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SOCIAL DISTANCING MONITORING ROBOT

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ABSTRACT

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, Theatre, etc.., usually see long queues for hours every day. To ensure social distancing in queues we hereby design a social distancing monitoring robot. The robot consists of a four 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 robot use IR sensor to travel along with the queue to and front in order to detect violations. The robot is now equipped with the obstacle detecting ultrasonic sensor in order to detect obstacles in the vehicle path. The robotic vehicle uses other ultrasonic sensor for detecting distance between two individuals in a queue. It any two individuals are found having less than three feet distance between them, the robot instantly sounds a buzzer and alert to inform about the violation, also it sends alerts of these violations along with a camera picture using WiFi over IoT to inform the higher authorities or head office to update them about violations with proof so instant disciplinary action can be taken. Thus this work allows for automatic maintaining social distancing in queues help to prevent the spread of the Corona virus

Keywords:Social distance monitor, Prevent spread

I INTRODUCTION

Coming future is expected to face a lot of difficulties for survival if the situation continues .The virus that causes COVID-19 spreads easily through physical contact from person to person. This is why it is important to reduce the ways people come in close contact with one another. An effective way to do this is to stay home as much as possible and avoid crowded, public places where it is difficult to keep a safe space between people.Physical distancing in indoor and outdoor spaces is an essential way to slow down the spread of COVID-19. And it's important to keep following physical distancing recommendations in your community, whether you're in one of the high-risk groups or not.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

counter-measures can be employed. Detecting social distancing breaches could also help in contact tracing.

II RELATEDDOCUMENTS

NaimahYaakob et al proposed the paper titled "IoT-BasedAutomated and Contactless Shopping Cart DuringPandemic Diseases Outbreak" .Which was published in the year 2021 by International Conference on Engineering and Technology (ICoEngTech) .Coronavirus (COVID-19) is an alarming disease outbreak that has affected more than 180 countries worldwide. It has caused close to 2.5 million deaths and has infected 114 million of the global population as of February 2021. This unprecedented pandemic, has caused severe socio-economic problems globally, catching many sectors off-guard and in a state of suspended uncertainty. While vaccines are just starting to circulate, there is still a need to practice new social norms, including social distancing during daily activities such as supermarket shopping. As such, contactless technology is critically needed and preferable to minimize physical contact and mitigate virus spread. In this work, an automated shopping cart is proposed as a potential solution to avoid item scanning at cashiers and long queues at payment counters. This innovation leads to reduced risk of exposure to COVID-19. This is done by integrating a typical shopping trolley with Internet of Things (IoT) technology.[1].

Nadikattu, Rahul Reddy, et al proposed the Paper titled "Novel economical social distancing smart device for COVID19" .Which was published in the year 2021 by International Conference on Engineering and Technology (ICoEngTech) In the coronavirus outbreak pandemic by COVID-19, the World Health Organization (WHO) has been issuing several guidelines through all government agencies. In line with those guidelines, social distancing in the population has been a major prevention practice, compelled by all government agencies worldwide. Despite strong recommendations to maintain at least one-and-a-half-meter distance between the persons, the guideline is not scrupulously followed. To overcome this situation, an IoT-based technical solution is proposed through this paper. PIR sensor is used for the detection of a target in the vicinity (1.5 m).. The suggested portable device will always notify the person who is violating the norm of 1.5 m. The proposed device will minimize the possibility of transmission and reduce the infection rate of COVID-19. The device uses a PIR sensor depending upon the applicability area of the human being.[2].

MeghaKanwar and L. Agilandeeswari proposed the Paper titled "IOT Based Fire Fighting Robot".Which was published in the year 2020 by International Conference on Engineering and Technology (ICoEngTech).This work is an IOT based firefighting robot that detects fire. After being informed the authorities can start visualizing the fire location and can communicate with people stuck with a help of an automatic receiver installed. Instructions can be given to the robot regarding its movement, turning on its water pump or carbon-dioxide pump depending on fire type through long distances. The fire type and carbon-monoxide level is known using the sensors installed that provide a graph to make the analysis. The analysis is also useful to further give information to safety authorities regarding amount of poisonous gases inhaled over a time period by the occupants of the affected area so they can take appropriate actions to undo the harm. The analysis is also useful to further give information to safety authorities regarding amount of poisonous gases inhaled over a time period by the occupants of the affected area so they can take appropriate actions to undo the harm.[3].

Manuel Martinez et.al proposed the paper titled "Helping the Blind to Get through COVID-19: Social Distancing Assistant Using Real-Time Semantic Segmentation on RGB-D Video". Which was published in the year 2020 by Institute for Anthropometrics and Robotics, Karlsruhe Institute of Technology. This work is the current COVID-19 pandemic is having a major impact on our daily lives. Social distancing is one of the measures that has been implemented with the aim of slowing the spread of the disease, but it is difficult for blind people to comply with this. In this paper, we present a system that helps blind people to maintain physical distance to other persons using a combination of RGB and depth cameras. They use a real-time semantic segmentation algorithm on the RGB camera to detect where persons are and use the depth camera to assess the distance to them; then, they provide audio feedback through bone-conducting headphones if a person is closer than 1.5 m. Our system warns the

user only if persons are nearby but does not react to non-person objects such as walls, trees or doors; thus, it is not intrusive, and it is possible to use it in combination with other assistive devices. They have tested our prototype system on one blind and four blindfolded persons, and found that the system is precise, easy to use, and amounts to low cognitive load.[4,22].

William Waites et al proposed the paper titled "Determining the level of social distancing necessary to avoid future COVID-19 epidemic". Which was published in the year 2021 by a modelling study for North East London. This work Determining the level of social distancing, quantified here as the reduction in daily number of social contacts per person, i.e. the daily contact rate, needed to maintain control of the COVID-19 epidemic and not exceed acute bed capacity in case of future epidemic waves, is important for future planning of relaxing of strict social distancing measures. This work uses mathematical modeling to simulate the levels of COVID-19 in North East London (NEL) and inform the level of social distancing necessary to protect the public and the healthcare demand from future COVID-19 waves. They used a Susceptible-Exposed-Infected-Removed (SEIR) model describing the transmission of SARS-CoV-2 in NEL, calibrated to data on hospitalized patients with confirmed COVID-19, hospital discharges and in-hospital deaths in NEL during the first epidemic wave. To account for the uncertainty in both the infectiousness period and the proportion of symptomatic infection, they simulated nine scenarios for different combinations of infectiousness period (1, 3 and 5 days) and proportion of symptomatic infection (70%, 50% and 25% of all infections).[5,21].

Seithikurippu R, PandiPerumal et al proposed the paper titled "'Distant socializing,' not 'social distancing' as a public health strategy for COVID-19" .Which was published in the year 2021. This model This work is an IOT based firefighting robot that detects fire. After being informed the authorities can start visualizing the fire location and can communicate with people stuck with a help of an automatic receiver installed. Instructions can be given to the robot regarding its movement, turning on its water pump or carbon-dioxide pump depending on fire type through long distances. The fire type and carbon-monoxide level is known using the sensors installed that provide a graph to make the analysis. The analysis is also useful to further give information to safety authorities regarding amount of poisonous gases inhaled over a time period by the occupants of the affected area so they can take appropriate actions to undo the harm. Social distancing, also referred to as physical distancing, means creating a safe distance of at least two meters (six feet) between yourself and others. This is a term popularized during the COVID-19 pandemic, as it is one of the most important measures to prevent the spread of this virus. However, the term 'social distancing' can be misleading, as it may imply that individuals should stop socializing. However, socializing in a safe context (i.e. over the phone, video-chat, etc.) is especially important during this time of crisis.[6,20].

GianlucaBardaro ,EnricoDaga et al proposed the paper titled "Introducing a Smart City Component in a Robotic Competition". Which was published in the year 2020by Knowledge Media Institute, The Open University, Milton Keynes, United Kingdom. This work In recent years, two fields have become more prominent in our everyday life: smart cities and service robots. In a smart city, information is collected from distributed sensors around the city into centralized data hubs and used to improve the efficiency of the city systems and provide better services to citizens. Exploiting major advances in Computer Vision and Machine Learning, service robots have evolved from performing simple tasks to playing the role of hotel concierges, museum guides, waiters in cafes and restaurants, home assistants, automated delivery drones, and more. As digital agents, robots can be prime members of the smart city vision. On the one hand, smart city data can be accessed by robots to gain information that is relevant to the task in hand. On the other hand, robots can act as mobile sensors and actuators on behalf of the smart city, thus contributing to the data acquisition process. However, the connection between service robots and smart cities is surprisingly under-explored. In an effort to stimulate advances on the integration between robots and smart cities, we turned to robot competitions and hosted the first Smart Cities Robotics Challenge (SciRoc).[7,12.15]

.Loke CH, Adam MS et al proposed the paper titled "Physical Distancing Device with Edge Computing for COVID-19)". Which was published in the year 2020 by Department of Electrical,

Electronics and Systems Engineering, Faculty of Engineering and Built Environment, UniversitiKebangsaan Malaysia. This work The most effective methods of preventing COVID-19 infection include maintaining physical distancing and wearing a face mask while in close contact with people in public places. However, densely populated areas have a greater incidence of COVID-19 dissemination, which is caused by people who do not comply with standard operating procedures (SOPs). Thiswork presents a prototype called PADDIE-C19 (Physical Distancing Device with Edge Computing for COVID-19) to implement the physical distancing monitoring based on a low-cost edge computing device. The PADDIE-C19 provides real-time results and responses, as well as notifications and warnings to anyone who violates the 1-m physical distance rule. In addition, PADDIE-C19 includes temperature screening using an MLX90614 thermometer and ultrasonic sensors to restrict the number of people on specified premises. The Neural Network Processor (KPU) in Grove Artificial Intelligence Hardware Attached on Top (AI HAT), an edge computing unit, is used to accelerate the neural network model on person detection and achieve up to 18 frames per second (FPS)[8,11,17].

NingLu, Kai-Wen Cheng et al proposed the paper titled "Weathering COVID-19 storm: Successful control measures of five Asian countries". Which was published in the year 2020. In this work COVID-19 pandemic will be over it is probably premature to declare victory for any of the 5 countries discussed above. But they all have kept the new infection numbers low, including China, the world most populous country. China's situation could have been far worse. COVID-19 hit at the time of Chinese New Year, when millions travel across the country for big gatherings and celebrations with families and friends. The extreme measures of lockdowns, large-scale suspension of business and schools, and strict stay-at-home orders, though not sustainable long-term and at an enormous economic cost, have brought COVID-19 outbreak under control and saved thousands of lives. Learned from the 2003 SARS outbreak, Singapore and Taiwan were well-prepared responding to COVID-19 proactively, quickly, and aggressively from its outset. South Korea, learned from MERS outbreak in 2015, implemented its well-planed and well-organized widespread testing to identify and isolate infected cases effectively. Japan, utilizing group mentality promoted social distancing successfully.[9,18,19].

Loke CH, Adam MS et al. proposed the paper titled "Social Distancing Device with Computing for COVID-19 (PADDIE-C19)" .Which was published in the year 2020 by Department of Electrical, Electronics and Systems Engineering, Faculty of Engineering and Built Environment, UniversityKebangsaan Malaysia. ThisworkThe most effective methods of preventing COVID-19 infection include maintaining physical distancing and wearing a face mask while in close contact with people in public places. However, densely populated areas have a greater incidence of COVID-19 dissemination, which is caused by people who do not comply with standard operating procedures (SOPs). This paper presents a prototype called PADDIE-C19 (Physical Distancing Device with Edge Computing for COVID-19) to implement the physical distancing monitoring based on a low-cost edge computing device. The PADDIE-C19 provides real-time results and responses, as well as notifications and warnings to anyone who violates the 1-m physical distance rule. In addition, PADDIE-C19 includes temperature screening using an MLX90614 thermometer and ultrasonic sensors to restrict the number of people on specified premises. The Neural Network Processor (KPU) in Grove Artificial Intelligence Hardware Attached on Top (AI HAT), an edge computing unit, is used to accelerate the neural network model on person detection and achieve up to 18 frames per second (FPS)[10,15-16]

III PROPOSED SYSTEM

As we can see the reduce in corona virus by maintain the social distance.The robot is now equipped with the obstacle detecting ultrasonic sensor in order to detect obstacles in the vehicle path. Also it sends alerts of these violations along with a camera picture using WiFi over IoT to inform the higher authorities or head office to update them about violations with proof so instant disciplinary action can be taken. And also, it is used to measure the temperature of the people in the queue is implemented. When the left sensor appears on the black line, the robot rotates to the left on the black line shown in figure3.8. If the right sensor detects the black line, the robot will turn to the right until both sensors are on the white surface. When the white area appears, the robot moves forward again. The sensor is displayed as a black line and the robot stops. The robot will have a four wheel design system that will be utilized to operate the robotic vehicle. It employs the line-following concept to keep up with the queue and monitor for social distance infractions. This robot will utilize infrared sensing to travel beside the queue in order to identify human transgressions. To identify obstructions in the vehicle's route, the robot now has an obstacle-detecting ultrasonic sensor. Another ultrasonic sensor is used by the robotic vehicle to detect the distance between two people in a queue. If any two individuals are found to have less than three feet between them, the robot instantly starts to sound and alerts them about the violation. Also, it will send an SMS alerts of these violations along that it send a alert in IoT using Wi-Fi 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 maintenance of social distance in queues to help prevent the spread of the SARS COVID-19 virus

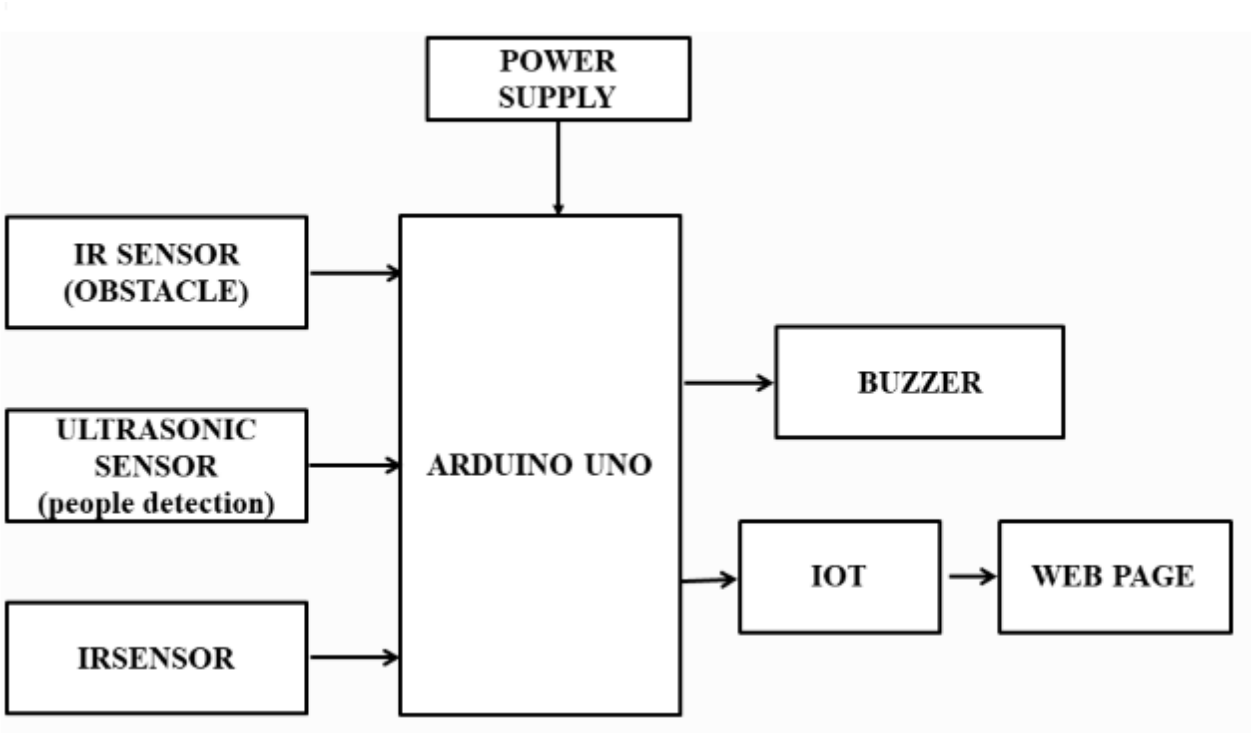

FIGURE 1. Social Distancing Monitoring Robot

In the figure 2 social distancing monitoring robot we are using for the automation of the robot. TheIR Sensor is used as the sensor for robot movement. The right sensor detects the

black line, the robot will turn to the right until both sensors are on the white surface. When the white area appears, the robot moves forward again. The sensor is displayed as a black line and the robot stops. Thelightwhichisconnectedtothelight.ThedetectionofthesensorsarestoredintheIoT cloudthroughtheWi-Fimodule whichisconnectedtothe Arduino.

IVRESULTSANDDISCUSSION

The robot was fully automated and the violations and social distancing are being continuouslymonitored. The Sensors are programmed in such a way that it will indicate farmers the varioussituations.Theoutputsof theprogrammedsensorsareindatabase farm.

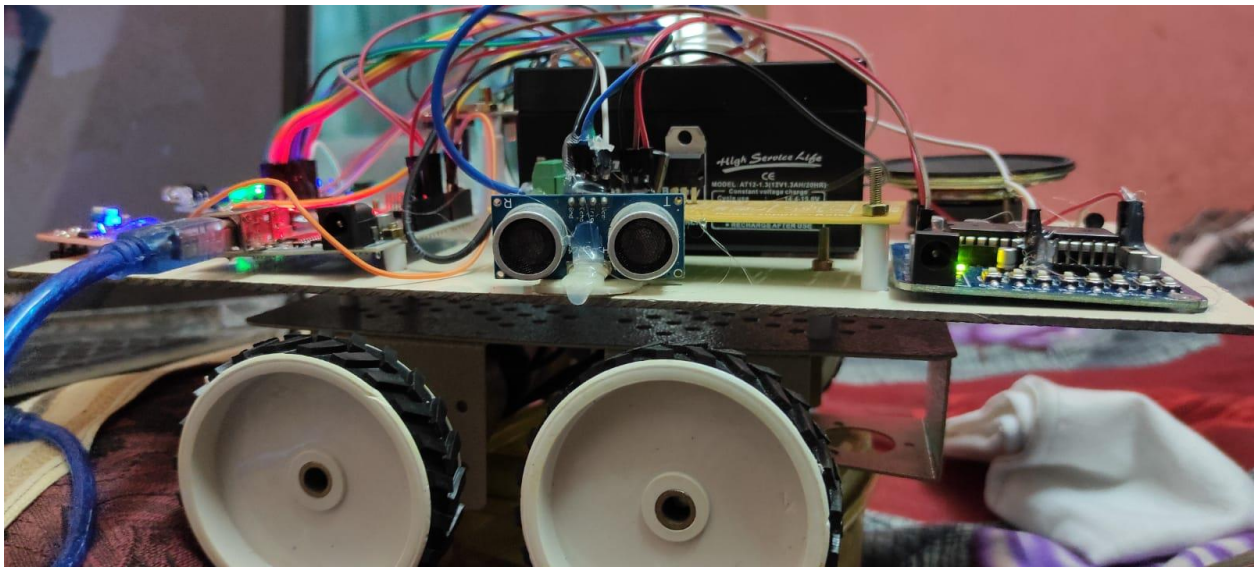

FIGURE 2 Social Distancing and Monitoring Robot Model

The database here shows the data of the social distance violated in thequeueand data maintained in IoT. The figure 3 and 4 shows theRobot Modeland figure 5 showsoutput of robot.

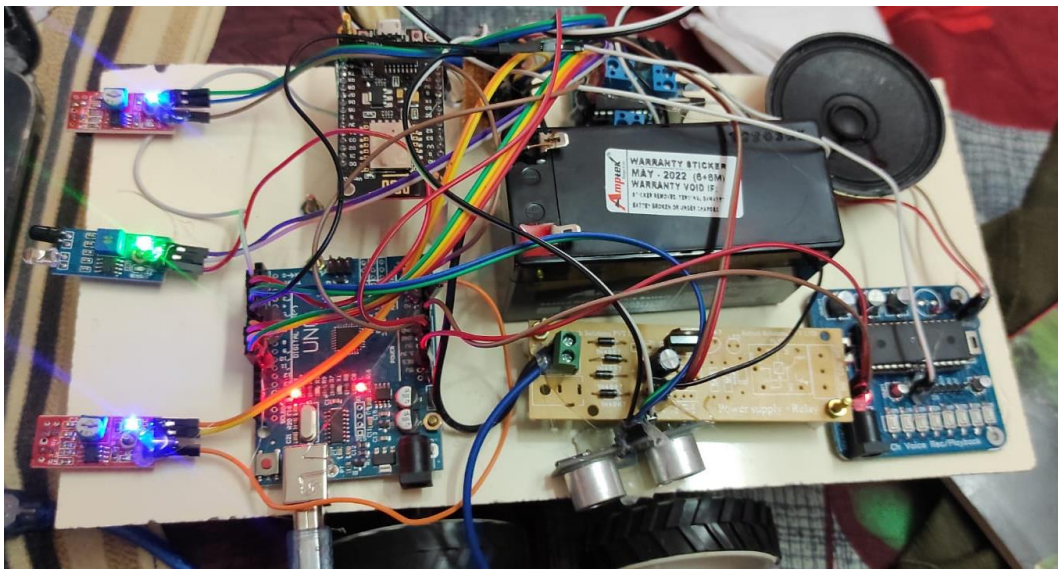

FIGURE 3 Social Distancing and Monitoring Robot Model

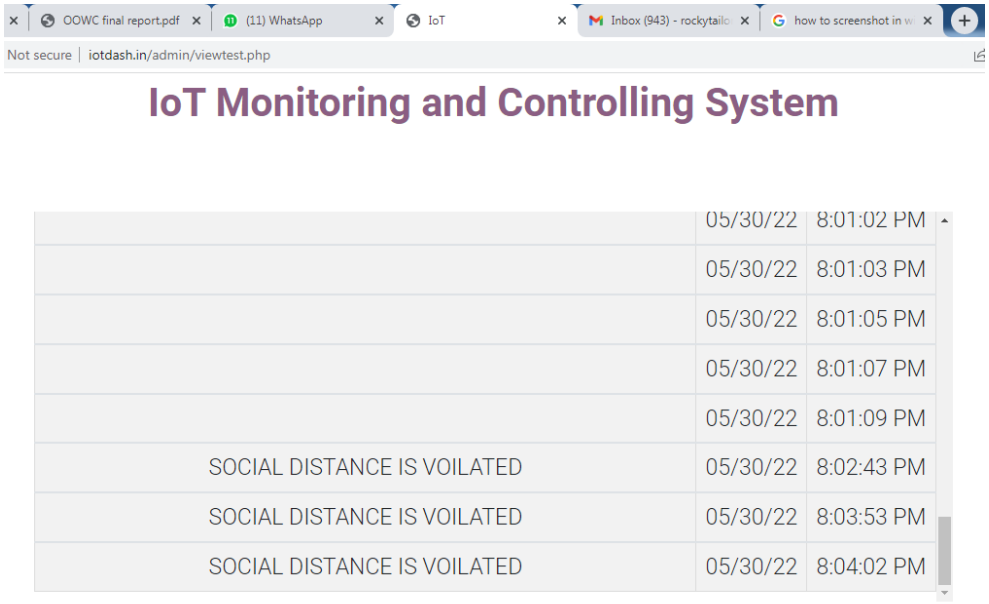

FIGURE4 Social Distancing and Monitoring Robot output

The above figure 5 is an output of social distancing monitoring robot where the social distance violated information are stored in aIoT.

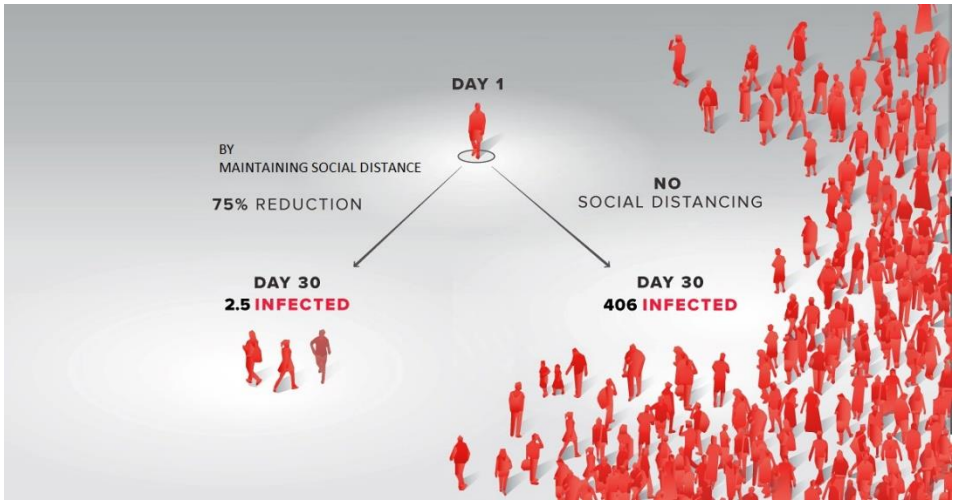

FIGURE 5 Overall Achievement

When there is no threat from a pandemic, there is no need for physical distancing, but some form of social distancing can still be useful for maintaining a scientist's intellectual independence either by developing a robot or by avoiding the risk of bruises in the first place by avoiding social friction.

VCONCLUSION

Even though people will spread the virus before they realize they're sick, it's critical to keep at least six feet away from others, even if you or they aren't sick. People who are at a higher risk of COVID-19 overexposure should maintain a greater social distance. We can determine the distance between people and control the spread of viral illnesses using this tail tracking and social distance robot, especially if social distance is a significant issue. Banks, government institutions, retail malls, theaters, and other places with long lines. With the use of machine learning, computer vision, thermal imaging, and ultrasound technologies, we will be able to automatically apply for the future.

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