



Social and Physical Distancing Detector

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ABSTRACT

A social solution recommended by World Health Organization (WHO) authorities in this COVID-19 is to cover a physical distance of six feet, a mandatory safety measure in shopping centers, schools and other crowded areas. In this COVID-19 environment, everyone is conscious about their safety, so we came up with the idea of developing this novel device. Most of the time, our focus is on the people in front and the side of the us, but were not able to monitor the people behind us. The main objective of this project is to maintain social distance between the people. In this proposed work PIR sensor, Ultrasonic sensor and Arduino UNO are used. When the PIR sensor detects motion, the ultrasonic sensor measures the distance between people. If a person is in the critical range of six feet around him, this device will warn the person. If the distance is less than six feet, this buzzer indicates the violation of requisite healthy distance. On March 11, 2020, the World Health Organization (WHO) confirmed COVID-19 a pandemic, in response to the more than 1,00,000 confirmed cases globally in more than 100 countries, and the persistent threat of spreading further. Presently, there is no medicine to cure or vaccine to prevent the spread of COVID 19. The only way to curb its menace is taking precautionary measures as advised by Health experts. Social distancing i.e. maintaining a minimum distance of 1-1.5 meter between two individuals is one of the proactive measures advised by WHO. In this paper, an ATMEGA (open source) based Smart wearable device “Manav Rakshak” is proposed. It can be worn while travelling outside home and will help in maintaining the social distancing thereby curb the spread of COVID-19.

Index Terms:- COVID-19, PIR sensor, ATMEGA, ultrasonic sensor.

1. INTRODUCTION

A corona virus is a type of common virus that infects our upper respiratory tract system including throat and nose. It derives its name from its crown like shape when observed under a microscope. As per World Health Organization (WHO), pneumonia of unknown cause detected in Wuhan, China

was first reported to the WHO Country Office in China on 31st December 2019. The outbreak was declared a Public Health Emergency of International Concern on 30th January 2020. On 11th February 2020, WHO announced a name for the new coronavirus disease: COVID-19. The situation was monitored closely along with



daily assessment of the number of confirmed cases of COVID-19 across the globe. On March 11, 2020, as per WHO report, in the past two weeks, the number of cases of COVID-19 outside China had increased 13-fold, and the number of affected countries tripled. With more than 1,18,000 cases in 114 countries, and 4,291 people having lost their lives, COVID-19 was spreading alarmingly. In the ensuing days and weeks ahead, it was feared that the number of cases, the number of deaths, and the number of affected countries would increase further. The number of people infected with this deadly disease is increasing in India also. In line with the directions and guidance of the World Health Organization, the Government of India, has taken active steps with an aim to curb the spread of this disease. As per advisory issued the suspected patient should look for the following signs and symptoms: Fever Cough Shortness of breath or difficulty in breathing Presently there is no medicine to cure or vaccine to prevent COVID-19. As they say prevention is better than cure, is aptly suitable in the current scenario. The best way to prevent infection is to avoid being exposed to the virus through the following measures: I. Observe good personal Hygiene II. Practice frequent hand washing with soap III. Covering mouth when coughing and sneezing IV. Social Distancing As per Health Experts Social Distancing can be an effective measure to curtail the spread of COVID-19. Social distancing is purposely maintaining the physical space between individuals to prevent spread of illness. Keeping a distance

of at least one metre from other people lessens the chances of getting infected with COVID-19. Social distancing is a non-pharmaceutical infection prevention and control intervention implemented to avoid/decrease contact between those who are infected with a disease causing pathogen and those who are not, so as to stop or slow down the rate and extent of disease transmission in a community. This eventually leads to decrease in spread, morbidity and mortality due to the disease. In addition to the proposed interventions, the State/UT Governments may prescribe such other measures as they consider necessary. For effective impact of social distancing the authorities

2. LITERATURE SURVEY

A brief literature review on some papers are given below. M. Christina (2020) evaluated a virtual social distancing model that helps people to be maintain in public places. They represent four types of vacancy called intimate space, personal space, social space, and public spacing. Based on the distance measurement rule, spaces are measured. The process deals with visual understanding and geometric measurements, homograph estimation, metric reference and density estimation, etc. Secondary analysis involves the detection of two-dimensional people and social distance monitoring of multiple angles and face mask detection using deep neural network detection[5].L. Shi (2012) discusses ultrasonic nondestructive testing methods applied in the hydraulic cylinder production process; Cylinder represents the detection of

defects of the raw material of the barrel. With the principle of ultrasonic thickness such as bubbles, cracks, impurities and tests of steel tube thickness; Introduces the method of selecting raw materials through measured thicknesses, detects the defects within the machine process and applies initial qualification tests to the assembled hydraulic cylinders. M. Matsumoto (2017) used to develop a human detection model, an hardware based that approach in which distance measurement using sound wave sensors is used. The distance between the two citizen is decided through the variation within the sound waves accumulated to make a distance variable [6]. The signal strength determines the variation within the distance. Normally the signal strength is decided using RSSI (received signal strength value). The system also track the position of the humans with reference to the received value of RSSI. In this paper, Tsai (2017) defines a system⁷ for measuring the temperature through monitoring the radiation of the object in the infrared spectrum. The temperature difference of an objects is observed by a long term on a computer is done by Lab View software, using a measuring device passing through a knowledge acquisition interface.

Yunkyung Kim, Bilge Mutlu el at. In his paper investigates how social distance can serve as a lens through which we can understand human-robot relationships and develop guidelines for robot design. In tw studies, we examine the effects of distance based on physical proximity (proxemic distance), organizational status (power

distance), and task structure (task distance) on people's experiences with and perceptions of a humanlike robot. Mohammed Ghazal, Rania Hamouda, Samr Ali el at proposes a smart queue management system for delivering real-time service request updates to clients' smartphones in the form of audio and visual feedback. The proposed system aims at reducing the dissatisfaction with services with medium to long waiting times Rahul Reddy Nadikattu, Sikender Mohseinuddin Mohammad, Pawan Whig el at. research paper, an innovative localization method was proposing to track humans' position in an outdoor environment based on sensors is proposed. With the help of artificial intelligence, this novel smart device is handy for maintaining a social distancing

3.METHODOLOGY

The proposed system in this will be implemented.

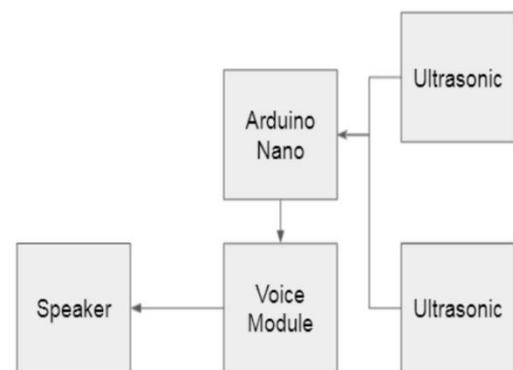


Figure 1 Block Diagram

We introduce the solution for social distancing problem, a device for monitoring social distance defined as the automatic estimation of the distance form an ultrasonic

sensor, and the characterization of related people aggregation. The device is pivotal for a noninvasive analysis to whether people comply with the SD restriction, and to provide a recorded voice signal about the level of safety of specific areas whenever this constraint is violated. Thus ensuring that everyone is within the healthy limits a socially safe distance. The device consists of Ultrasonic Sensor, Buzzer and a microcontroller. The Sensor will detect the distance between the wearer and other individual. The microcontroller is programmed to verify the desired distance and trigger the alarm accordingly. The ultrasonic sensor use to detect the distance in cm . There are two sensors that continue to detect the distance . for Ultrasonic 1 if the distance is less than 10 cm (for demo we use 10cm) for 5 seconds then voice playback that please maintenance the distance between 1 and 2 . Voice module is MP3 player model that have SD card and mp3 format messages to play. As per the programming we can play the message if the sensor detect the signal threshold value. Similarly for Ultrasonic 1 if the distance is less than 10 cm (for demo we use 10cm) for 5 seconds then voice playback that please maintenance the distance between 2 and 3. After 10 second continue to play the message like maintain “the social distance and wear the mask.

4.IMPLEMENTATION

The flow diagram of PDD

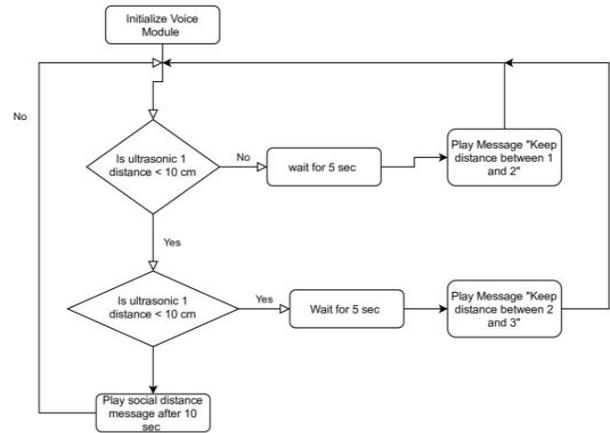


Figure 2 Flowchart of the system

The Circuit Diagram of the Social Distancing Project based on the Arduino Nano and an Ultrasonic Sensor is very simple. The whole project can be powered up using different voltage sources. You can use a 9V or 12V battery. As the LM7805 Voltage Regulator accepts a wide range of input voltages from 7 to 25 Volts, so the whole project can also be powered up using a small solar panel. also use the 5V Lipo Battery pack.

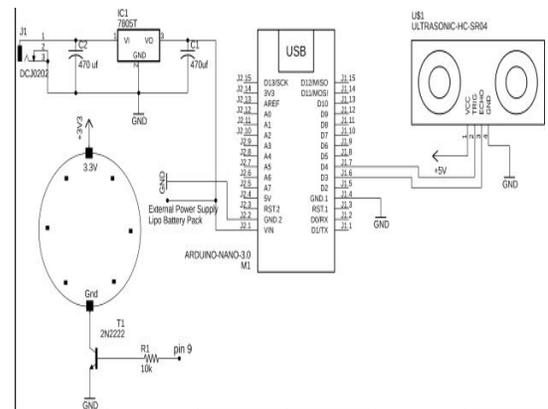


Figure 3 Circuit Diagram of the system

J1 is the DC Female Power Jack and this where we connect our external power supply. The voltage and GND legs of the DC female power jack are connected with the input and ground legs of the LM7805 Voltage regulator. Two 470uF electrolytic decoupling capacitors are connected at the input and output sides of the voltage regulator. The output leg of the voltage regulator is connected with the VIN pin of the Arduino Nano and the ground of the 5V regulated power supply is connected with the GND pin of the Arduino Nano. The LED module 3.3V supply pin is connected with the Arduino's 3.3V. The ground pin of the LED ring module is connected with the collector of the 2n2222 NPN transistor. The emitter of the transistor is connected with the ground, while the base is connected with the Arduino's pin number 9 through a 10K resistor. The transistor and 10k resistor together makes the driver circuit that controls the LED module. The HC-SR04 Ultrasonic Sensor VCC and GND pins are connected with the Arduino's 5 Volts and GND, while the Trigger and ECHO pins of the Ultrasonic Sensor are connected with the Arduino's pins 4 and 3 respectively. So, that's all about the circuit diagram.

5. RESULT & CONCLUSION

Here, two ultrasonic sensors are placed in directions and connected to Arduino Uno. Each sensor collects the distance of the object in all four directions and compares it with the distance safety value defined in the program. When the user comes too close to

another person in any of the directions, an alarm sound is produced.

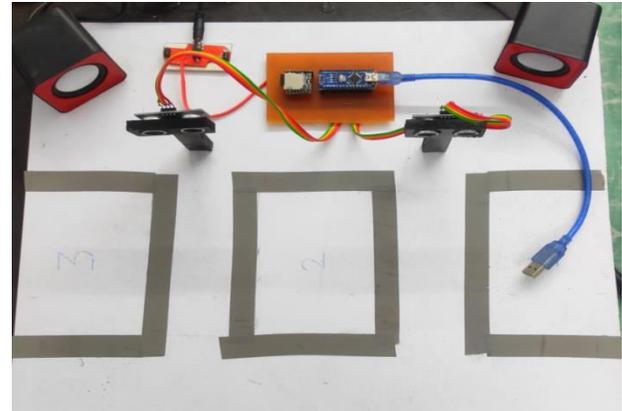


Figure 4 Demo model and is working as per the requirement

In this system, System can alert the user, according to the distance generated on the Arduino processor based on the results of ultrasonic wave sensing received. The position obtained by arduino is closer than the actual position, so the warning is given when the actual distance is greater than the distance. The results of the trial showed that system worked according to the objective, i.e. it is meticulous at a "critical" distance of 1.5 m to 2 m. The results of this study are still open to follow-up research involving the public as actual users..

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