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IOT Based Social Distancing & Monitoring Robot

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Abstract: In This Period Maintaining social distancing norms between humans has become an indispensable precaution to slow down the transmission of SARS COVID-19. I present a novel method to automatically detect pairs of humans in a crowded scenario who are not adhering to the social distance constraint, i.e., about 6 feet of space between them. My approach Will makes no assumption about the crowd density or pedestrian walking directions. I use a mobile robot with commodity sensors, namely a camera and a 2-D lidar to perform collision-free navigation in a Crowd and estimate the distance between all detected individuals in the camera's field of view. In addition, With It I also equip the robot with a thermal camera that wirelessly transmits thermal images to a security/healthcare personnel who monitors if any individual exhibits a higher-than-normal temperature. In indoor scenarios, this mobile robot can also be combined with static mounted cameras to further improve the performance in terms of number of social distancing Culprits detected, accurately pursuing walking pedestrians etc. I highlight the performance benefits of our approach in different static and dynamic indoor scenarios.

Keywords: SARS COVID-19 pandemic, Social Distancing, Collision Avoidance. Mobile Robot.

I. INTRODUCTION

Nowadays Social distancing is of key importance during the current pandemic It helps limit the spread of covid by observing distance between disease spreading individuals Now it is not possible to station a person 24×7 at each queue to monitor social distancing violations Banks, Public Offices, Malls, Schools, Theatres etc usually see long queues for hours every day to ensure social distancing in queues we hereby design a social distancing monitoring robot. A key issue is developing guidelines and methods to enforce these social distance constraints in public or private gatherings at indoor or outdoor locations. This gives rise to many challenges including, framing reasonable rules that people can follow when they use public places such as supermarkets, pharmacies, railway and bus stations, spaces for recreation and essential work, and how people can be encouraged to follow the new rules. In addition, it is also crucial to detect when such rules are breached so that appropriate counter-measures can be employed. Detecting social distancing breaches could also help in contact tracing.

II. REVIEW OF LITERATURE

The SARS COVID-19 pandemic has caused significant disruption to daily life around the world. As of August 14, 2020, there have been 21:8 million confirmed cases worldwide with more than 735 thousand fatalities. Furthermore, this pandemic has caused significant economic and social impacts.
SARS COVID-19 is to avoid being exposed to the coronavirus. Organizations such as the Centres for Disease Control and Prevention 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. Broadly, social distancing refers to the measures taken to reduce the frequency of people coming into contact with others and to

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maintain at least 6 feet of distance between individuals who are not from the same household. Several groups have simulated the spread of the virus and shown that social distancing can significantly reduce the total number of infected cases.

III.PROBLEM STATEMENT

As We Humans Weren't ready for the novel coronavirus and neither were the machines. The pandemic has come at an awkward time, technologically speaking. Ever more sophisticated robots and AI are augmenting human workers, rather than replacing them entirely. While it would be nice if we could protect doctors and nurses by turning more tasks over to robots, medicine is particularly hard to automate. It's fundamentally human, requiring fine motor skills, compassion, and quick life-and-death decision-making we wouldn't want to leave to machines. "Robotics and automation could play a major role in combating infectious diseases, such as Covid-19," As epidemics escalate, the potential roles of robotics are becoming increasingly clear. "Additionally, robots could enable a form of telemedicine that would keep humans out of areas of contagion. "SARS COVID-19 could be a catalyst for developing robotic systems that can be rapidly deployed with remote access by experts and essential service providers without the need of traveling to front lines," they wrote. A cruel irony of the coronavirus pandemic is that medical professionals know better than anyone that social distancing is critical for slowing the rate of new infections, yet they're forced to be the closest to the disease. And those that need social interaction perhaps more than anybody the elderly are the ones who need to isolate the most, since they're the most susceptible to the disease.

IV. PROPOSED PLAN

The robot will consist of a 4-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. This robot will uses IR sensing to travel along with the queue in order to detect violations by humans. The robot is now equipped with obstacle detecting ultrasonic sensor in order to detect obstacles in the vehicle path. The robotic vehicle uses another ultrasonic sensor for detecting distance between 2 individuals in a queue. It any 2 individuals are found having less than 3 feet distance between them, the robot instantly start sounds and alert to inform about the violation. Also, it will send alerts of these violations along with a camera picture using Wi-Fi over IOT to inform the higher authorities to update them about violations with proof so instant disciplinary action can be taken against those humans. Thus, this project allows for automatic maintaining social distancing in queues to help prevent spread of the SARS COVID-19 virus.

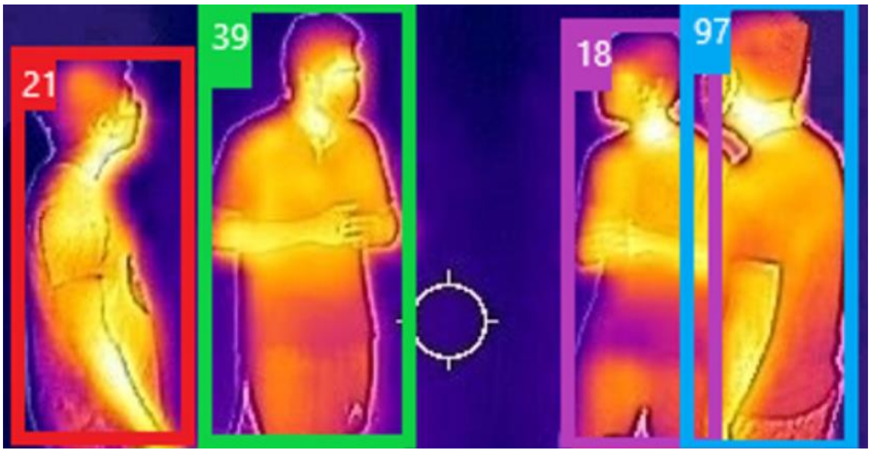

Fig 1 Thermal Illustration

V. ANALYSIS OF RESULTS

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A mobile robot system that detects breaches in social distancing norms, autonomously navigates towards groups of non-compliant people, and encourages them to maintain at least 6 feet of distance. we demonstrate that our mobile robot monitoring system is effective in terms of detecting social distancing breaches in static indoor scenes and can enforce social distancing in all of the detected breaches. Furthermore, our method does not require the humans to wear any tracking or wearable devices. integrate a CCTV setup in indoor scenes (if available) with the COVID-robot to further increase the area being monitored and improve the accuracy of tracking and pursuing dynamic non-compliant pedestrians. This hybrid combination of static mounted cameras and a mobile robot can further improve the number of

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breaches detected and enforcements by up to 100%. A real-time method to estimate distances between people in images captured using an RGB-D camera on the robot and CCTV camera using a homograph transformation. The distance estimate has an average error of 0.3 feet in indoor environments. algorithm for classifying noncompliant people into different groups and selecting a goal that makes the robot move to the vicinity of the largest group and enforce social distancing norms. a thermal camera with the robot and wirelessly transmits the thermal images to appropriate security/healthcare personnel. The robot does not record temperatures or perform any form of person recognition to protect people's privacy.

VI. CONCLUSION

we present a method to detect breaches in social distancing norms in indoor scenes using visual sensors. If we use a mobile robot to attend to the individuals who are non-compliant with the social distancing norm and to encourage them to move apart by displaying a message on a screen mounted on the robot. we demonstrate this method will effective in localizing pedestrians, detecting breaches, and pursuing walking pedestrians. We conclude that the hybrid configuration outperforms configurations in which only one of the two components is used for tracking and pursuing non-compliant pedestrians. Therefore, all individuals in an indoor environment are encouraged to maintain a 6-foot distance from each other. The current approach for issuing a warning to violating pedestrians using a monitor has limitations, and we need to develop better human-robot approaches. As more such monitoring robots are used to check for social distances or collecting related data, this could also affect the behavior of pedestrians in different settings. we need to perform more studies on the social impact of such robots. Due to COVID restrictions, have only been able to evaluate the performance of COVID-robot in low to medium density laboratory settings. Eventually, we want to evaluate the robot's performance in crowded public settings and outdoor scenarios. we will also need to design better techniques to improve the enforcement of social distancing by using better human-robot interaction methods.

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