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IoT based Auto Temperature Detection and Social Distancing Monitoring

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Abstract: *In today's pandemic situation of COVID-19 WHO suggest 3 norms for avoiding COVID-19 infection such as Wear a Mask, Maintain 6 feet distance from other person and use hand sanitizer frequently as these are proven to be the only solution. As we know, to stop the spread of corona virus we need to avoid rush, maintain social distance and people with high fever symptoms are not allowed at public places. In this paper, we introduced cost-effective system based on IOT that help organizations respect the COVID-19 safety rules and guidelines in order to reduce the disease spread is presented. It seems very difficult to measure temperature manually of every person so we are presenting an idea of auto temperature detection using Arduino microcontroller board along with temperature sensor. We decided to use these devices due to their small size and affordability. Temperature sensing & social distancing check subsystem relies on Arduino using sensors. The device will give alert (using buzzer) to the person if someone is not following social distancing. If the Temperature is above threshold limit we not allow to enter the person. The method is reasonably accurate and can be very useful in maintaining social distancing and Auto Temperature Detection.*

Keywords: Temperature Detection

I. INTRODUCTION

Since last two years whole world is facing to COVID-19 Pandemic situation. As of now, researchers know that the coronavirus is spread through droplets and virus particles released into the air when an infected person breathes, talks, laughs, sings, coughs or sneezes. Larger droplets may fall to the ground in a few seconds, but tiny infectious particles can linger in the air and accumulate in indoor places, especially where many people are gathered and there is poor ventilation. This is why mask-wearing, hand hygiene and physical distancing are essential to preventing COVID-19. However, to the best of our knowledge, there is no such solution covering all these aspects together to achieve this goal while allowing execution on low-cost devices at the same time. In our proposed paper, we will present an idea that will cover solution for high temperature & social distancing. This application used in public area as well like malls, banks, theatres, offices and everywhere.

Device is equipped with different sensors and is able to detect different types of safety rule Violations. Two types of safety rule violations are considered: Social Distancing and High Temperature. In case that some violation occurs, then the corresponding Action is taken as a response, such as closing Door, alter (buzzer), display on LCD screen. This advantage of this novel device is that it does not only help in maintaining social distancing but also give alert.

II. RELATED WORK

The current outbreak of the novel coronavirus also known as COVID-19 was declared as a public health emergency by the WHO where over a million people have been affected by the disease with over 50000 deaths till date. Social distancing is a method to minimize crowd interactions and prevent the spread of disease within groups of people. This is a common practice which has been carried out over generations to minimize the spread of virus by limiting its reproduction rate (R0) among communities. The article focuses on how social distancing has been used to deal previous pandemics globally and the issues that need to be addressed to tackle the COVID-19 threat.

The solution, based on the combined integration of an infrared thermometer and a capacitive humidity sensor, is able to provide a fast and accurate tool for remotely sensing both ambient and body temperature in the framework of pandemic

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situations, such as COVID-19, thus avoiding any direct contact with people. The information relative to the ambient temperature is successfully exploited to derive a correction formula for the accurate extraction of body temperature from the measurement provided by the standard infrared sensor. Full details on the design of the proposed platform are provided in the work, by reporting relevant simulation results on the variations of ambient temperature, relative humidity, and body temperature. Experimental validations are also discussed to provide a full assessment of the proposed approach.

III. LITERATURE SURVEY

COVID-19 is an acute, sometimes severe, respiratory illness caused by the coronavirus. In 2019 First discovered in Wuhan, China, the virus has spread all over the globe, where places like Europe, India are facing the second wave of COVID19 pandemic in 2021. Now that the pandemic is nowhere to be seen to take an end, efforts must be made to mitigate the spread of the Virus. Organizations like Shopping malls, schools, Banks have turned out to be places where crowd gatherings happen the most, and here the chance of being infected also increases. So, to stop the spread of the virus, we have proposed a system that provides smart surveillance in crowded areas. In the proposed model we have done Face Mask detection, temperature Monitoring along with continuous tracking of crowd density and to integrate all these modules we have used Multiple Regression Mode.**[1]**

Due to COVID-19 pandemic, society needs to embrace and adopt new norm that includes practising social distance to break the transmission. The smart social distance application or tracker can help people to be constantly monitored and reminded to adhere to this practice. Direct impact that can be seen from this application will be lower or minimum number of COVID-19 cases due to high level of social distance compliance. This paper will present an innovative solution called MySD which stand for "My Safe Distance" that help users or public to observe social distance advice closely. It leverages smart phone hardware features that typically has Bluetooth transceiver as well GPS to determine safe distance and required level compliance. **[2]**

The paper presents a methodology for social distancing detection using deep learning to evaluate the distance between people to mitigate the impact of this coronavirus pandemic. The detection tool was developed to alert people to maintain a safe distance with each other by evaluating a video feed. The video frame from the camera was used as input, and the open-source object detection pre-trained model based on the YOLOv3 algorithm was employed for pedestrian detection. Later, the video frame was transformed into top-down view for distance measurement from the 2D plane. The distance between people can be estimated and any noncompliant pair of people in the display will be indicated with a red frame and red line. The proposed method was validated on a pre-recorded video of pedestrians walking on the street. The result shows that the proposed method is able to determine the social distancing measures between multiple people in the video. The developed technique can be further developed as a detection tool in real-time application. **[3]**

Machine learning concepts and algorithms also find a great place amidst various scientists. Among all the preventive measures, social distancing plays a vital role in flattening the COVID-19 curve. This paper proposes an effective social distancing capturing and alerting tool to detect humans if they are not maintaining the social distance. The system acquires images/videos as input and process it to detect the Region of Interest (ROI) and human in the image frame. Then, the pairwise distance is computed between all the identified people and depending on the distance value obtained the system will alert the people who are not maintaining the social distance. The system is evaluated for various image input acquisition techniques like image, video, and camera image/video to compute the performance of the system. Experimental results shows that the proposed system obtains a better precision of 99.7% for images and 97% recall for videos. The system can also be extended to applications like human tracking, pedestrian detection, and vehicle tracking. **[4]**

The widespread Corona Virus Disease 2019 or COVID-19 infectious disease has caused global deaths of 1.5+million with more than 66.5 million worldwide cases as of 5 December 2020. As per WHO and various studies based on mathematical models concluded that social distancing is the most potent preventive measure against covid-19 which can help bring down the rising cases and mortality rate. With more than 50 candidate vaccines under development but none being 100% effective to cure covid-19, social distancing is the most effective approach to fight this global pandemic. Inspired by this we propose a computer vision-based social distancing detector based on the Detection Transformer object

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detection model and applied camera calibration and perspective transformation to make the complete system independent of the camera view-point and distortion which attains balanced mean average precision (MAP) and fps score suitable for real-time environments. Extensive and meticulous experiments were done using SOTA models; Efficient Net with Efficient Net B0 and B5 backbone and DETR with resnet-50 backbone. DETR outperformed both variants of Efficient Net and was used for real-time social distancing monitoring and analysis. **[5]**

IV. SYSTEM ARCHITECTURE

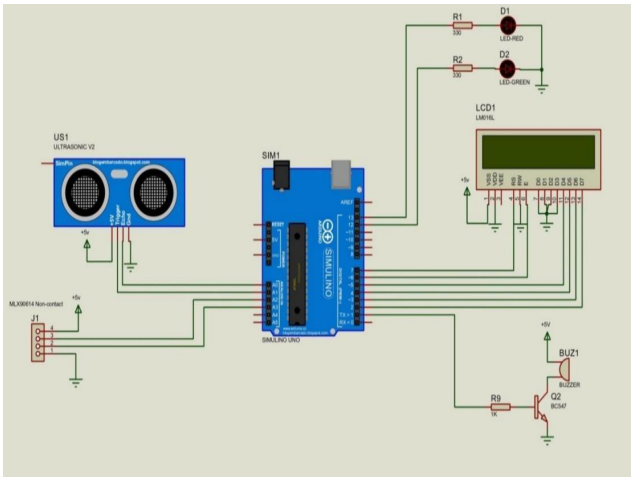

Figure: System Architecture

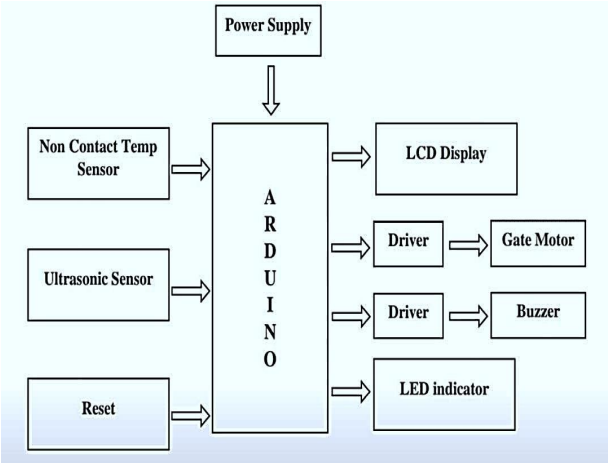

Figure: Block Diagram

For temperature measurement, non-contact temperature sensor is used and for social distancing, ultrasonic sensor is used. There is LCD display connected to controller for displaying temperature. There are two additional circuit (driver mentioned in block diagram) is used to drive motor and amplify current.

V. CONCLUSION

As per current pandemic situation of COVID-19 maintaining social distancing and measuring body temperature of every individual is necessary to avoid spread of Corona Virus. This paper will focus on the solution which is helpful for such pandemics disease situation and helps to maintain Social Distancing.

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