HEALTH MONITORING SYSTEM AND SMART DOOR FOR MARK OFF BODY TEMPERATURE

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Abstract:

The beginning of Covid-19 has commenced in the city called Wuhan, China. It was a severe respiratory disease. As a consequence of the huge spread and infection, The WHO (World Health Organization) has declared the novel coronavirus (COVID-19) as a universal pandemic. The Flu began spreading its wings around the globe. During this pandemic time, public places are gathering more crowd. There will be a lot of chances to spread the virus. This study exhibits an IOT-based system that is a real-time health monitoring system making use of the uniform values of temperature, and blood pressure of people, which are paramount measurements essentials for critical care. The proposed model can be used for any shopping mall, hotel, apartment entrance. This system has an LCD Display that shows the above constraints.

Keywords:

Arduino Uno, Servo motor control, Heart-rate detection, Temperature sensor, PIR Module.

1. Introduction

At present whole world is going under pandemic due to COVID19. As this is virus is highly dangerous, World Health Organization (WHO) has given some guidelines to reduce virus transmission in between people in various ways. It is more dangerous for people who are having lung and diabetes diseases [1]. The way to control this to take vaccine when it is available and should follow social distance. People were unable to follow the social distancing especially in illiterate regions were unaware of the preventions. There were crowds of people waiting for their turn at public places and hence caused to speed up the spread of COVID-19. Till date the world has suffered a lot of loss in this pandemic in terms of human lives, education, economy and poverty. As the virus increasing rapidly in every place, people starting to self-protect themselves from the virus by staying in home, quarantining, wearing face masks and maintaining personal hygiene. And there is no physical face to face communication between people as there are high range of changes to coronavirus to pass into them [2].

Hands are the mode of transmission of infectious

virus and diseases. Thus, the most important to avoid transmit harmful diseases are hand hygiene [3]. To maintain the hand hygiene there are some ways from prevention of coronavirus entering into the body. Some mandatory actions are to be performed are hand wash/hand sanitizer in a frequent manner. In general, hand hygiene is one of the most crucial 2issue for infection prevention and control. A researches study has shown a decrease of 14.8–39.9% in the upper respiratory disease symptoms among residential students (university) due to a general improvement of hand hygiene behavior [4]. Though people should carry a sanitizer always along with them, But majority of people are not maintaining it. Alcohol based sanitizer (ABHS) are good enough to control the spread of virus and infections in floating areas such as malls, movie theaters, colleges etc [5]. There are several types of sanitizer dispensers which are mechanical, automated with pushbuttons, touchless etc [4]. Since the use of mechanical and automated pushbuttons are having a wide range of chances to spreading of virus because of mandatory physical contact with the dispensers. Hence touchless dispensers are very effective to control the spread of virus and infections as it do not require any human touch. Another major symptom of covid19 is temperature and irregular heartbeat. According to World Health Organization (WHO) the person having high temperature should wear a mask, should maintain social distance and also should stay at home with proper precautions. And also, in most diseases together with covid19 fever is a regular symptom. Heat levels vary depending on a number of factors, including ambient temperature, gender, and eating habits. More or less a standard human body temperature is $37°C$ [6]. In a healthy person, the temperature varies from 97.8F (36.5°C) to 99F (37.2°C). Many different disorders can cause temperature changes. As a result, it is vital to take one's body temperature on a frequent basis [5].

In this paper, a temperature sensor is used to detect when a person walks through the door. At the entry, there will be a device that will detect the person's temperature level. If the temperature remains within the maximum range, the door will automatically open.

2. Literature survey

Covid19 caused a severe damage to the people. This is a respiratory spreading disease. There are no monitoring devices except in hotels, hospitals and quarantine locations. So this paper introduced a way to produce aid services at distance. The most common symptom of covid19 is body temperature or irregular heart beat, cough and throat pain. This project detects the following constraints to indicate. So this can be can be used in any emergency condition of patient. And also during this covid19 pandemic patients can avoid going to outside or hospitals to monitor their temperature. Those results will be displayed on the LCD screen [2].

There are many applications of IOT in the world, in that health care are very important. The new sensors can be with patients to continuously observe the condition of their health. So that there will be a early stage of disease prediction by the data collected by the device. This device detects the person's temperature and heartrate all the time and stores it in database. This type of devices can reduce the medical expenditures. This can make every patient fearless as they cannot rely on doctors and clinics, they can check with this IOT device at their own places [7].

Health-care is most important in these days due to covid19. With vast usage of sensor and smart phones now-a-days diagnostics of person can be monitored and get an idea about the health state of that person. risk level of diseases which will hit in you in future. [10]

This device is designed to check the heartrate, sp02 (Blood oxygen saturation) and this also makes the person alert for any negatives in his health. This device is cheaper than the equipment in the hospitals and workplaces. This can make every patient fearless as they cannot relay on doctors and clinics, they can check with this IOT device at their own places. This can be a practical solution for every patient who can reduce time by going out for hospitals [8].

In the past few years the development of wearable biosensor system for health monitoring has grabbed a lot of attention in health industry. Major grabbed attention because of increased medical costs and heathcare costs and by recent new technologies which are wireless sensing devices which can monitor various types of health issues at low cost at any place. Research is taking place worldwide for what type of diseases which can be monitored are people facing. This device have the potential to monitor the issue as early as possible in low cost and that lead to a better treatment [9].

This device intents to combine both IOT and health monitoring to detect the various health problems such as heartrate, Temperature etc. These are developed using sensors which are wireless. This will be a real time monitoring. The data will be stores in a cloud storage that can be shared between the devices. In current health care system there are some problems such as over usage of users, poor real time performance. This device will work in a manner that can measure almost accurate heart rate, temperature and other parameters too. The data will be integrated from the internet of things for achieving the real time data for monitoring.

3. Proposed system

The proposed device called IOT Health Monitoring system And Smart Door For Mark Off Body Temperature is developed using several components in which Arduino is crucial of this device. Arduino connected with temperature sensor and collects the data of the person and turns that input into output as temperature. Sensor will show

the room temperature at the time of connection if any person is not detected. Servomotor are the angular displacement of the shaft is determined via electrical signals. Human infrared sensor is connected and detects the motion of the object and sends the output as input to the temperature sensor as shown in fig(1). When the person tries to enter the motion of the person is detected and temperature sensor will check the Celsius of the person and if the results are in the range of allowance the doors will be opened using servomotor and if results are not in allowance range red light will be glown and doors will not be opened.

4. Hardware representation :

Health monitoring:

In most cases, the Arduino microcontroller must be powered by a 7-12 volt DC source with a maximum current of 300 milli amperes [11]. The Arduino USB-based board is used to control the program, which has an ATmega 328p CPU (ATmega indicates Atmel) and a 28-pin 8-bit microcontroller [12]
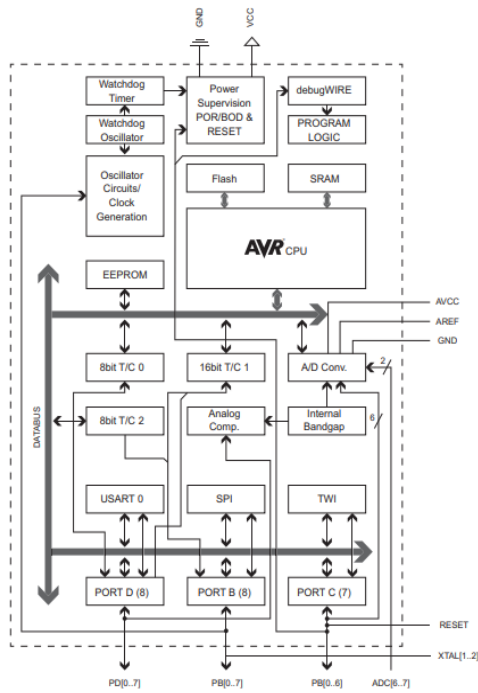

Fig1. Arduino Uno

Fig2: ATmega328 block diagram [12]

Temperature detection

MLX 90614ES is a sensor where it's output is linearly proportional to Celsius [13]. MLX 90614ES will be capturing the temperature around, where it's job is to detect the temperature of the object and also surroundings[14]. The temperature sensor MLX 90614ES is attached to both the Arduino and the breadboard, and the relevant code is produced [15]. If the temperature of the object surpasses the acceptable range, the LED will light red, and if it is within the acceptable range, the Doors will be opened for the person [2].
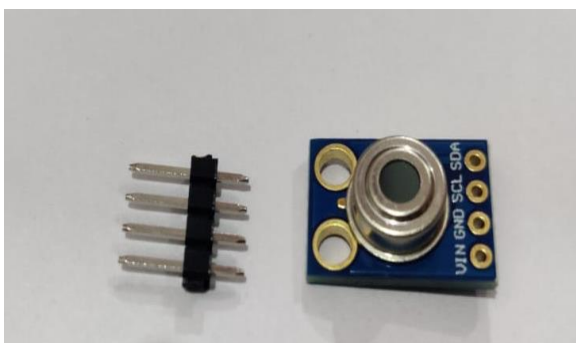

Fig3: Temperature detetctor

Heartrate detection

The MAX30100 sensor is used to detect an object's heart rate and blood oxygen saturation. Fingers of the person should be touched or attached for getting the readings [16]. It is wired to both the breadboard and

the Arduino, and the appropriate code is produced [17]. BPM is the output; if the BPM is within the safe range, the door will be opened, and the object will be permitted to proceed. If the BPM is outside of the allowed range, the LED will light red and the reading will be displayed on the LCD display and doors will not be opened [18].

Servomotor

Servo motors MG90S are used to operate various modules such as power and PWM generators, which have a reliable operation to control the output from a feedback signal via a velocity loop in the servo motor's control system [19]. The digital data is communicated with the system's modules [20].
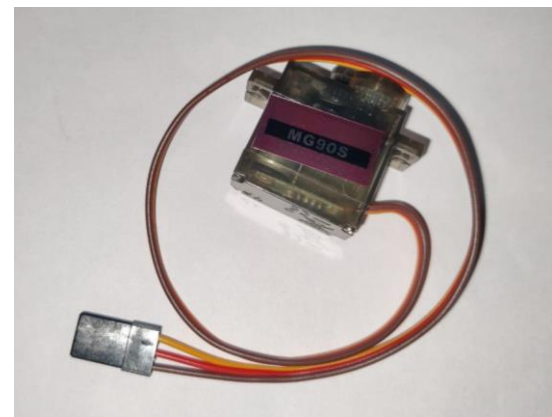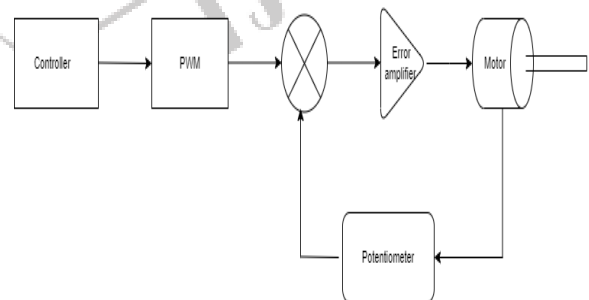

Fig4: MG90S

Fig5: Servo motor

Lcd display

A liquid crystal display (LCD) is a screen that may display text or movies [21]. LCDs were first introduced in 1964. Programs can be written in Arduino and then uploaded to the microcontroller, which can then display text upon this Display screen. [7].
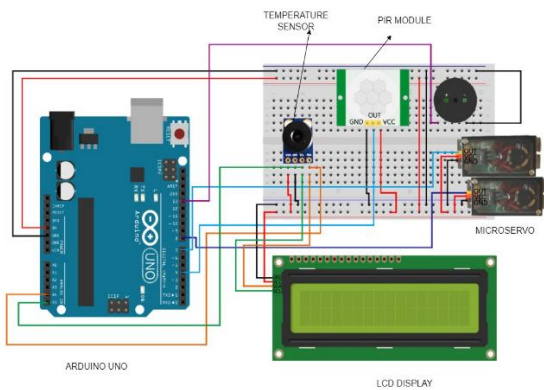
Fig6: LCD Display

Circuit diagram -

Fig7: Circuit diagram

System overview

Anyone attempting to enter the building must pass through these devices, which monitor blood pressure and temperature. Before entering the building, your body temperature will be taken. This will be accomplished using the MLX 90614ES sensor. Before entering, the heart rate will be monitored, and MAX30100 will be taken into consideration. The door will not open if the person's body temperature is over the acceptable level. If the individual's temperature is within the acceptable range, the doors will be unlocked. This IOT solution is used to guarantee that safety rules are followed during COVID19. In this device we find the temperature of person with the help of sensor MLX 90614ES. To get the better result of the person should put this on his hand or armpits. The heartrate will be achieved by MAX30100 sensor and to get the

better result the person should put this on his finger or ears. The LED light will show case the maximum and average level indication by glowing. These two sensors have different input parameters and these are converted to output. MLX 90614ES sensor will showcase it ouput interms of Celsius and Fahrenheit. MAX30100 will potray the output in terms of Beats per minute (BPM). In analogue it will show the output in form of sharp lines which will go up and down as spikes. But in digital LCD Display it will display the actual Bpm. These two sensors are connected to the Arduino uno. And the converted outputs will be showed on the LCD Display which is also connected to Arduino. If person passed all the requirements of allowance into the building etc. These sensors are connected to the Arduino.

Sample Results of patients

S.no	Patient name	Temperature	Result (Doors)
1	John	41℃	Closed
2	Nikhil	37℃	Opened
3	Varma	36℃	Opened
4	Prudhvi	42℃	Closed
5	Ganesh	39℃	Opened

Conclusion

People are at a higher risk of being affected by the covid19 in crowded places such as shopping malls, hospitals, multiplexes, and other places where people congregate, as well as not maintaining proper social distance. We can use this device at building entrances where people will be checked before being allowed to enter. By this we can avoid maximum number of spreading the disease. And with this device people cannot rely on physician or to go visit nearby clinic's for knowing their heartrate and temperature. This can

be done at their own places. This will reduce the medical expenditure and lowering the chance to get exposed to the virus by going out.

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