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Social Distancing Monitoring Robot

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ABSTRACT: Social distancing monitoring robot which aims to limit the spread of Covid by observing distance between disease spreading individuals. We present a method is essential for banks, Public Offices, Malls, Schools, Theatres etc usually see long queues for hours every day. In the absence of an effective treatment and vaccine the efforts to control this pandemic strictly to take effective measures to monitor the safety distance criteria to avoid more positive cases and to control the death toll. To ensure social distancing in queues we hereby design a social distancing monitoring robot. The purpose of this work is to provide an effective social distance monitoring solution. The robot consists of a 2 wheel design system used to drive the robotic vehicle. It makes use of a line following principle to constantly move along with the queue and monitor for social distancing violations. The robotic uses IR sensing to travel along with the queue to and fro in order to detect violations. The robot is now equipped with obstacle detecting ultrasonic sensor in order to detect obstacles in the vehicle path.

KEYWORDS: Distance detection, Alert message, Capturing images, Mobile App (telegram).

I. INTRODUCTION

The **COVID-19 pandemic** is an ongoing pandemic. Social distancing is very importance during this current pandemic. The World Health Organization declared a Public Health Emergency of International Concern regarding COVID-19 on 30 January 2020, and later declared a pandemic on 11 March 2020. As of 31 May 2021, more than 170 million cases have been confirmed, with more than 3.54 million confirmed deaths attributed to COVID-19, making it one of the deadliest pandemics in history. This situation forces the world to find out a solution to avoid current pandemic. Organizations such as the Centers for Disease Control and Prevention (CDC) have recommended many guidelines including maintaining social distancing, wearing masks or other facial coverings, and frequent hand washing to reduce the chances of contracting or spreading the virus. The term social distancing is the best objective to reduce the spread of COVID by observing distance between disease spreading individuals. As prescribed by WHO, people should maintain at least 1 meter (m) distance from each other to control the spread of this disease [1, 2, 3].

To ensure social distancing in queues we hereby design a social distancing monitoring robot. The robot consists of a 2 wheel design system used to drive the robotic vehicle. It makes use of a line following principle to constantly move along with the queue and monitor for social distancing violations. The robotic uses IR sensing to travel along with the queue to and fro in order to detect violations. The robotic vehicle uses another ultrasonic sensor for detecting distance between 2 individuals in a queue. If any 2 individuals are found having less than 3 feet distance between them, the robot instantly sounds a buzzer and alert to inform about the violation. Also it sends images of these violations along with a camera picture. Thus this project allows for automatic maintaining social distancing in queues to help prevent spread of the virus.

Paper is organized as follows. In Section 2, we present a brief review of related works on the importance of and emerging technologies for social distancing and robot navigation. In Section 3, we describe about methodology In Section 4, We provide experimental result including image of working model. The model uses ultrasonic sensors and IR sensor, also this section including the sample images which we capture through the mobile App. Finally, In Section 5, we present the effectiveness or working result of our monitoring robot



II. RELATED WORK

In this section, we briefly introduce related work done on the social distancing in the context of the 2019 novel corona virus disease. The novel generation of the corona virus disease (COVID-19) was reported in late December 2019 in Wuhan, China. After only a few months, the virus became a global outbreak in 2020. As the disease spread at the end of December, researchers started work to pay their contributions in the deadly situation. On March 11, World Health Organization (WHO) [1, 4] declared it pandemic due to its spread over 114 countries with a death toll of 4000 and active cases of 118000 [5]. Social distancing was suggested as the alternative solution. During this serious situation, it is necessary to take proper action. Recently, Eksin et al. [6] evaluated the susceptible infected recovered (SIR) model where they included a social distancing term. They showed that the spread of disease depends upon people's social behaviour. In the same background, Prem et al. [7] studied the consequences of social distancing measures on the progression of the COVID-19 epidemic in Wuhan, China. They used synthetic location-specific contact patterns to imitate an ongoing trajectory outbreak using age structure susceptible-exposed-infected removed (SEIR) models for several social distancing measures. They interpreted that a sudden rise in interventions will lead to an early secondary peak but it will flatten gradually with time. In the same background, Kylie et al. [8] have studied the association between transmissibility and social distancing and found that association decreases as transmissibility decreases within different provinces of China

The COVID-19 pandemic began; many technology-oriented solutions are formed. Many techniques have been proposed to monitor whether people are maintaining the social distance. For instance, workers in Amazon warehouses are monitored for social distancing breaches using CCTV cameras. Other methods include using wearable alert devices. Such devices work using Bluetooth or UWB technologies. Companies such as Apple and Google are developing contact tracing applications that can alert users if they come in contact with a person who could be infected.

As well as many countries are seeking for a technology-oriented solutions. UK has launched an application (app) named C9 corona symptom tracker [9] that helps people to report their symptoms. Similarly, South Korea launched an app named Corona 100m [9] that has stored the location of infected people and generate alert to healthy people when they came near to corona patients at a distance of 100m. India has developed an app that helps people to maintain a specific distance from a person who has tested corona positive. Besides this, India, South Korea, and Singapore are taking benefit from CCTV footage [9] to monitor the recently visited places of COVID-19 patients to track down the infected people. China is utilizing AI-powered thermal cameras [9] to identify those people in the crowd having the temperature. Such inventions are very helpful to reduce the spread of the corona virus

Effectiveness of a social distancing measure is evaluated based on two factors: (1). the basic reproduction number R_0 , and (2) the attack rate. R_0 is the average number of people to whom an infected person could spread the virus during the course of an outbreak. The attack rate is the ratio between the total number of infected cases over the entire course of the outbreak [10]. For instance, in [11], in a workplace setting, the attack rate can be reduced by up to 82% if three consecutive days are removed from the workdays for $R_0 = 1.4$ [11]. Similarly, in an $R_0 = 1.4$ setting, maintaining 6 feet or more between persons in the workplace could reduce the attack rate by up to 39.22% [12] or reduce the rate by 11% to 20% depending on the frequency of contact with other employees [13].

III. METHODOLOGY

In this section, we describe the major hardware parts and how our method effectively detect the distance. Then we describes the second part of its working. IOT based monitoring technique is used in this system with Raspberry Pi model 3+, IR sensor and ultra sonic sensor model SRO4. IR sensor to travel along with the queue to and fro in order to detect violations. Ultrasonic sensor for detecting distance between 2 individuals in a queue. If any 2 individuals are found having less than 3 feet distance between them, the robot instantly sounds a buzzer and alert to inform about the violation with a warning message as "keep distance". Also this system takes the images that make the violation using webcam

- A fully autonomous surveillance robot.
- IR, Ultra sensing
- Buzzer
- Alert message



- Capturing images using webcam

IV. EXPERIMENTAL RESULTS

Figures show experimental result and hardware, software parts. Description about the components of the Hardware parts and it's working.

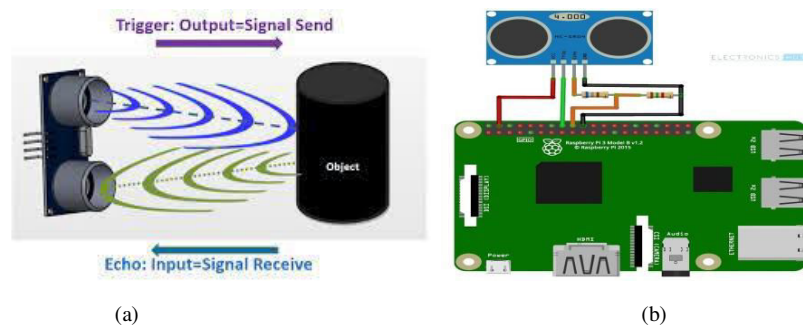


Figure 1 (a) shows that the object detection using Ultra sonic sensor. 1(b) is the image of main part of this monitoring robot, Raspberry pi that is Connected with sensors.

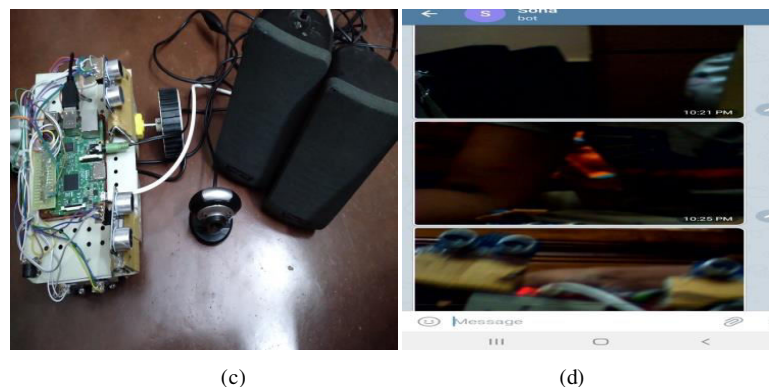


Fig. 2. (c) Working model of social distancing monitoring robot-speaker used to produce the buzzer sound, webcam is used to capturing the images who makes the violation. 2 (d) shows that the software part of this model . Sample images which are send through the mobile App(telegram)

V. CONCLUSION

We have presented a IOT- based model to control the current pandemic. It helps to limit the spread of Covid by observing distance between disease spreading individuals'. The robotic vehicles move along with the queue and monitoring social distancing violations. It detecting the distance between 2 individuals in a queue. If any 2 individuals are found having less than 3 feet distance between them, the robot instantly sounds a buzzer with a alert message as" keep distance" to inform about the violation. Also it captures the pictures that makes the violations and send through a mobile App to inform the higher authorities.

We need to perform more studies on the social impact of such robots. . Eventually, we want to evaluate the robot's performance in crowded public settings and outdoor scenarios. We also need to design better techniques to improve the enforcement of social distancing by using better human-robot interaction methods.



REFERENCES

- [1] WHO. Who director-generals opening remarks at the media briefing on covid-19-11 march 2020;. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports>.
- [2] Setti L, Passarini F, De Gennaro G, Barbieri P, Perrone MG, Borelli M, et al. Airborne transmission route of COVID-19: why 2 meters/6 feet of inter-personal distance could not Be enough; 2020. pmid:32340347
- [3] da Cunha de Sá-Caputo D, Taiar R, Seixas A, Sanudo B, Sonza A, Bernardo-Filho M. A Proposal of Physical Performance Tests Adapted as Home Workout Options during the COVID-19 Pandemic. *Applied Sciences*. 2020;10(14):4755.
- [4] Organization WH. WHO corona-viruses (COVID19);. <https://www.who.int/health-topics/coronavirus>
- [5] Roosa K, Lee Y, Luo R, Kirpich A, Rothenberg R, Hyman JM, et al. Short-term forecasts of the COVID-19 epidemic in Guangdong and Zhejiang, China: February 13–23, 2020. *Journal of clinical medicine*. 2020;9(2):596.
- [6] 4Eksin C, Paarporn K, Weitz JS. Systematic biases in disease forecasting–The role of behavior change. *Epidemics*. 2019;27:96–105.
- [7] Prem K, Liu Y, Russell TW, Kucharski AJ, Eggo RM, Davies N, et al. The effect of control strategies to reduce social mixing on outcomes of the COVID-19 epidemic in Wuhan, China: a modelling study. *The Lancet Public Health*. 2020;.
- [8] Ainslie KE, Walters CE, Fu H, Bhatia S, Wang H, Xi X, et al. Evidence of initial success for China exiting COVID-19 social distancing policy after achieving containment. *Wellcome Open Research*. 2020;5.
- [9] G Seetharaman EB. How countries are using technology to fight coronavirus;. <https://economictimes.indiatimes.com/tech/software/how-countries-are-using-technology-to-fight-coronavirus/articleshow/74867177.cms>
- [10] C. T. Nguyen, Y. Mulya Saputra, N. Van Huynh, N.-T. Nguyen, T. Viet Khoa, B. M. Tuan, D. N. Nguyen, D. T. Hoang, T. X. Vu, E. Dutkiewicz, S. Chatzinotas, and B. Ottersten, “Enabling and Emerging Technologies for Social Distancing: A Comprehensive Survey,” arXiv e-prints, p. arXiv:2005.02816, May 2020
- [11] L. Mao, “Agent-based simulation for weekend-extension strategies to mitigate influenza outbreaks,” *BMC Public Health*, vol. 11, no. 1, p. 522, Dec 2011. [Online]. Available: <https://doi.org/10.1186/1471-2458-11-522>
- [12] S. Kumar, J. J. Grefenstette, D. Galloway, S. M. Albert, and D. S. Burke, “Policies to reduce influenza in the workplace: impact assessments using an agent-based model,” *Am J Public Health*, vol. 103, no. 8, pp. 1406– 1411, Aug 2013.
- [13] T. Timpka, H. Eriksson, E. Holm, M. Stromgren, J. Ekberg, A. Spreco, and Dahlstrom, “Relevance of workplace social mixing during influenza pandemics: an experimental modelling study of workplace cultures,” *Epidemiol. Infect.*, vol. 144, no. 10, pp. 2031–2042, July 2016.



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