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Social Distancing Indicator

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Abstract- Infections by the coronavirus have been reported in millions of people around the world, and this number is expected to rise. When people come into contact with an infected person, the virus spreads. If you're concerned about COVID-19's spread through the social network, this paper introduces a new "smart social distance system" that lets people keep a safe distance from each other in both indoor and outdoor settings. When a person's social distance is less than a predetermined threshold, the wearable prototype of a low-cost electronic device is activated to alert the wearer to the situation. Testing of the new social system found that it had a 96.1 percent acceptance rate and a low localization error (6 m).

Keywords- COVID-19, social distance, social distance system, localization error.

I. INTRODUCTION

A viral infection caused by SARS-CoV-2 (COVID-19) is called COVID-19 (Coronavirus disease 2019). (severe acute respiratory syndrome coronavirus 2). When it was found in December 2019 in China. An outbreak of the disease has been declared a pandemic by the WHO. On average, COVID-19 doubles every 7.4 days. Coronaviruses are responsible for the spread of COVID-19. Through the mouth, nose, and eyes, the coronavirus enters the human body.

People can spread coronavirus through the droplets produced by sneezing, coughing, and even speaking. Preventing the spread of COVID-19 has been a top priority for the World Health Organization and other government medical agencies. Distancing yourself from others is one of the most effective ways to prevent the spread of disease, according to the WHO. It is called social distancing when two people maintain a distance from each other socially. Keeping a distance of at least 1.5 m is strongly recommended by WHO to reduce transmission of COVID-19.

When it comes to public health, "social distancing," also known as physical distancing, refers to various non-pharmaceutical interventions or measures that help prevent a contagious disease from spreading. It usually entails keeping a certain distance from others (the distance specified varies by country and can

In order to prevent the spread of disease, it is necessary to reduce the likelihood that an infected person will come into physical contact with an uninfected person. A variety of other precautions, such as good respiratory hygiene, face masks and hand washing can be used in conjunction with these ones. The spread of infectious diseases can be slowed by a variety of social-distancing measures, especially during a pandemic.

II.LITERATURE REVIEW

Coronavirus transmission can be prevented by adhering to guidelines provided by the World Health Organization (WHO). Ministers and administrators of the health care systems in various countries receive these guidelines. Patients with COVID-19 can receive life-saving treatment under the WHO guidelines without compromising public health objectives. For the sake of preventing COVID-19's spread, the World Health Organization has issued interim guidelines for the public. All phases of the COVID-19 emergency response and preparedness plan are governed by these interim guidelines. People should be separated by a distance of 1.5 metres, according to the rules. For the WHO, preventing outbreaks and delaying their spread are the most important goals.

For this purpose, the World Health Organization (WHO) strongly recommends social isolation. A wide

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definition of "social distancing" is provided by the Centers for Disease Control and Prevention. Schools and workplaces have been closed, people have been isolated, and mass gatherings have been cancelled as a result of social isolation. Physical distancing is another term for social distance, according to Johns Hopkins Medicine. The World Health Organization (WHO) has established this guideline in an effort to limit the spread of COVID-19. Using social distancing as a method to slow the spread of pandemic influenza has been shown to reduce the rate of transmission of COVID-19.

1. Advantages

1. It reduces the number of people infected.
2. It spreads the number of people infected over a longer period of time.
3. Distancing oneself from others slows the spread of disease and can even put an end to an outbreak.
4. Coughing or sneezing can spread an infection, so this is the best method to use when this happens.

2. Limitations

1. If the infection is transmitted by contaminated water or food or mosquitoes or other insects, it is less effective.
2. If people aren't used to being around other people, it can lead to feelings of isolation and even depression.
3. Productivity suffers, and there are other benefits of human interaction that are lost.

III. METHODOLOGY

3.1 Existing Methods:

In order to slow the spread of COVID-19, many digital tools are being researched and developed. This section focuses on current social distance monitoring and alerting systems. Both wearable and stand-alone social monitoring systems are options that are currently available in the market. It is possible to estimate the distance to other people by attaching a tag (user) to their body. Image analysis methods are used to monitor the social distances between people in the area of interest using stationary or mobile devices.

Smart tags (RFID, GPS, or Bluetooth), smartphone applications (IOS or Android), and wireless sensor nodes are three possible approaches to developing wearable-based systems. User-specific methods must be used for distance measurements and warning notifications when any user is in a congested area.

The IoT-based social distance monitoring system proposed by Jahmunah and colleagues includes a mobile phone application and a wearable device. Each contact tracking app in the mobile app has the ability to collect and interpret data. Lubis proposes a proximity-based COVID-19 contact tracing system based on Bluetooth Low Energy (BLE). When a person walks close enough to the device, it can detect their presence and send the information to their smartphone. Students with IoT tags can be placed and relocated in an indoor environment using Alrashidi's proposed system, which uses an intelligent method to determine the optimal location of a group of students using two optimizers (ant colony and particle swarm).

III. PROPOSED METHOD

It is possible to measure the distance between two objects using an ultrasonic sensor. Transducers transmit and receive ultrasonic pulses that convey information about an object's proximity to an ultrasonic sensor. Spectacular echoes are produced when high-frequency sound waves reflect off of surrounding surfaces. Arduino Uno is a microcontroller board based on the ATmega328P microcontroller. Fourteen digital I/O pins, six of which can be used as PWM outputs, six analogue inputs, a 16 MHz ceramic resonator (CSTCE16M0V53-R0), a USB connection, a power plug, an ICSP header, and a reset button are all present on this board as shown in figure 1. To get started, all you need to do is plug it into a computer via USB or an AC-to-DC adapter or a battery into the included power supply. A few dollars and a new chip later, you'll be back up and running again.

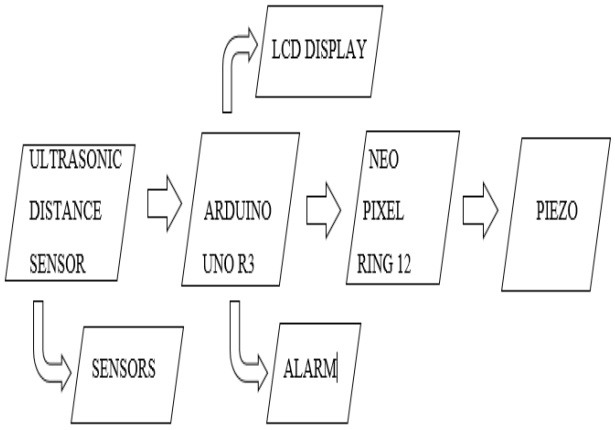

Figure 1:Block diagram of the proposed method.

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Electronically modulated optical devices that use liquid crystals in conjunction with polarizers are known as liquid-crystal displays (LCDs) or polarised displays. Color or monochrome images can be created by using a backlight or reflector in conjunction with liquid crystals. As in a general purpose computer screen, LCDs can display random images or images with low information content that can be shown or hidden at will. Devices with these displays include pre-set words, digits, and seven-segment displays, like those found in digital clocks. The Ultrasonic distance sensor is linked to the Arduino Uno R3 and the Sensors. Using the Arduino Uno R3, the output can be obtained in the form of an LCD display and a buzzer alarm.

As a way to combat the spread of COVID-19, real-time camera surveillance systems have been implemented in public spaces to monitor for social distancing violations. Studies on COVID-19's spread have shown that proper social distancing application can reduce the disease's spread by as much as 90%. It is essential to accurately and consistently identify pedestrians in a crowd. According to a study on crowd scene analysis, deep learning models outperformed traditional statistics-based models in detecting objects in a crowd scene. Distancing violations are reported if there is less than an agreed-upon distance between two bounding boxes. Physical distance is mapped to image pixel to arrive at the threshold value. The model achieved 92 and 98 percent accuracy, respectively, without and with transfer learning.

IV.IMPLEMENTATION TOOL

Table 1 Hardware details of the proposed system

Hardware Details			
S.No	Hardware Component	Description Of Component	Quantity
1	Breadboard	A flexible plastic board that is used to connect various electronic components. Breadboards, which are commonly used for prototyping electronic circuits, can be recycled for new purposes.	1
2	Arduino Uno R3	The Arduino Uno R3 is an ATmega328 AVR microcontroller board with a removable dual-inline package (DIP).	1
3	Ultrasonic Distance Sensor	An ultrasonic sensor is a device that uses ultrasonic sound waves to measure the distance to an object.	1
4	Piezo	Certain solid materials, such as crystals, ceramics and biological matter like bone and DNA, accumulate an electric charge known as piezoelectricity.	1
5	Neo Pixel Ring 12	A circle with an outer diameter of 1.75" (44.5mm) contains 12 ultra-bright smart LED NeoPixels.	1

Table 2 Software details of the proposed system

S.No	Software Component	Description of Component
1	Arduino IDE	The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++.

5.Results

Figure 2(a) Hardware implementation.

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Figure 2(b): Hardware implementation.

In order to prevent the spread of most respiratory infectious diseases, social distancing involves keeping a distance of at least 2 metres between people. When the trigger distance is reached, the buzzer goes off, signalling that the device is monitoring the distance continuously. There is a 1-meter trigger distance. As a result, the buzzer will sound if anyone comes within two metres of it. Keeping social distance is made easier with the aid of this device. For this purpose, the device employs an ultrasonic distance sensor. The ultrasonic sensor measures the distance between the device and an obstacle or person by sending out high- and low-frequency pulses. As shown in Figure 2(a & b), sensor errors in distance estimations are analysed and modelled to better understand how the system works.

VI. CONCLUSION

Social distancing is one of the most effective ways to prevent the spread of the COVID-19 virus among individuals and organisations. Accurate distance measurements, exposure time measurements, warnings about being too close, and sensor technology all work together to slow the spread of the disease. This will be a much more effective way of reducing the spread of disease as a result of social isolation. Finally, it's important to note that this research only looks at one aspect of social distancing: keeping a physical distance from strangers in public places.

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