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Social Distancing Alarming Through Proximity Sensors for COVID-19

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Abstract: The term social-distancing (S-D) is a way to stop or slow the spreading of contagious disease. In other words, it means less physical communication between two or more persons. In S-D the gap between two living beings (normally human) is 6 feet (two meters). In this short note, we propose a proximity-based alarming device that alerts the user when he or she crosses the threshold S-D limit. This equipment will help people to maintain safe distance among themselves that ultimately help avoidance of spreading coronavirus. This model is the integration of the proximity sensor and an alarming mechanism. This prototype has been tested on a toy for validation purposes.

1. Introduction

Coronavirus disease 2019 (COVID-19), is a contagious disease which is caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). In December 2019, the first case of COVID-19 has been detected at Wuhan the capital of China's Hubei province. Now, this has been spread globally, resulting in the ongoing coronavirus pandemic. As per the report published by the World Health Organization (WHO), the virus mainly spread due to close contact. The small droplets produced through talking, sneezing, and coughing are the carrier of the CORONA virus. This COVID-19 also can be spread through touching the infected surface or objects and by touching the face as well. As of today (5th -April-2020), more than 1.2 million cases have been reported from all over the world that results in 64,700 deaths and more than 247,000 people have recovered.In this short-note, we are not going to discuss the medical background of COVID-19 neither we are going to discuss the history of COVID-19. This information is already available in various forums like social networks, journals, YouTube videos, etc. The primary focus of our work is to warn the people when they knowingly or unknowingly cross the threshold of an S-D limit that is 6 feet or 2 meters. The proposed model is the integration of proximity sensors and an alarming model. To design this social distancing device (S2D) we have borrowed the concept of the proximity sensor in the car.

2. Proximity Sensor

The proximity sensor (PS) which is also known as the perimeter sensor, is responsible to trigger the alarm when an object is close to the sensor perimeter. The PS can detect the presence of a non-metallic object without having a touch. PS uses semiconductor outputs, which gives a

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Service life. PS can be used in temperatures ranging from -40 to 200°C. PS performance is independent of the colors of the object. The basic function of PS is the emitting of electromagnetic radiations (Ex. Infrared (IR)), and observe for a change in the echo signal. There are several types of PS are available based on the PS's target. In-car, the PS uses echo-times from sound waves that bounce off nearby objects. The PS able to calculate the distance between the objects and the car. The same concept we have transferred into a portable pocket device called "S2D" for the human. In this case, if two persons with an S2D device come in close contact that is within two meters range then both the person will get a warning for social distancing. The alarm can be in any forms like a sound or a digital message. Fig.1 illustrates the distancing concept with the help of PS. Fig.2 illustrates the internal element of inductive PS.

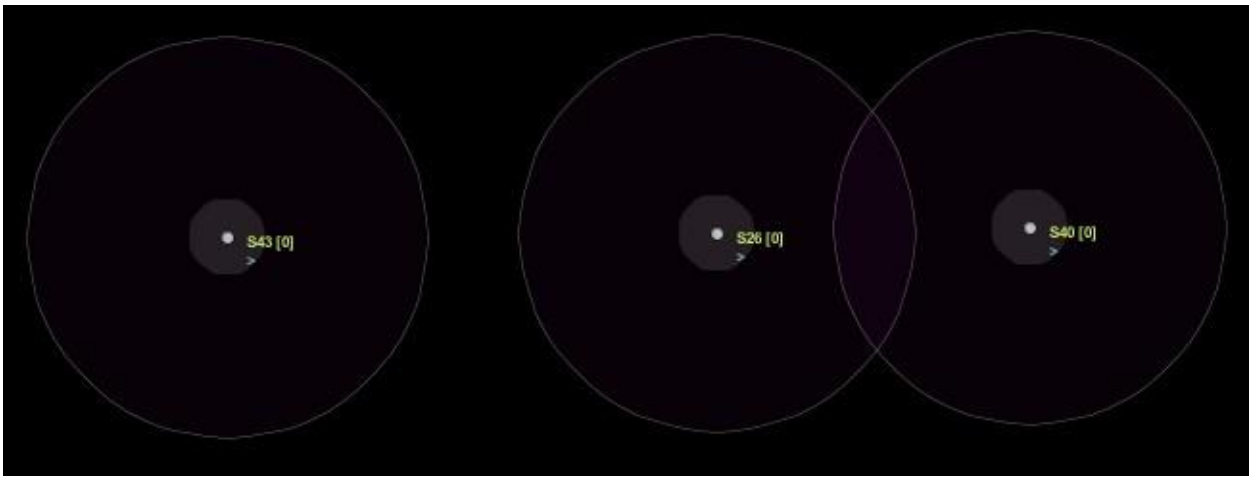

Fig.1 Deployed Proximity Sensors with their perimeter

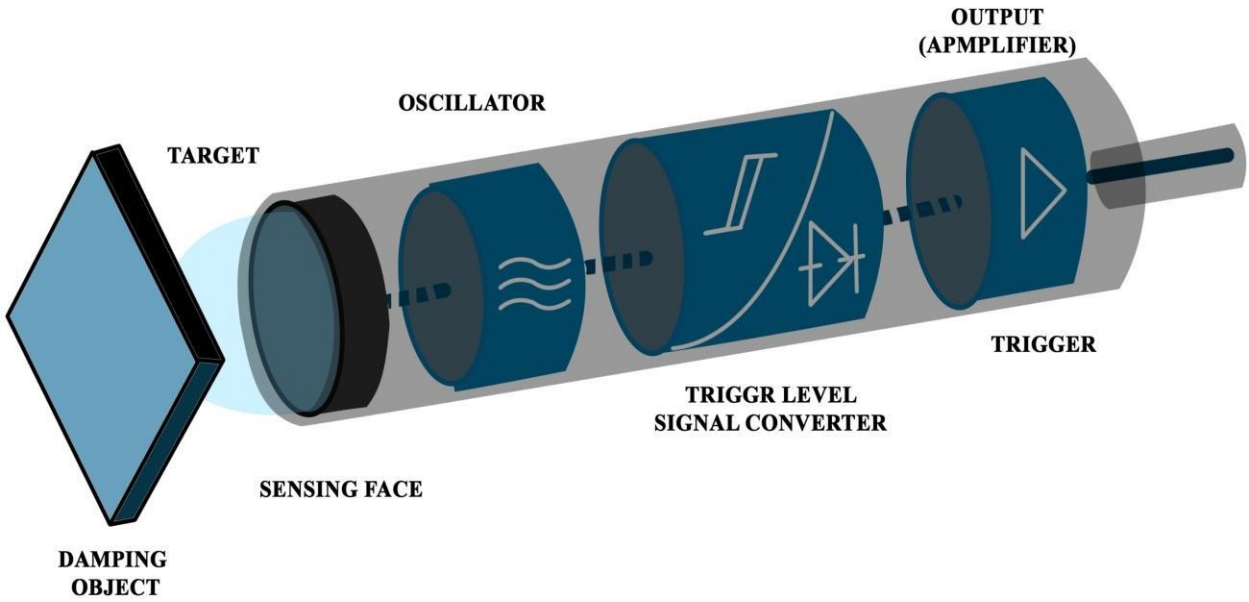

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Fig.2 Internal elements of inductive proximity sensors

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1. Simulation of S2D

In the designing process of S2D, we have used PS and an alarming system. Fig.3 illustrates the alarming process when the sensors are touching the perimeter of each other. The replication of the same when we have applied on toy for the alarming about social distancing. This process creates an alarm for each human when they knowingly and unknowingly enter into the close proximity of each other. Fig 4 illustrates the PS based human interaction. In Fig 4, two case study has been illustrated in the first case (left side of image) where the two men are maintaining proper social distancing whereas in the right side of the image the two men are crossing the proximity-based threshold limitation hence there is an alarm as a warning message.

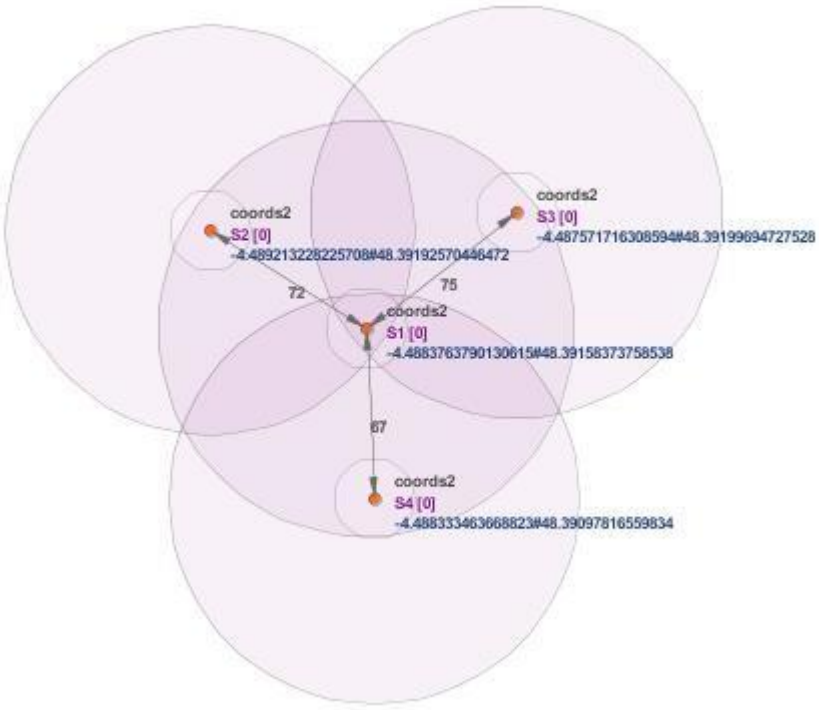

Fig 3. Interaction among PS

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Steps	Procedure
Step 1	**Inputs:** Human Interaction
Step 2	**Output:** Alarm Generation
Step 3	**If** (S-D > Minimum Threshold Limit)
Step 4	**Then**
Step 5	No alarm
Step 6	**Else**
Step 7	Trigger Alarm
Step 8	**Repeat: Steps 3-7**
	For (Each new interaction**)**

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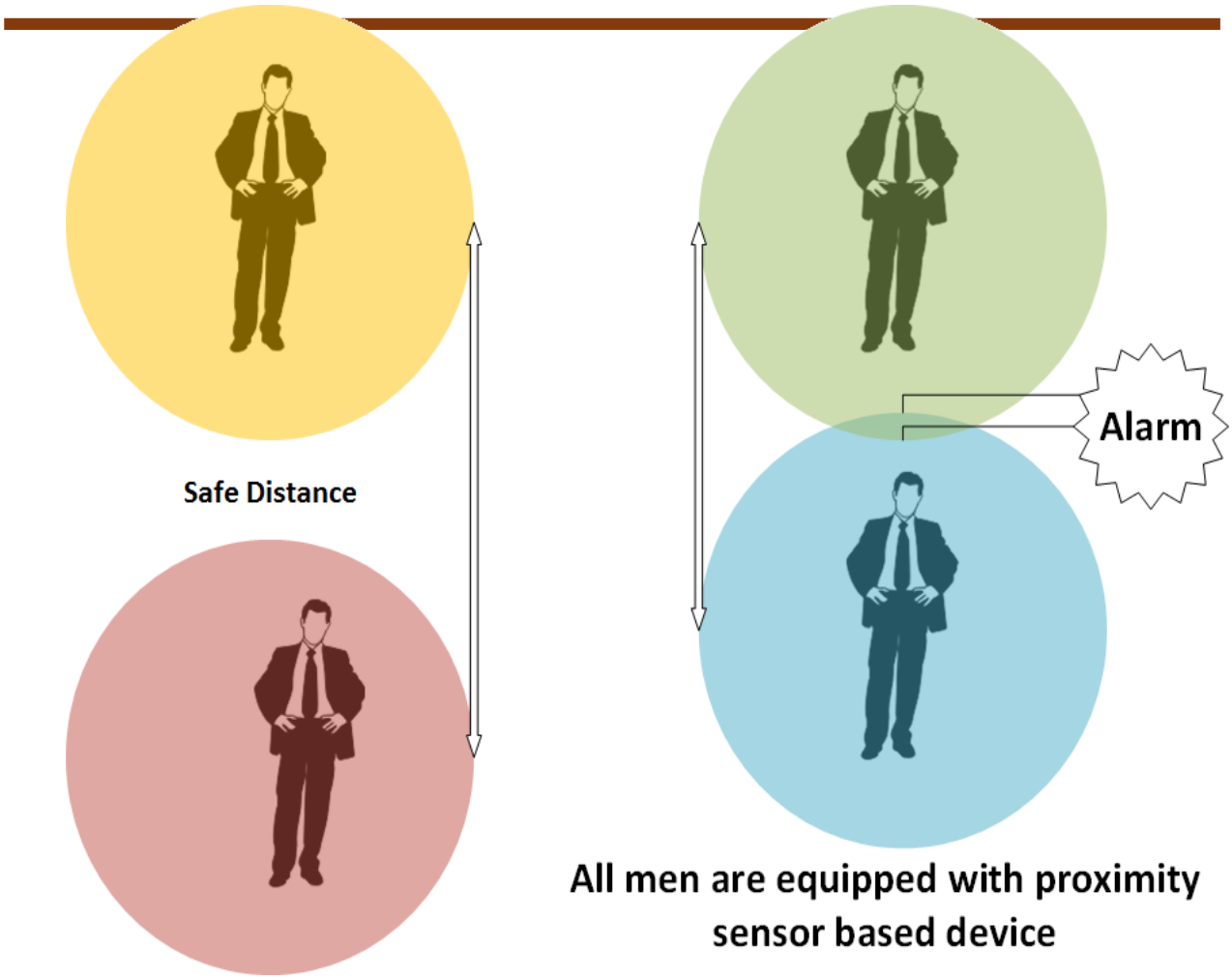

Fig 4. PS based human interaction.

In this short note, we have proposed the idea that the proximity sensor of the car can also be used for humans as an alarming device during this crucial condition of COVID-19. As we all know, until today no vaccine has been developed for COVID-19 hence except social-distancing there is no other way to stop the spreading of the coronavirus. Through this proposed model the users can get an alarm or warning which helps them to maintain a safe distance in case of emergency interaction.

3. Conclusion:

In this paper, we just tried to help the society to fight against COVID-19. In the absence of a vaccine for COVID-19, social-distancing is the only solution left with human beings. Hence, in this short note, we have tried to use the proximity sensor of the car for humans. In case of emergency interaction or in any other circumstances when interaction cannot be avoidable by using this S2D device the users can maintain a safe distance from each other. The alarming

system of S2D warns the human when they cross the threshold minimum safe distance.

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