

# Physical Distancing System Using Computer Vision

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**Abstract**—The regulation of social distancing in standing queues such as queues at ATMs and queues for ordering fast food is very important to apply during COVID-19 pandemic. The system can control the discipline of keeping a distance which can reduce the rate of transmission of the Covid 19 virus. The system is expected to be able to handle supervision and regulation of the application of physical distancing by involving hardware input in the form of a camera, which will provide the condition of standing queue in the form of images to be processed to produce output information, the number of objects in the standing queue, the distance between objects and the x, y coordinates of the object in the standing queue. The final result of the Physical Distancing Warning System is able to maximize the distance control in standing queues such as queues at ATMs and queues for ordering fast food. Based on tests carried out able to detect human objects and calculate the distance between them. Tests to obtain the validity of system performance are carried out by varying the minimum threshold value. The best performance results are obtained at the minimum threshold value of 40 where the system error is 22.75%. The output of the computer vision process that is sent to the microcontroller as a command to the lights, servo and laser has been fully worked (100%) with the correctness of the response completely controlled by the processing results in the computer vision section.

**Keywords**—Physical distancing, computer vision and robotics

## I. INTRODUCTION

The regulation of social distancing in standing queues such as queues at ATMs and queues for ordering fast food is very important to apply during this COVID-19 pandemic. The supervision in the implementation of physical distancing needs some effort. This is not an easy thing because there are many obstacles such as limited personnel who can carry out supervision. The person who carries out supervision will not fully be able to concentrate on conducting supervision, since as human nature is easily tired and bored, enforcing discipline of someone to obey the rules of physical distance is often underestimated. Thus resulting in the personnel on duty reluctant to give warnings repeatedly. A way out of the constraints in seeking to supervise the watchful of physical distancing arrangements needs to be done immediately. It takes a new breakthrough to explore creativity and innovation to maximize the distance control handlers that are not easily tired, bored and

minimize emotional feelings (unpleasant) in the disciplined application of guarding distance.

The previous relevant studies not founded physical distancing warning system pandemi covid-19 but computer vision in object detection using the background subtraction method and the use of the Arduino microcontroller already exists. This innovation is a combination of software and hardware that is integrated by utilizing the field of artificial intelligence in the aspects of computer vision and robotics. The system is able to supervise and regulate the application of physical distancing by involving the input of hardware in the form of a camera which will provide the condition of standing queues. The form of images processed by utilizing computer vision through a process of background modeling, background subtraction, thresholding, contours, moments, sending serial data to the microcontroller port to detect objects that are considered human. In obtaining objects in standing queues the image is obtained from direct recording by the camera in the form of a video to produce output information in the form of serial data, the number of objects in standing queues, the distance between objects and the x, y coordinates of the object in standing queues (as raw data to find the laser beam servo angle to the object).

Serial data is the output of the computer vision process, then the data parsing process will be carried out to break down the serial data so that it can be sent to the Arduino microcontroller (as a controller of output hardware work). The output of hardware is in the form of green and red led marker lights to provide information on the capacity of standing queues in a state that can be added to visitors (green light is on) or has met the maximum visitor capacity (red light is on), the laser light installed in both servo will fire the lights according to the servo angle of the detected object regardless of the distance and the display screen to provide information on the state of queues has reached the maximum or can be added, informed by running text.

The final result of Physical Distancing Warning System able to maximize the distance control in standing queues such as queues at ATMs and queues for ordering fast food & others with best validity of system performance in the minimum threshold value of 40 where the system error is 22.75% and the output of the computer vision process that is sent to the microcontroller as a command to the lights, servo and laser has been fully worked (100%).