# Social Distancing Surveillance System For Public Places And Queue management

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**Abstract—Social distancing plays an important role to curb infectious diseases(COVID-19). Individuals have approached stope gatherings in crowded places, so there are chances to control the spread of the virus till a vaccine is found. At present days AI and IoT-based technologies are help full for solving daily life problems. and many chores have been automated by using them. In this report, we used python combined with artificial intelligence and computer vision to observe social distancing. The proposed system uses the YOLO v3 object recognition model to detect people in a video outline and then transforming that video frame to a bird's eye view for precise measurement of the distance between two persons and hardware to turn on the buzzer via IoT. The framework also proposes different features for different environments where the system is deployed like keeping track of Queue in Banks, Railway stations, Bus stands, etc., and areas where people gather more often, notifying people at the end of the day in private workplaces if they do not maintain social distancing, etc.**

**keywords – YOLO v3, Human detection, Bird's eye view transformation, Social Distancing, Queue management, send data to wireless node**

## I-INTRODUCTION

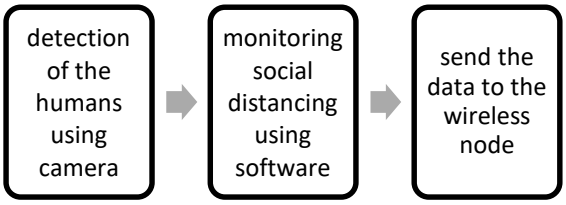
Coronavirus has a place with the group of Covid caused illnesses, at first revealed at Wuhan, China, in lateDecember 2020. Several healthcare organizations, clinical specialists, and researchers are attempting to create legitimate medications and antibodies for this virus, but to date, no achievement is reported. The present circumstance powers the overall planet to look for substitute ways to stop the spread of these infections. Social distancing is undertaken as the best stopper plug in the current situation, and all suffering countries are completely implemented locked down to maintain social distancing.[1]Numerous administrations all throughout the planet have carried out different estimates that advance social removing. Those actions incorporate travel limitations, restricting enormous occasions and get-togethers of numerous individuals, requesting that residents stay at home however much as could be expected, and keeping distances of 1.5-2 meters from one another or wearing a cover when such distance is unimaginable [1].[2]Nevertheless, individuals actually need to go outside for fundamental work, for medical care, and to get food, and it isn't in every case simple to carry out such measures. [2]Therefore, it is pivotal to create advances that work with social removing and that help forestalls its uncontrolled and quick spread.

The means of the paper is coordinated as follows. In Section II,we are introducing related deals with advancesused in the project to curb spread of infection. We are then proposing one such system for monitoring social distancing in public places and queues in Section III, then we conclude our work in Section IV.

## II-Related work

Social distancing is very important during the current pandemic disease named corona virus. It helps limiting covid-19 spread. It is impossible to station a person 24x7 at each queue to monitor social distancing violations. Public places like Schools, Malls, and Banks usually see long queues for hours every day .To avoid corona spread and maintain social distance we hereby design a [3][4]social distancing monitoring robot. The proposed frame work utilizes Human detecting utilizing visual observation framework is a setup space of examination which is depending upon manual techniques for distinguishing strange initiates, in any case, it has restricted abilities. Toward this path, late progressions advocate the need for[5] clever frameworks to identify and catch human enacts. object identification issues have been proficiently tended to by as of late created progressed strategies. Using pre-trained object detection models like[7] YOLO v3 one can easily detect humans in images .There are several methods to measure distance between detected humans like directly measuring [5],[6]pixel wise distance and using bird's eye view transformation for distance measurement more precisely. In these methods calibration of the distance is required.

Plan of execution: Our goal is to monitor social distancing in several environments. For this, we required a robust pre-trained model for human detection, several appropriate videos to work on, methods to measure the precise distance between two humans in several environments, and cloud-based hardware to give buzzer and safety instruction.




Implementation of proposed method: The proposed execution utilizes[7] you only look once v3 (YOLO v3) model for real-time object detection for this model we selected YOLOv3-416 which has an mAP (identifier execution on an approval set) of 55.3, which is very solid, with an execution speed of 35fps.weimportedlibraries of NumPy as[np],opencv2, mat plotlib. pyplot as [plt].to load and start the model for people detection and transform the video frame into[7][8] bird's eye view and Euclidean distance is utilized to gauge the distance between two people and Pass each casing through the model the model and get square boxes directions of each item, The certainty of every expectation (0 to 1), Class of the forecast (0 to90). Channel out fail forecasts and non-pertinent objects. One of the various classes perceived by the model is a person. The class-related with an individual is 1. To avoid both week forecasts (limit: 0.65) and any remaining classes of items with the exception of the individual, we utilized and if articulation consolidating the two conditions to bar some other article from the further calculation.Using the transformation matrix, these points are transformed to plot the human location on the bird's eye view, and the [8][9]Euclidean distance function is used to measure the distance between two peoplein the video outline. On the off chance that a social removing infringement is recognized (less than 6 feet), the bounding box and point in the bird's eye view are marked red. if the social distance is maintained the bounding box and point in the birds-eye view are marked green. [9]sSending the data to the wireless node using Raspberry pi via server and the data is received by the receiving node and it turns up thebuzzerand gives safty instruction.

Figure 1 image with source points

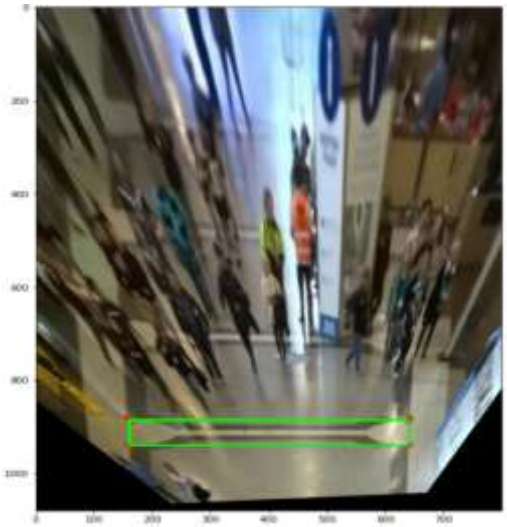


Figure 2 image with perspective transform

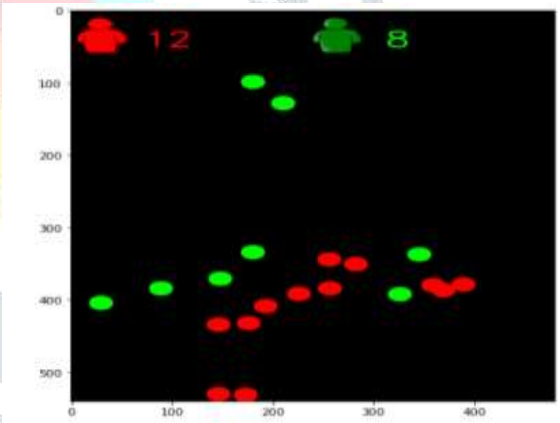



Figure 3 eagles view of finding people without social distance

Figure 4 detected people marked green with social distance and red without social distance

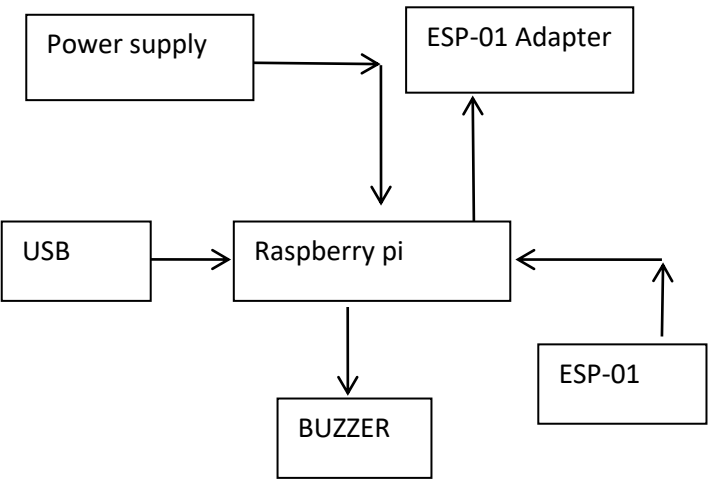
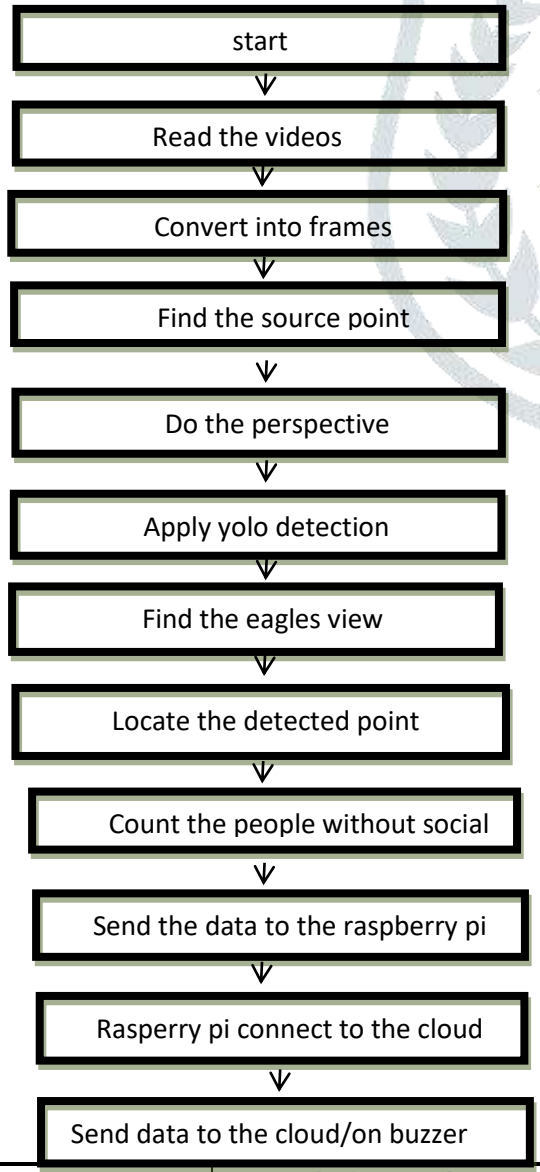



Figure 5 Send data to wire less node and to turn on buzzer

Flowchart-1

The social distance is monitored and alerted in splittings.


Flow Chart-2




detection of the crowd takes place using camerathen the video is captured and converts video into frames and find source point to detect the people [figure -1]the image is converted into gray scale for the better detectionthe images after the conversion is sent to the yolo v3. Yolo V3 algorithm detects the people and after detection we apply perspective transform[fig-2]. The perspective transform detects the people without social distancing and generates a eagles view [fig-3]detected people marked green with social distance and red without social distance[fig-4].counts the people with and with out social distancing and send data to raspberrypi which is connected to the cloud and send data to the cloud

Results:

Figure 6 Video before processed

Figure 7 Detection of people

Figuew 8Video frames are processed to detect total no of people and divide red marked persons and green marked persons

Figure 9 output for detected frams

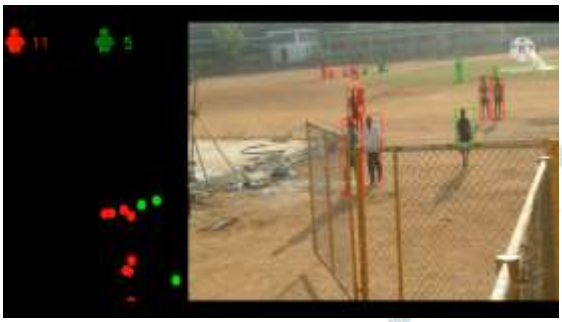


Figure 10 final result

IV-Discussion and conclusion

Today, social distancing measures are most frequently thought about as the way to slow the unfold of pandemic influenza. Health specialists have checked out past pandemics and found that in the 1957-58 pandemic, the spread of unwellness followed public gatherings like queues in government transport, conferences, and festivals. and through this pandemic, the highest attack rates were seen in class kids, due to their close contact in their school gatherings. Health specialists believe that avoiding crowds of individuals is going to be so helpful to unfold pandemic contagious diseases. Since a plague can not be stopped once it's started, and since health specialists don't know much about the situation as it will not happen so often, once the pandemic contagious disease is found in our space, social distancing measures can be used to slow the unfold the spread. so in our project mainly proposes an efficient real-time detection framework to automate the process of monitoring the social distancing via object detection, in which the program will run in real-time and detect persons and mark as boundary boxes. The generated boundary boxes aid in distinguishing the teams of individuals satisfying the safe distance norms or not and computed with the help of bird's eye view and the euclidian distance approach.

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