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Temperature Scan and Mask Detection Based Entry System

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Abstract: In the current day and age, the danger and fear of COVID-19 still stands large. Personally monitoring of social distancing norms and rules is impractical and inefficient with a large influx of people and lack of task force and resources to administer them. There is a need of small and effective system that automates this process and works 24x7. This paper proposes an effective and comprehensive solution to detect mask and scan temperature using microcontroller atmeg328p.This system also uses machine learning to understand different faces and check the status of mask.
For this, microcontroller atmeg328p and esp32 camera module is being used. This system also uses ultrasonic sensor (HC-SR04),IR temperature sensor (MLX9164) and stepper motor(28BYJ-48) among all the other components. This system also uses a self-made and pretrained data set of different face types.
Keywords: COVID-19, IR temperature sensor, Servo Motor, Ultrasonic sensor, Microcontroller, Pretrained

I. INTRODUCTION

Modern problems require modern solution. As seen in a lot of rapidly spreading viruses' fever is one of the main symptoms that can be used for diagnosis. Coronavirus (CoV) are a wide groups of viruses causing disease ranging from common cold to deadly infections like MERS (Middle East Respiratory Syndrome) and SARS (severe acute respiratory syndrome). The COVID-19 virus can spread by direct contact or indirect contact. With increasing cases and increasing number of deaths, it has become crucial to control the spread of this virus as quickly as possible. Monitoring social distancing rules and evaluating use of proper facial masks manually is not only restrictive with less human resources, but can also sometimes lead to errors in screening. This system has vast number of applications in various public places like malls, banks, petrol stations, supermarkets etc.

This paper proposes an effective and lightweight COVID-19 prevention system that uses video surveillance to detect face mask on people. This project will help to measure temperature of each individual and allow access to them if they are in safe body temperature range and using appropriate masks.

Early detection and prevention are any day better than cure; thus, this system devises a way to reduce further spread of any infectious dieses with fever as a symptom by measuring body temperature of each individual and allowing access to them if their body temperature is in safe or normal body temperature range and only if they are making use of a proper mask.

The first step to detect covid is by scanning for fever. We have temperature checking systems for every entrance for scanning but manual temperature scanning has a lot of limitations. The personnel are not well trained on using temperature scanning devices. There is human error in reading values. Many a times people are not barred from entering even after higher temperature readings. The scanning is skipped by the personnel if supervisors are not watching. Manual scanning system is not suitable for large crowds. Also monitoring use of proper masks is essential.

This project is basically concentrating on following areas of application:

1) Office Entry, Railways Entry, Airport Entry,
2) Museums and Amusement Parks
3) School and College Entry
4) Government Institutions

II. LITERATURE SURVEY

A. Corona Virus Disinfectant Tunnel Using Face

Mask Detection and Temperature Monitoring was published in,2021, authors are R.K Bhogal, S. Potharaju, S. Polla, R.V Jampani, V.B.R Yennem, The paper provides insight about a system that guides to disinfect humans using the proposed solution after it detects the human face mask by making use of camera module that works on convolutional neural networks and contactless temperature detection using infrared temperature sensor.

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The proposed tunnel allows an individual person entry only if the person wears a face mask and his/her body temperature is in prespecified normal range of temperature. If the person clears both the conditions then the tunnel lets the person enter into the tunnel and sprays the disinfectant solution from the head to toe on the body. System also houses a display that guides the user to wear mask properly.

Focusing on Social Distancing, this paper basically outlines the new technologies that have emerged as a result of the COVID – 19 Pandemic. The Paper also suggests technologies that could be further improved and innovated upon such as Crowd Detection and Health Monitoring Systems. [1]

B. COVID-19 Monitoring System using Social

Distancing and Face Mask Detection on

Surveillance video datasets was published in 2021.

The authors are S.Srinivasan, Rujula Singh R, R.R Biradar, Revathi SA.

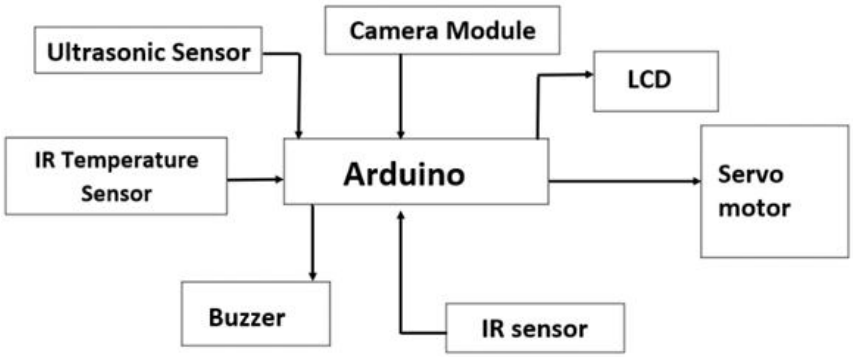
The paper focuses on building a lightweight, robhust,24x7 video monitoring system that automates the process of manually monitoring social distancing norms. The proposed system a comprehensive and effective solution to perform person detection, social distancing violation detection, face mask detection using object detection and Convolutional Neural Network (CNN) based binary classifier. For this, YOLOv3, Density-based spatial clustering of application with noise (DBSCAN), Dual Shot Face Detector (DSFD) and MobileNetV2 based binary classifier have been used on surveillance video dataset.

The system performance is evaluated in terms of accuracy of 91.2% and F1 score of 90.79% on the labelled video dataset.

This paper reviews the hardware and testing of a Social Distancing and Face Mask Detection

We aim to address this issue by proposing to create a device, using similar hardware, that would be placed at an event. Also, the detection system would be handled by the devices between themselves; hence, less room for error. [2]

III. BLOCK DIAGRAM



1) Arduino block works as CPU of the system.
2) IR thermometry module reads the temperature of a person.
3) If the temperature is less than 38 °C then door will open, but if the temperature is more than 38 °C then door will remain closed and a buzzer will get triggered.
4) If the individual is having a proper mask placed properly on the face covering their mouth and nose then and only then the gate will open
5) Also, the temperature will be shown on LCD display.
6) LCD block is used to display temperature values and status of the door.
7) Human sensor block is used to detect whether a real person is standing or not.
8) IR sensor block is used to detect if a person is standing in between the door if it's open.

IV. METHDOLOGY

The problem of improper thermal screening aroused during COVID-19 pandemic and the team started doing research on the solution available. Firstly, we studied the requirements and selected Arduino. We found out the types of sensors needed to fulfil the requirement and their alternatives. Finalised on IR temperature sensor (MLX90614) because of its properties were fulfilling the need of the system.

Next, ultrasonic sensor (HC-SR04) was selected to detect the exact distant of an individual from the Temperature sensor. Stepper motor (28BYJ-48) is being used to open and close the door. IR sensor (HW-201) is being used for the last part of the process. Lastly LCD16x2(RG1602A) is being used to display all the output commands.

V. RESULTS

By implementing of Temperature Scan and Mask Detection Based Entry System we will be able:

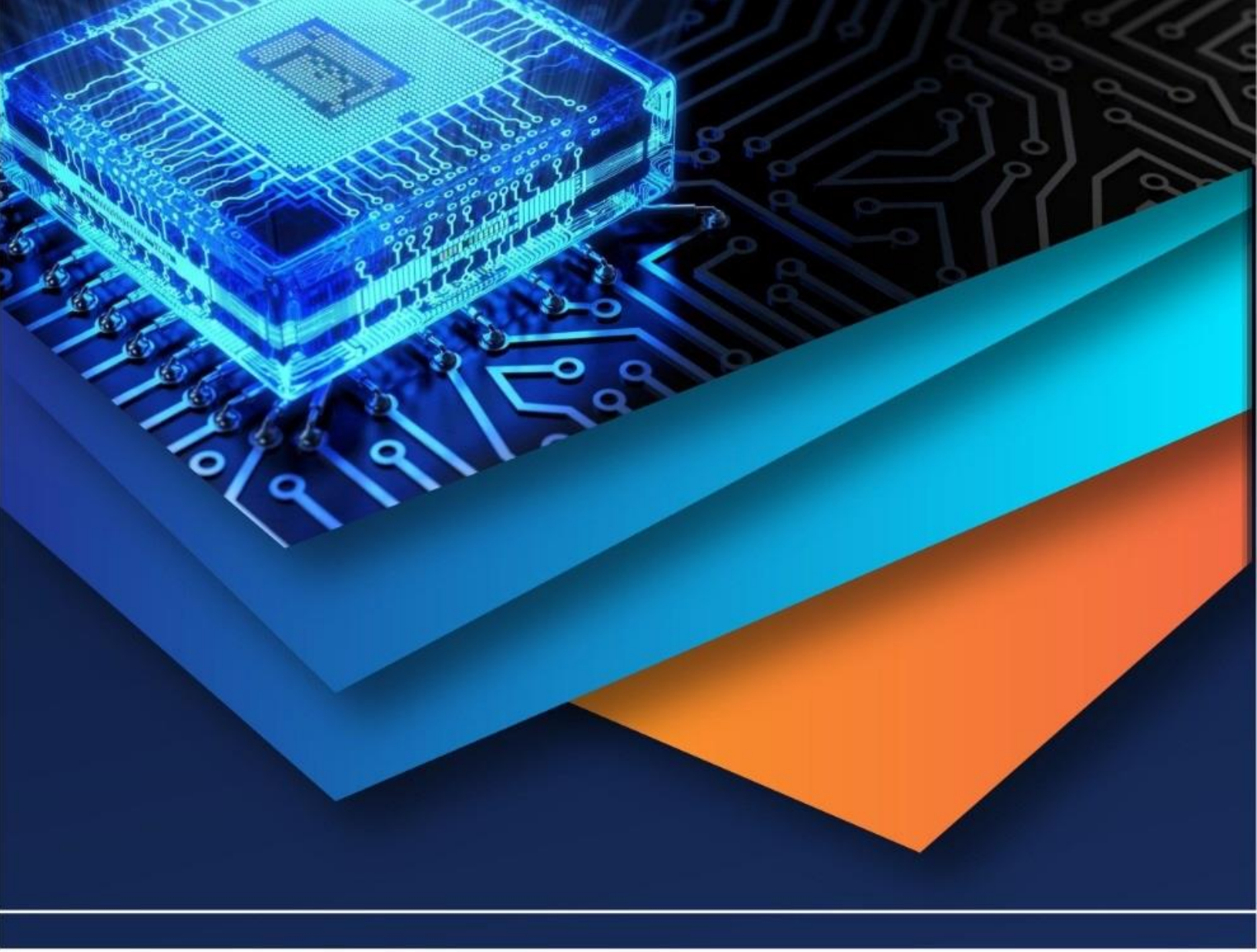
1) To identify people having body temperature greater than pre-defined safe limits.
2) To identify whether people are wearing masks or not.
3) To reduces the risk of further spreading of a virus from an infected person
4) To automate the manual and time consuming

VI. CONCLUSION

The proposed system is successful for ensuring a safe and steady passage of people into any institutional building. The system benefits are many when compared to the cost. Various models of Human temperature detection system have been proposed till date. The system that we are proposing uses machine learning which makes it capable of understanding and taking new data every time. The model will be able to accurately identify mask status and allow entry after fulfilling all the required conditions. This system can allow the manual process to be automated using minimal equipment and make the process more efficient.
This system reduces the risk of further spreading of a virus from an infected person besides it is low maintenance system

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