

Electric Street Cart with Protocols for Airborne Diseases

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ABSTRACT

Airborne diseases can be transmitted from one individual to another through the air. The aerosols might be generated from sources of infection individual or biological wastes. Air pollution place a significant role in airborne diseases common infection that spread by airborne transmission include. Ex: chickenpox virus, influenza virus, corona virus etc. The transmission of virus increases rapidly, researching the vaccines takes more time until we can avoid spreading of virus through precautionary measures like, wearing of mask and social distancing in crowded areas. People are uncomfortable and carelessness to wear the mask to solve this challenge we needed a reliable mask monitoring system. Hence, we design a raspberry pi model of electric street cart with protocols for airborne diseases that is automatic face mask detection and social distancing using software based on AI and image processing techniques

Keywords— Airborne diseases, raspberry pi, image processing techniques, biological wastes

INTRODUCTION

Many people in the world are suffering badly due to airborne diseases as it is spreading at a higher rate. Thousands of people are suffering day by day because of virus micro- organisms. This diseases is acquired through droplets of an infected person. when the infected person coughs or sneezes the virus enter into the body through droplets of the victim. For the buying essential needs like, vegetables ,fruits etc. The spread of virus can be limited by the following rules of social distancing and also acquiring the habit of wearing mask. Face mask detection system through artificial intelligence will prove beneficial To everyone for recognizing people with masks or not. On the other hand ,it will be challenging to recognize whether people has wearing masks by any monitoring system .so ,by taking into account we are going to develop a system to check whether the person is wearing a mask perfectly or not. if the system finds a person without mask then speaker will sounds. Ultrasonic sensor will measures the distance between the object and the person. Airborne diseases are caused by pathogenic microbes small enough to be discharged from an infected person via coughing, sneezing, laughing and close personal contact or aero solization of the microbe. The discharged microbes remain suspended in the air on dust particles, respiratory and water droplets. Illness is caused when the microbe is inhaled or contacts mucus membranes or when secretions remaining on a surface are touched.

Transmission of airborne diseases can be greatly reduced by practicing social and respiratory etiquette. Staying home when ill, keeping close contact with an ill person to a minimum, allowing a few feet distance from others while ill, and wearing a mask, covering coughs and sneezes with elbow or tissue can greatly reduce transmission. Good hand washing can decrease spread of germ-containing droplets that could be picked up on hands from surfaces or hand contact with secretions. Environmental controls and engineering alternatives help reduce transmission of water droplet aerosolized pathogens.

Although numerous researchers have committed efforts in designing efficient algorithms for face detection and recognition but there exists an essential difference between ‘detection of the face under mask’ and ‘detection of mask over face’. As per available literature ,very little body of research is attempted to detect mask over face. Thus, our work aims to a develop technique that can accurately detect mask over the face in public areas(such as airports ,railway stations, crowded markets ,bus stops ,etc)to curtail the spread of Corona virus and thereby contributing to

public healthcare .Further, it is not easy to detect faces with/without a mask in public as the dataset available for detecting masks on human faces is relatively small leading to the hard training of the model

LITERATURE SURVEY

Authors in [1], are used poor detection stability Biosensors for distance detection and we are using Ultrasonic sensors to improve detection stability. The detection methods for airborne microorganisms can be roughly summarized as biochemical, immune, and molecular technologies. After years of development, some detection methods have become mature and new technologies are emerging constantly. In [2] an AI and Black chain for symptoms of covid-19 diseases and we are using AI for finding infection of airborne disease. In such a pandemic scenario, blockchain provides promising security solutions to support fighting COVID-19. Indeed, the blockchain constructs immutable ledgers of transactions for medical data sharing systems. protocols for face mask detection and we are implementing the feature face mask detection with distance measurement with protocols presented [3].

Authors of [4] used AI in a smart city network an automated system to limit covid-19 using facial mask detection. Recently, a study on understanding measures to tackle COVID-19 pandemic carried by the researchers at the University of Edinburgh reveals that wearing a face mask or other covering over the nose and mouth cuts the risk of Coronavirus spread by avoiding forward distance travelled by a person's exhaled breath.

PROBLEM STATEMENT

The spread of infection as the virus mainly gets transmitted with the aerosols which come out of an infected person's nose or mouth while coughing and sneezing. In the airborne diseases crisis, wearing masks is a fundamental need nowadays. In public places because of the large volume of people it becomes tough for security officials to check every person who is not wearing a mask. This model detects a person wearing a mask or not. The main objective of the face detection model is to detect the face of individuals and conclude whether they are wearing masks or not at that particular moment when they are captured in the image.

OBJECTIVES

The two main objectives of the proposed work are:

1. To develop an AI-based automatic face-mask detection system using a Raspberry Pi and webcam for identifying individuals wearing or not wearing masks.
2. To develop a sensor-based social-distance monitoring system that provides an audible warning when the distance between individuals falls below the specified threshold.

PROPOSED SYSTEM

The proposed system integrates an electric street cart with an embedded airborne-disease protocol monitoring unit. The Raspberry Pi 4 Model B acts as the main controller and processing unit. A webcam captures real-time images of people approaching the cart, while the face-detection and mask-classification software determines whether the detected individual is wearing a mask. If the person is not wearing a mask, the speaker produces a warning message such as "Please wear a mask."

An infrared sensor is used for proximity monitoring. The sensor detects the presence or distance of objects and supplies the corresponding signal to the Raspberry Pi. When the measured distance is below the defined threshold, the

speaker generates a social-distancing warning. Thus, the system combines visual AI-based monitoring with sensor-based proximity detection in a single mobile platform.

BLOCK DIAGRAM

Fig. 1 shows the block diagram of the proposed electric street cart with airborne-disease protocols. The webcam and sensor provide input to the Raspberry Pi for face-mask detection and social-distance monitoring, respectively. Based on the detected conditions, the Raspberry Pi activates the speaker to provide appropriate warning messages.

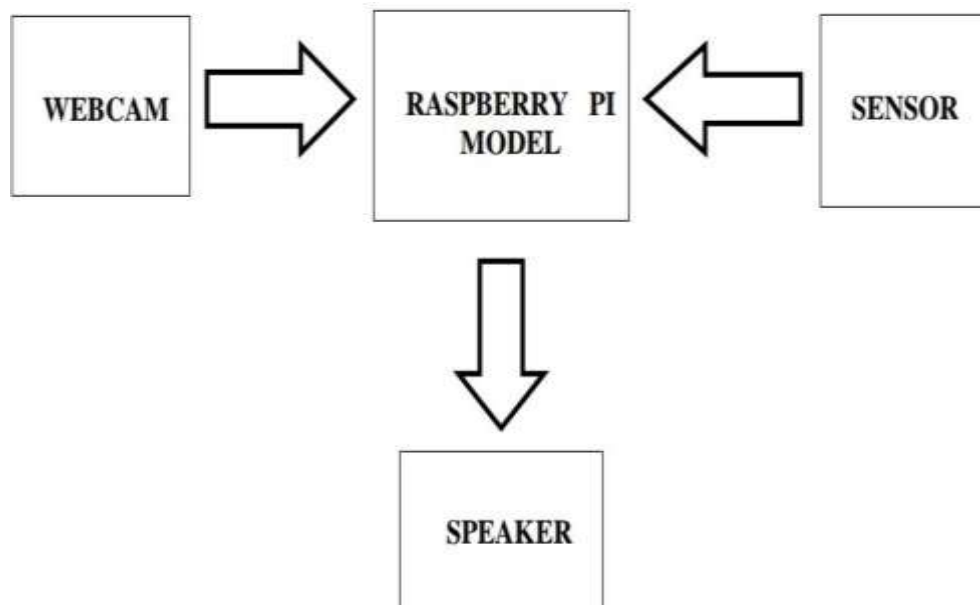


Fig 1:Block Diagram of Electric Street Cart with Protocols for Airborne Diseases

CIRCUIT DIAGRAM

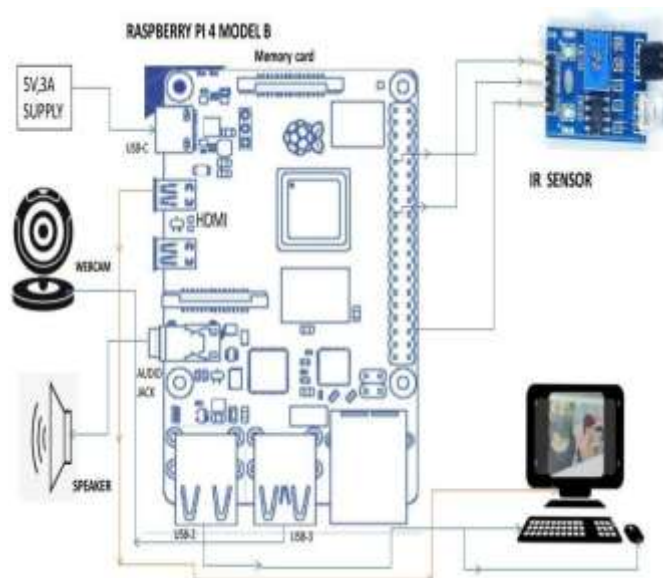


Fig2: Circuit Diagram of Electric Street Cart with Protocols for Airborne Diseases

METHODOLOGY

The proposed methodology is divided into five major stages. First, a dataset containing images of individuals with and without face masks is collected and labelled. Second, the images undergo preprocessing and are used to train the mask-classification model. Third, the trained model is deployed on the Raspberry Pi and connected to a webcam for real-time image acquisition. Fourth, an infrared sensor is connected to the GPIO interface to monitor proximity. Finally, the Raspberry Pi evaluates the detected conditions and activates the speaker whenever a mask violation or inadequate distance is identified. The report specifies an 80:20 training/testing division for the face-mask dataset.

During operation, the webcam continuously captures frames. The face detector identifies the facial region and the extracted region is passed to the mask classifier. A correctly masked person does not generate an alert, whereas a person classified as without a mask causes an audio warning. Simultaneously, the proximity subsystem monitors the distance condition and generates a social-distance warning whenever the defined threshold is violated.

RESULTS AND DISCUSSION

Fig. 2 illustrates the successfully implemented prototype for face-mask detection in both static images and real-time video streams. The Raspberry Pi-based system is designed to perform reliably under different image resolutions and varying lighting conditions. MobileNetV2 is employed as the classification model, providing visual and audio alerts based on the detected mask status.

Connection model implemented and face mask detection is shown in above figure. The experimental procedure begins



with collection of more than 1000 masked and unmasked images, followed by labelling, preprocessing, model training, classification, and real-time camera testing. The completed system provides mask-observation output through the live camera feed.

The prototype also demonstrates social-distance monitoring using the sensor subsystem. The Raspberry Pi receives the sensor input and activates the speaker when the configured distance condition is not satisfied. Therefore, both major functions—face-mask detection and social-distance warning—are integrated into the same embedded platform.

The project report identifies advantages including relatively simple operation, low equipment investment, fast analysis, and the possibility of achieving high detection performance. The system can therefore be considered suitable as a low-cost prototype for public-environment monitoring.

CONCLUSION

This paper presented the experimental implementation of an electric street cart integrated with protocols for airborne diseases. The proposed system combines Raspberry Pi-based embedded processing, webcam-based face-mask detection, deep-learning image classification, infrared-based proximity monitoring, and audio alerts. The implemented

prototype successfully detects face masks in static images and real-time video streams and provides warnings when mask or social-distance protocols are violated.

The use of MobileNetV2, OpenCV, TensorFlow, Keras, and Python provides a practical software platform for implementing the system on Raspberry Pi. The project demonstrates that AI-based monitoring and sensor-based proximity detection can be integrated into a compact street-cart platform. With further improvements in accuracy, sensing, computing capability, and system integration, the concept can be extended to a wider range of public environments.

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