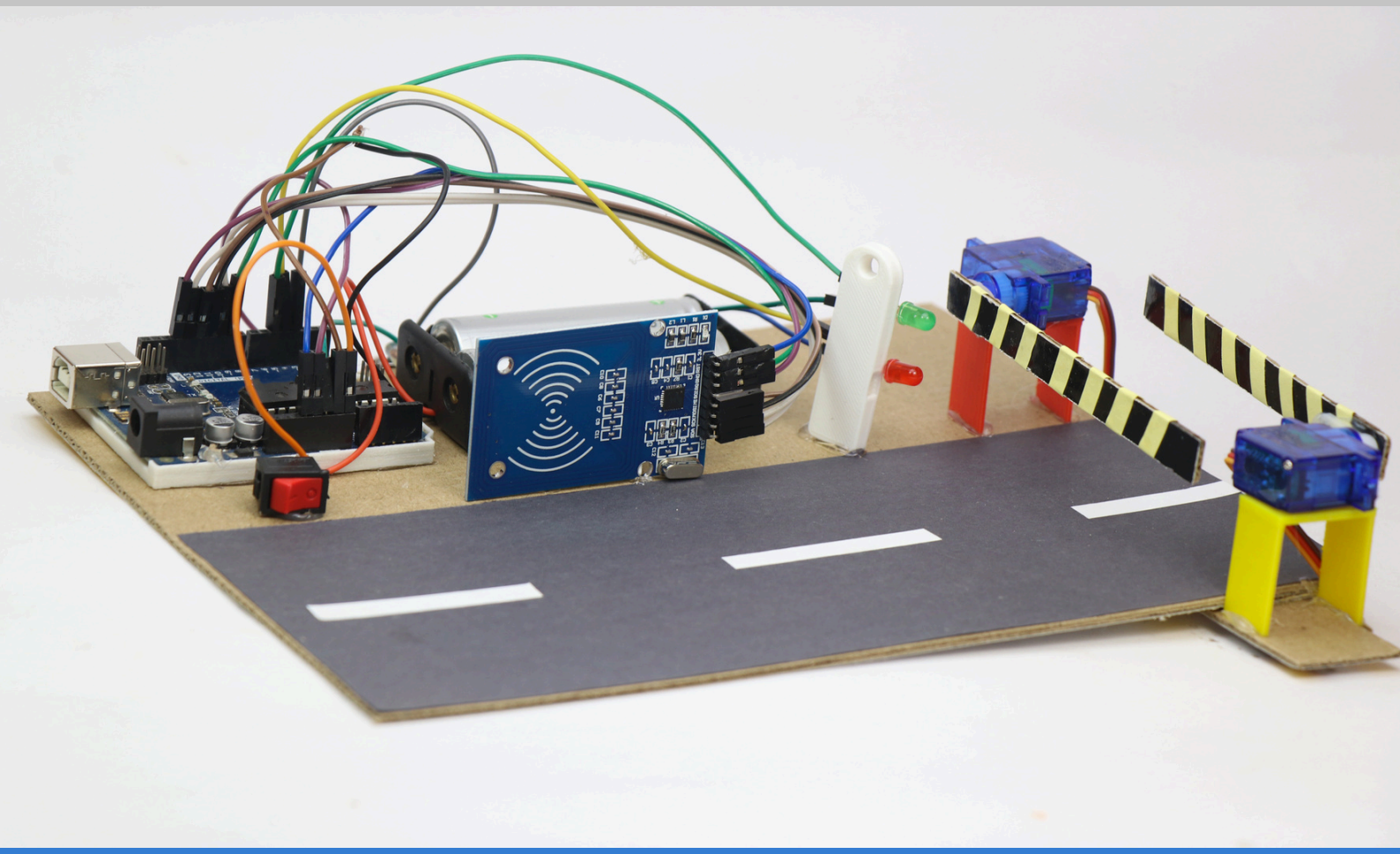
Design and implementation of a smart automatic door opening system to detect high body temperature and provide covid-19 disinfection



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Abstract

One of the measures to decrease the transmission of coronavirus ailment 19 (Covid-19) is to take your body temperature and disinfect it. Measurement of body temperature is done as an attempt to identify people with Covid-19, so it is necessary to prevent them from coming into contact with others. Manual temperature measurement can lead to burnout for personnel performing the task and reduced accuracy. Therefore, it is necessary to build an automatic temperature measurement system and display the data easily. In addition to measuring your body temperature, another step to prevent the spread of Covid-19 is disinfecting your hands. The disinfection process can be carried out by spraying disinfectant gel automatically on your hands. These two processes are carried out sequentially, after measuring the body temperature and not exceeding the allowable limit, followed by the disinfection process. This method is implemented on a gate equipped with two leaves, with the first opening of the leaf occurring at a body temperature not exceeding the permissible limit, and the second opening of the leaf occurring after automatic disinfection of the hands.To minimize physical contact, the process is automated and contactless. To develop the system, one Arduino Mega 2560 microcontroller, 3 MLX90614 sensors, 3 HC-SR04 sensors, 3 e18-d80nk sensors, 1 relay, 1 DC pump motor and 2 DC blade drive motors are required. The body temperature limit can be set manually. Operationally, the system was tested and demonstrated to work, including spraying disinfectant gels. To check the temperature measurement, there was an average deviation of 0.018% from the sensor measurement for the temperature measured with a heat gun.

Keywords (Design..Implement..smart automatic door..opening system to detect high body temperature..provide covid_19 disinfection

Chapter One

Introduction

1.1 Introduction

The coronavirus, commonly referred to as Covid-19, first emerged in Wuhan, China and has since quickly spread to several countries, including India, the second most populous country in the world with a population of over 1.34 billion. Due to such a large population, India faces significant challenges in containing the spread of the virus. The use of face masks and hand sanitizer has proven to be the most effective measure in reducing the rate of transmission. These methods have yielded positive results in reducing the spread of the disease. Common symptoms associated with COVID-19 include fever, sore throat, fatigue, loss of taste and smell, and nasal congestion. The virus is mainly transmitted indirectly through contaminated surfaces, although it can also be transmitted directly from person to person through respiratory droplets. The incubation period of the virus can be significantly longer and ranges from 10 to 14 days in severe cases. In response to the pandemic, the government has implemented a series of protective measures to minimize transmission, including social distancing, mandatory wearing of masks indoors, implementation of quarantine protocols, restrictions on travel within and outside the country, promotion of quarantine, and lifting of restrictions. Completed . Large gatherings and events The impact of the COVID-19 pandemic has been felt across all sectors, affecting work, social interaction, sports, and live and digital entertainment. People with elevated body temperatures are prohibited From visiting public places due to the increased risk of infection and the possibility of spreading the virus. Therefore, wearing a mask is mandatory. Temperature checks and mask checks are mandatory at city entrances, workplaces, shopping malls, and hospitals. As a result, a sophisticated entry system has been developed that can automatically monitor body temperature and check the use of masks at the entrance. This innovative system combines three key functions: temperature detection, occupancy calculation, and mask check.

1.2 The purpose of this project:

The goal of this topic is to prevent the widespread and intense spread of the Corona virus, and it is to open the door without touching the objects by detecting the objects through the degree of temperature of the objects.

Chapter two

Literature review And Related Work

2.1 Introduction:-

The automatic door opening systems are used in Corona Virus. These systems are designed to automatically open the door when a person approaches and close it after the person exits or enters the door. Various sensors are available in the market for developing such systems, including radar sensors, passive infrared (PIR) sensors, infrared sensors, and laser sensors, etc. This particular project uses a PIR sensor to facilitate automatic door opening and closing by detecting infrared energy emitted from the human body. When someone approaches the door, the change in infrared energy detected by the PIR sensor triggers a mechanism to open and close the door. Then the signal is sent to the microcontroller to control the operation of the door.[16].

2.2 Related Work

The reputation of body temperature assessment in clinical diagnosis and treatment cannot be overestimated [5]. There are some disadvantages such as low measurement accuracy and long measurement period. Traditional methods of artificial measurement make it difficult to automatically and accurately monitor The patient's body temperature should be monitored quickly. To solve this problem, a distributed body temperature measurement monitoring system is proposed. Various temperature sensors such as DS18B20 are used to detect the human body temperature signal, which is then processed by the AT89C52 single-chip microcontroller. The nRF905 wireless transceiver chip is used to wirelessly transmit signals from a workstation called a slave station to a master station, which is connected to the host computer via a PDIUSBD12 USB adapter. Keeping the temperature calculation error less than ±0.1°C, the system has demonstrated excellent performance and effectively meets the medical needs of the clinic. Can be By using the modular design of the system, it can be transferred to another part, namely the intelligent monitor of the greenhouse environment. Real-time data collection is critical in the field of human health [6]. This article describes a method to track a person's heart

rate per second and determine their normal body temperature remotely. Data was collected from a group of volunteers and the device was tested using sensors developed by the research team. The Arduino microcontroller is designed to send data over the Xbee wireless network to a remote computer station for display and storage. By activating the sensor using a remote control command from the receiving computer, it reduces the power consumption of the device [7].

The presentation of wireless sensor network has been investigated in growing applications including weapon ships, medical applications, habitat monitoring and seismic monitoring [8]. WSN has recently focused on indoor surveys and market applications. This project demonstrates the performance of WSN models generated by PIC. Network-wide temperature sensor nodes were used to generate sensor events. Here, the results show that timing adjustment has a significant impact on the performance of the sensor node. The objective of this paper is to identify and briefly explain the important factors and issues that affect the results of WSN.

Laboratory measurement and clinical trial regulations limit the validity and duration of many assessments. For example, monitoring the effects of Sleep deprivation at regular intervals, called the circadian rhythm, on the human body requires accurate profiles of skin temperature throughout the body over long periods of time, combined with real-time data from medical professionals. In addition, they review the main applications of wearable sensors and highlight the importance of personalized behavior, including adaptive sampling to improve energy efficiency, adaptive strategy formulation, automatic atmosphere adjustment, and automatic data logging.They have Design and prototyping of a non-invasive wireless monitoring system that can accurately measure body temperature and provide real-time feedback to physicians. An accuracy Of 0.02°C was achieved by designing, parameterizing, and calibrating an active measurement subsystem that included average body temperatures of 16–42°C based on two previous studies on the effect of skin temperature on

circadian and mental rhythms.They found that their method could be a valuable asset for medical research. Biometric personal identification systems are used to provide a secure alternative [9]. Although various biometric recognition methods and algorithms have been developed and published in the literature, there is no research on the relationship between biometric indicators. In this study, they investigated whether biometric features are related to people's attempts to extract a biometric feature from other biometric features of the same person. As a result, they developed and published a novel intelligent framework that uses a novel artificial neural network approach to generate face masks from fingerprints with absolute age error percentages ranging from 0.75 to 3.60. Experiments have shown that fingerprints can be used to generate face masks without prior knowledge of aspects. In addition, fingerprints and faces are closely related.Although this system is still in the early stages of development, the results are very positive and promising.

Video analytics improves video surveillance services by performing tasks such as real-time event tracking and post-event analysis. People save time and money, and the efficiency of the monitoring system is increased. One of the most common standards in video analytics security is the automatic detection of a person wearing a mask. This paper proposes a four-part visual detection method for masked face recognition. This paper explains the concepts of each of these methods, as well as the use of face and face recognition algorithms.

This new approach to the problem resulted in a less complex solution that could be implemented in real-time. The success of the algorithm in test video sequences provides valuable insights to improve the performance of masked face detection. In the field of face recognition and computer vision, face mask recognition has made significant progress [10]. Various methods and algorithms have been used to build face recognition models. The approach proposed in this project uses deep intelligence, TensorFlow, Keras, and OpenCV to recognize face masks. This method can be used defensively since it is inexpensive to implement. This method has an accuracy score of 0.9264 and

an F1 score of 0.93.The Haar Cascade algorithm is used for identifying facial features in low-cost IoT applications using the Raspberry Pi method [11]. It is an advanced access control system. It incorporates machine learning techniques for face detection and recognition and uses the Haar Cascade features from the OpenCV library to achieve fast processing and high recognition accuracy. Face recognition serves as a means of identifying and authenticating people based on their facial characteristics. The changes in the framework were implemented using the Python programming language. This system distinguishes between color and grayscale face images using a positive-positive approach. The effectiveness of the system is evaluated by evaluating the face recognition rate of each person in the database. The results of the proposed system demonstrate its ability to accurately identify faces even in low-quality images.

This paper presents an innovative approach using cost-effective IoT nodes, mobile devices, and fog-based machine learning (ML) tools to perform statistical analysis and health diagnostics. The IoT node is designed to assess various health parameters including blood oxygen saturation, respiratory function, toxicity level, body speed, and body temperature, and then updates the mobile application to reflect the user's current health status. To reduce the transmission of the virus, the application advises users to maintain a physical distance of 2 meters (or 6 feet).

In addition, the Mamdani system, running on a cloud server, assesses the health status of users and environmental hazards to determine the risk of infection in real-time. The virtual zone concept facilitates communication about environmental hazards and disseminates relevant information to multiple locations. In addition, the analysis includes a comparison of energy consumption and required bandwidth (BW) in different event scenarios.Due to the global spread of the corona virus COVID-19, face masks are becoming increasingly popular in public places [12]. Before covid-19, people used masks as a measure to protect themselves from air pollution and protect their

well-being. Some covered their faces, While others took care of their appearance to hide their emotions from the crowd.Scientists say wearing a mask may reduce the transmission of COVID-19. The last influenza virus to affect human health in the 20th century is COVID-19. The World Health Organization (WHO) declared this disease a global pandemic in 2020 due to its rapid spread. In less than six months, Covid-19 has infected more than five million people in 188 countries.The outbreak Of the corona virus has led to an unprecedented level of international scientific cooperation. Artificial intelligence (AI), with a focus on machine learning and deep learning, is helping to combat COVID-19 in various ways [13]. Machine learning can help researchers and doctors predict the spread of COVID-19, act as an early warning system for pandemics, and identify vulnerable populations by evaluating massive amounts of data. .

The role of data-driven mobile applications in combating the COVID-19 pandemic has been considered [14]. Innovative case studies show two types of indoor safety monitoring and resource planning as evidence of practice during a major pandemic. The corresponding cross-platform mobile apps are built using the App Sheet Framework, which automates the development of Google Sheets as a data source.

If the situation does not change today, institutions like the Academy are at risk of closing due to the COVID-19 pandemic. . Covid-19 is a virus that can cause severe respiratory complications, which is also called acute respiratory syndrome. The disease Caused by Corona 2 is highly contagious and is spread through droplets released by people when they talk, sneeze or cough. Transmission is facilitated by close contact with infected people and touching contaminated objects or surfaces. Due to the limited availability of Covid-19 vaccines, the main way to protect yourself is to prevent infection.The implementation of an integrated face mask detection system and warning mechanism to maintain physical distance using deep learning techniques using Convolutional Neural Networks (CNN) is studied. The researchers proposed a high-accuracy mask detection method using fully convolutional networks, gradient descent and binomial mutual entropy through semantic segmentation. In addition, a CNN program has been developed to improve the accuracy and

efficiency of the identification of Durio zibethinus varieties, commonly known as durian, based on the visual characteristics of the plant. In addition, the production of pulse oximetry kits using Internet of Things (IoT) technology to remotely monitor COVID-19 patients using smartphones, maintain physical and social distancing protocols, and monitor the body temperature of users. {15}

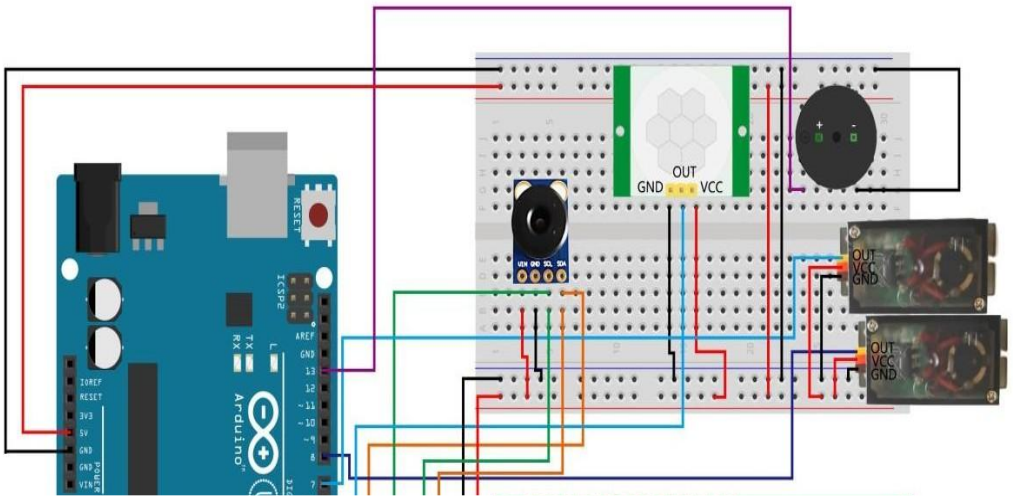
2.3 Automatic Door Opening System

Opening and closing doors has always been tedious, and because of the recent developments that have taken place in many countries, including the development of opening and closing doors without contact. This project provides the automatic opening and closing of doors through sensors such as infrared sensors, and when the object is close to the door, the door opens through complete sensing because the object emits infrared radiation energy, which the sensor detects and delivers to the control units so that the command is executed to operate the door motor. [17].

2.4 Automatic Door Opening System Circuit

The drawing below shows the set of pressures for opening and closing the door This circuit was designed using several tools, including an Arduino, several connecting wires, a temperature sensor, a power source, and a motor driver.

closing system.



Figure(1):- Show that The circuit diagram of an automatic door opening

A connection has been made to the circuit system It consists of several things The sensor consists of 3 pins, such as GND and Vcc, which are 5 volts, and the Dout pin is connected to pin14 (A) of the Arduino. All pins of the screen are connected to 12 and 13 of the Arduino board, and the data pins are connected to the Arduino pins, which are D0 to D7. The motor is connected to pin0 and pin1 Through this, this control is achieved.

2.5 Automatic Door Opening System and It's Working

This project is very important in the system of opening and closing doors automatically This is used through a pIR type sensor This project includes several things, including software, hardware, wires, resistors, transistors, capacitors, as well as a door motor and a transformer..

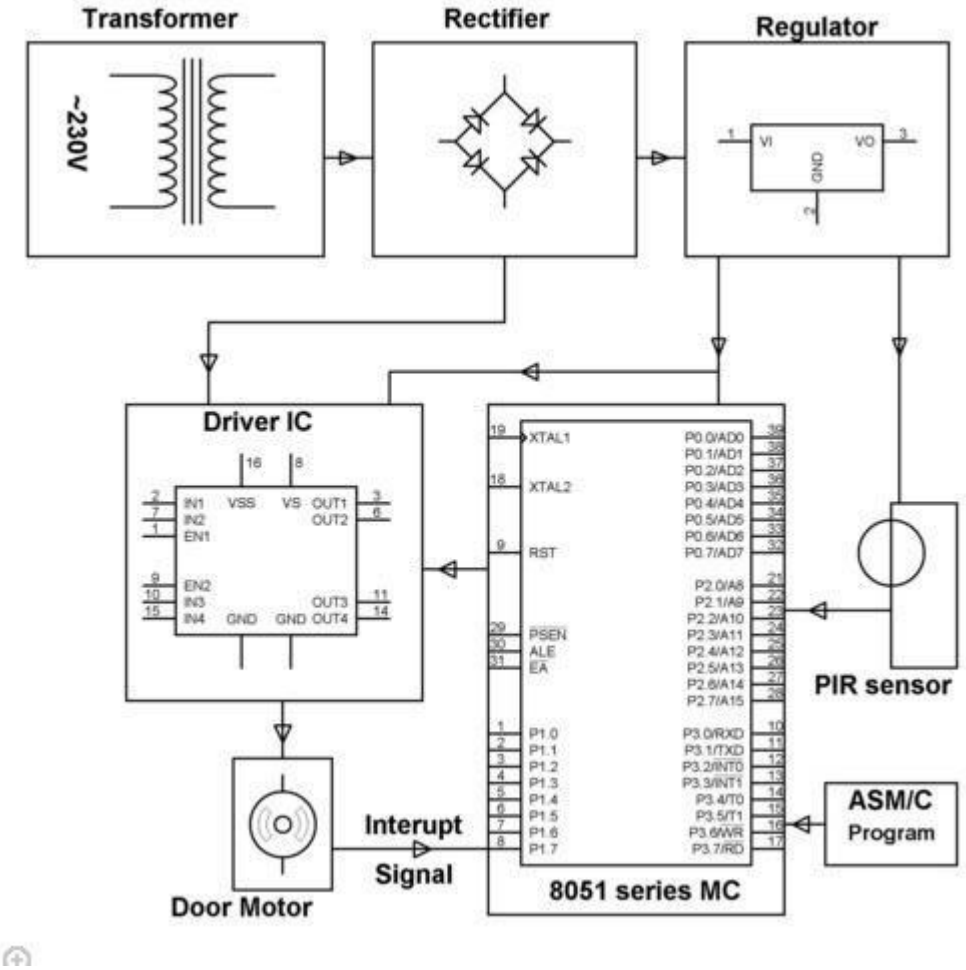


Figure (2):- Show that automatic door opening system project.

This proposed system employs a PIR sensor to detect human movement in proximity to the door. Typically, a human body radiates infrared energy in the form of heat, which the PIR sensor can detect from a certain distance. The signal generated by the sensor is then transmitted to an 8051 microcontroller, which controls a door motor through a motor driver IC. When an individual approaches the detection range of the PIR sensor, it triggers a signal to open the door. The door is designed to close automatically after a predetermined time delay, provided there is no further movement detected within the sensor's range. To prevent the motor from entering a locked rotor condition, interrupt signals are utilized via limit switches.Additionally, the proposed system can be enhanced by integrating a counting mechanism to monitor the entry and exit of individuals in a designated area. This can be achieved by connecting an EEPROM to retain the data in the event of a power outage.

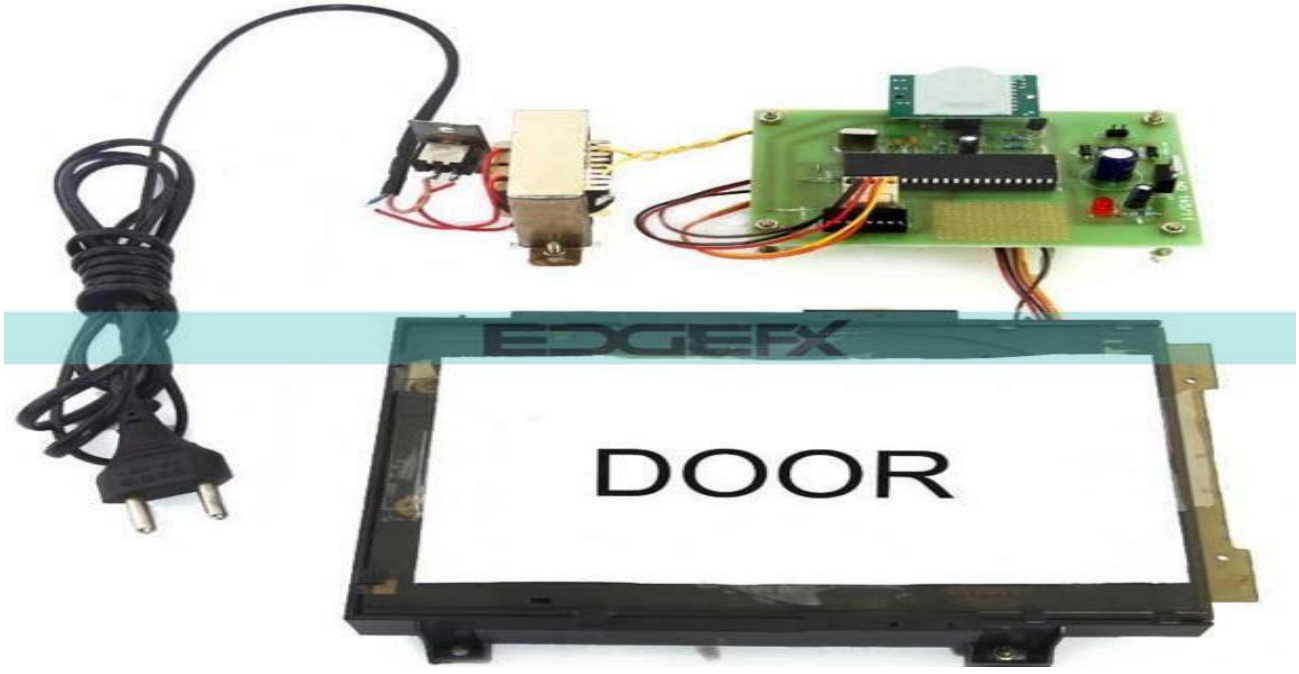


Figure (3):- Show that sensor to sense the human body movement near to the door.

2.6 Arduino

— Arduino is an open source hardware and software community initiative for the design and manufacture of microcontrollers and single board kits for building digital devices. The hardware is available under the CC BY-SA license and the software is available under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL). This licensing system allows people to build Arduino boards and share software. Arduino boards can be purchased through the official website or from an official distributor.

The design of the Arduino board incorporates a range of microprocessors and controllers. These boards are equipped with a collection of digital and analog input/output (I/O) pins, which can be connected to various breadboards, commonly referred to as "shields," or used for prototyping with other circuits. Certain models include serial communication interfaces, such as the Universal Serial Bus (USB), which facilitates the uploading of programs.

Microcontrollers can be programmed using the C and C++ programming languages through a standard application programming interface (API), often referred to as the Arduino language. This language is derived from Processing and is utilized alongside a modified version of the Processing integrated development environment (IDE). In addition to conventional compiler toolchains, the Arduino project offers an integrated development environment (IDE) and a command-line tool developed in the Go programming language.

Initiated in 2005, the Arduino project was designed as a resource for students at the Institute for Interactive Design in Ivrea, Italy. Its primary aim was to

provide both novices and experienced users with an affordable and accessible means to create devices that interact with their surroundings through the use of sensors and actuators. Common examples of such devices, which are particularly appealing to beginner hobbyists, include simple robots, thermostats, and motion detectors.

The name "Arduino" is derived from a bar in Ivrea, Italy, where several of the project's founders convened. The name also pays homage to Arduin of Ivrea, who served as Prince of the March of Ivrea and King of Italy from 1002 to 1014.

2.7 Hardware

An R3 Uno board compatible with Arduino, manufactured in China, lacks the Arduino logo yet features identical markings, including the inscription "Made in Italy." Arduino operates as open-source hardware, with hardware reference designs disseminated under a Creative Commons Attribution Share-Alike 2.5 license, accessible on the Arduino website. Additionally, layout and production files for certain versions of the hardware are also provided.

The hardware and software designs are accessible under copyleft licenses; however, the developers have stipulated that the name Arduino should remain exclusive to the official product and cannot be utilized for derivative works without prior authorization. The official policy regarding the use of the Arduino name highlights the project's openness to integrating contributions from others into the official product. Numerous commercially available products that are compatible with Arduino have opted to refrain from using the project name by adopting alternative names that conclude with –duino.

An early version of the Arduino board features an RS-232 serial interface located in the upper left corner and is equipped with an Atmel ATmega8 microcontroller chip, which is positioned in the lower right. The board includes 14 digital input/output pins at the top, 6 analog input pins at the lower right, and a power connector situated at the lower left.

Most Arduino boards are built around an Atmel 8-bit AVR microcontroller, which may include models such as the Atmega8, Atmega168, Atmega328, Atmega1280, or Atmega2560, each offering different specifications in terms of flash memory, pin count, and features. The 32-bit Arduino Due, utilizing the Atmel SAM3X8E, was launched in 2012. These boards are designed with single or double-row pins or female headers that enable easy connections for programming and integration into other circuits. They can also connect to additional modules known as shields, which may be stacked and individually addressed through an I2C serial bus. Most boards are equipped with a 5 V linear regulator and a 16 MHz crystal oscillator or ceramic resonator. Certain models, like the LilyPad, operate at 8 MHz and omit the onboard voltage regulator due to specific design constraints.

Arduino microcontrollers come pre-installed with a bootloader that streamlines the process of uploading programs to the onboard flash memory. The default bootloader for the Arduino Uno is the Optiboot bootloader. Programs are transferred to the boards through a serial connection to an external computer. Some serial Arduino boards incorporate a level shifter circuit to convert RS-232 logic levels to transistor–transistor logic (TTL) signals. Contemporary Arduino boards are programmed via Universal Serial Bus (USB), utilizing

USB-to-serial adapter chips such as the FTDI FT232. In some later models of the Uno, the FTDI chip is replaced with a separate AVR chip that contains USB-to-serial firmware, which can be reprogrammed through its own ICSP header. Other variants, including the Arduino Mini and the unofficial Boarduino, utilize a detachable USB-to-serial adapter board or cable, Bluetooth, or alternative methods. When employing traditional microcontroller tools instead of the Arduino IDE, standard AVR programming techniques are applicable.

The Arduino board makes available a popular of the microcontroller's input/output pins for integration with other circuits. The Diecimila, Duemilanove, and the current Uno models feature 14 digital I/O pins, of which six are capable of generating pulse-width modulated signals. Additionally, there are six analog inputs that can also function as six digital I/O pins. These pins are located on the upper side of the board and are accessible through female 0.1-inch (2.54 mm) headers. A variety of plug-in application shields are commercially offered as well. The Arduino Nano, along with Arduino-compatible Bare Bones Board and Boarduino boards, may include male header pins on the underside, allowing them to connect to solderless breadboards.

Numerous Arduino-compatible and Arduino-derived boards are available, some of which are functionally similar to an Arduino and can be used interchangeably. Many of these variants enhance the fundamental Arduino by incorporating output drivers, often aimed at educational purposes, to facilitate the construction of buggies and small robots. Other variants maintain electrical equivalence but alter the form factor, with some retaining compatibility with shields while others do not. Certain models utilize different processors, resulting in varying degrees of compatibility.

2.8 Software

It is a language through which the Arduino is programmed through several programming programs, including, and most importantly, C++ programming. This programming implements several procedures to convert them into commands and by connecting the ports to provide precise control..

Chapter three

Methodology and materials

3.1 Basic Theory

Automatic doors according to the work, it is necessary to add some treatments or changes to an automatic thing so that the work is done in the desired way [20]. Using something automated is often used to facilitate various human activities. Of course, the meaning of automatic door is not much different from the above description. An automatic door must be able to open or close the door on its own. To do this, the fence must be connected to a control system that can give instructions to the fence about when to open the fence and when to close it[21].

3.2 Materials Used

3.2.1 Arduino

An open source electronic board consisting of several sources and ports. The range of electrical power capacity ranges from 5 to 12 volts. A set of commands are executed. These commands are executed by programming and connecting them to the computer and sending them to the board. The information is stored inside the microcontroller.

Figure 4: show that the electronic development board of Arduino

3.2.2 motion sensor

It is an electronic sensor that detects infrared radiation emitted by any object that passes through its detection range. The sensor contains a plastic lens that transmits infrared rays, especially those with wavelengths of 8 to 14 micrometers, as well as near-infrared radiation from the human body.

Figure 5: show that the electronic sensor that senses the infrared radiation emitted by any object passing through its sensing range

3.2.3 temperature sensor mlx90614

A device that senses temperature To measure it through infrared contact, it consists of several ports (4 ports) that are also connected to the Arduino board and controllers. It carries a voltage of 5 volts and measures the temperature of objects.

Figure 6: show that the 3temperature sensor mlx90614

3.2.4 Water pump

And a motor working on a voltage of 24 volts and a voltage of 24 watts, it pumps water at a high rate of up to 125 psi.

Figure 7: show that the Water pump.

3.2.5. Servo motor

The servo motor consists of several ports and has different movements and rotations, and the movement ratio is 180 degrees. The motor is often connected to a DC electrode It is controlled through a code that is placed in the Arduino for the purpose of rotating at a certain rate

Figure 8: show that the Servo motor.

3.2.6. Buzzer:

- ► It is an audio device that converts energy into sound
- ► Is used in the project to warn about a person's high temperature

Figure 9: show that the device that converts electrical energy into audible sound

3.2.7 LCD

A screen that is programmed and displays what is entered, for example, writing or numbers, as is found in mobile phones, televisions, and computers.

Figure 10: show that the LCD.

3.2.8 Step-down transformer

These transformers convert high voltages into low voltage outputs, as well as low currents into high voltages. This happens if the primary coil is larger than the secondary coil by the number of turns.

3.3 Working Principle

The principle of operation of the device is a temperature sensor. It senses body temperature. When the sensor receives the signal, it is like when it receives a temperature above 37, the sensor sends a signal to the door motor and it remains closed. However, when it is less than the above temperature, the gate will open and there is a sterilizer when the person enters for good sterilization.

Chapter four Results and discussion

4.1 Result of project:

The innovative sterilization feature in this topic is for protection and distancing from the Corona virus. This was done when objects approach the sensor, and the human temperature is detected, and then work is done. Where the process is done by the person approaching the sensor. If the temperature is normal, the gate of the system is opened, and if it is abnormal, the gate remains closed and this depends on the temperature. This is because those infected with the Corona virus have a high temperature, so it is easy to distinguish them through this system.

4.2 Future work

In this project, an electronic portal with a sensor that measures the temperature of the human body was created. In order to invest in this project in the future, it is necessary to improve and add sensors of higher quality, and to use this organization after development in government facilities to serve the public interest.

CONCLUSION

It can be concluded that the development of the smart portal based on temperature detection can help reduce the risks of virus spread. It also helps identify individuals with symptoms. Reduces human reagent interference. It has an immediate social impact. A reasoning plan based on the careful entry method which was prepared by the temperature sensor was presented. This is provided in a way to ensure that guests follow welfare agreements established by the public authority and to prevent the spread of COVID-19 in open areas. The proposed arrangement is intended to be cost-effective and easy-to-use for fever screening, . The estimate frame is suitable for the facility in a fixed internal location, similar to the corridor at the entrance to the room. The adjustment was made to the sensors and the fever threshold used in the calculation was set to a certain normal temperature in degrees Celsius. Thus, a smart portal can be designed that will have an immediate societal impact in the current situation.

REFERENCES

1- F. C. C. Bluetooth, “ANT and Bluetooth®,”2010.

2- Z. Mumtaz et al., “An automation system for controlling streetlights and monitoring objects using Arduino,”Sensors, vol. 18, no. 10, p. 3178, 2018.

3- M. Muthumari, N. K. Sah, R. Raj, and J. Saharia, “Arduino based Auto Door unlock control system by Android mobile through Bluetooth and Wi-Fi,”in 2018 IEEE International Conference on Computational Intelligence and Computing Research (ICCIC), 2018, pp. 1–4.

4- L. Kamelia, A.Noorhassan, M. Sanjaya, W. S. E. Mulyana, and others, “Door-automation system using bluetooth-based android for mobile phone,”ARPN J. Eng. Appl. Sci., vol. 9, no. 10, pp. 1759–1762, 2014.

5- M. P. V Gaikwad and M. Y. R. Kalshetty, “Bluetooth based smartautomation system using Android,”Int. J. New Innov. Eng. Technol., vol. 7, no. 3, pp. 24–29, 2017.

6- O. G. Chiagozie and O. G. Nwaji, “Radio frequency identification (RFID) based attendance system with automatic door unit,”Acad. Res. Int., vol. 2, no.2, p. 168, 2012.

7- M. Husni, H. T. Ciptaningtyas, R. R. Hariadi, I. A. Sabilla, and S. Arifiani, “Integrated smart door system in apartment room based on internet,”TELKOMNIKA, vol. 17, no. 6, pp. 2747–2754, 2019.

8- G. Mahalakshmi and M. Vigneshwaran,“IOT based home automation using Arduino,”Int. J. Eng. Adv. Res. Technol, vol. 3, no. 8, pp. 1–6, 2017.

9- S. Wadhwani, U. Singh, P. Singh, and S. Dwivedi, “Smart home automation and security system using Arduino and IOT,”Int. Res. J. Eng. Technol., vol. 5, no. 2, pp. 1357–1359, 2018.

10- W. Uriawan, W. B. Zulfikar, R. M. Sofa, and M. A. Ramdhani, “Internet of things for automatic garage doors using ESP8266 module,”in IOP

Conference Series: Materials Science and Engineering, 2018, vol. 434, no. 1, p. 12057.

11- M. Dzar Faraby et al., “Prototype Pengontrolan Pintu Otomatis Menggunakan Arduino Berbasis Android,”JTT (Jurnal Teknol. Ter., vol. 2, no. 2, pp. 32–39, 2016, doi: 10.31884/jtt.v2i2.17.

12- P. A. Adewuyi, M. O. Okelola, and A. O. Jemilehin, “PIC based model of an intelligent gate controller,”Int. J. Eng. Adv. Technol., vol. 2, no. 3, pp. 601–605, 2013.

13- M. M. Maung, M. M. Latt, and C. M. Nwe, “DC motor angular position control using PID controller with friction compensation,”Int. J. Sci. Res. Publ., vol. 8, no. 11, p. 149, 2018.

14- B. Su and L. Wang, “Application of Proteus virtual system modelling (VSM) in teaching of microcontroller,”in 2010 International Conference on E-Health Networking Digital Ecosystems and Technologies (EDT), 2010, vol. 2, pp. 375–378.

15- L. Liu and Z. Li, “Design and simulation of LED clock circuit based on Proteus,”in 2010 International Conference on Computer, Mechatronics, Control and Electronic Engineering, 2010, vol. 6, pp. 315–316.

16- 2. A. Hidayat, Subono, V.A. Wardhany, A.S. Nugroho, S. Hakim, M. Jhoswanda, “Designing IoT-Based Independent Pulse Oximetry Kit as an Early Detection Tool for Covid-19 Symptoms “, 2020 3rd International Conference on Computer and Informatics Engineering (IC2IE).

17- 3. Carlo Alberto Boano Matteo Lasagni Kay Romer Tanja Lange. "Accurate Temperature Measurements for Medical Research using Body Sensor Networks".

18- 4. Cristina S.....-.C....., B-P BUTUNOI and Calin C.....," IoT Based Intelligent Building Applications in the Context of COVID-19 Pandemic", 2020, 10.1109/ISETC50328.2020.9301124

19- 5. Yahaya F.H., Yusoff Y.M., Abidin H.Z., Rahman R.A. *IEEE International Conference on Information Management and Engineering*. 2010. Development of a PIC-based wireless Sensor node utilizing XBEE Technology.

20- 6. Deora Gayatri. *IEEE Conference on Advances in Signal Processing*. 2016. Ramakrishna Godhula and Dr. Vishwas Udpikar "Study of Masked Face Detection Approach in Video Analytics.

21- 9. K Baskaran, Baskaran P., N. Kumaratharan, Rajaram V., "IoT Based COVID Preventive System for Work Environment", the Fourth International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC) IEEE Xplore Part Number: CFP20OSV-ART; ISBN: 978-1-7281-5464-0.

22- L. Tang and H. Kiourmars, Wireless Network for Health Monitoring Heart Rate and Temperature Sensor", 10.1109/ICSensT.2011.6137000.

23- Ozkaya N., Sagiroglu S. *IEEE International Joint Conference on Neural Networks*. 2008. Intelligent face Mask Prediction System.

Appendix code:

```
#include <LiquidCrystal_I2C.h>

#include <Servo.h>
#include <Wire.h>
#include <Adafruit_MLX90614.h>

Adafruit_MLX90614 mlx = Adafruit_MLX90614();
```

```
LiquidCrystal_I2C  lcd(0x27,20,4);

Servo myservo1;
Servo  myservo2;

#define red 13
#define haha 4
int pos1,pos2;

void setup() {
  Serial.begin(9600);
  pinMode(red,OUTPUT);
  pinMode(haha,INPUT);
  myservo1.attach(7);
  myservo2.attach(8);
  myservo1.write(90);
  myservo2.write(90);
  mlx.begin();

  lcd.init();
  lcd.backlight();


}

void loop() {

      int montion = digitalRead(haha);
```

```
        if(montion == 1){

          Serial.print("made");
          Serial.print("\n");
          lcd.setCursor(0,0);
          lcd.print("ObjectTemp:");
          lcd.setCursor(13,3);
          lcd.print("-DKARDU");

          kaiguan();
          }
}

void kaiguan(){

   int temp_obj = mlx.readObjectTempC();
   Serial.print(temp_obj);
   Serial.print("\n");
          if(temp_obj < 31){
           lcd.setCursor(0,1);
           lcd.print(temp_obj);
           lcd.setCursor(0,2);
           lcd.print("Not detected,retest!");

          }if(temp_obj > 30 && temp_obj <38){

           lcd.setCursor(0,1);
           lcd.print(temp_obj);
           lcd.setCursor(0,2);
```

```
          lcd.print("body temperature ok ");
          for(pos1 = 90; pos1 <= 180; pos1 += 1)
         {
           myservo1.write(pos1);
           myservo2.write(180-pos1);
           delay(15);
         }
           delay(5000);

          for(pos1 = 180; pos1>=90; pos1 -=1)
          {
           myservo1.write(pos1);
           myservo2.write(180-pos1);
           delay(15);
          }

         }
         if(temp_obj>37){
           digitalWrite(red,HIGH);
           lcd.setCursor(0,1);
           lcd.print(temp_obj);
           lcd.setCursor(0,2);
           lcd.print("      Keep out!        ");
           delay(500);

  }
  digitalWrite(red,LOW);
}
```