AIJR Preprints
Section: Coronavirus
Article Id: 326, Version: 1, 2021
DOI: https://doi.org/10.21467/preprints.326
URL: https://preprints.aijr.org/index.php/ap/preprint/view/326

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NOT PEER-REVIEWED

Version 1: Received: 07 July 2021 / Approved: 08 July 2021 / Online: 09 July 2021

Design and Implementation of COVID19 Safety Amalgamation

Akshan Sandeep D'souza, Bhoomika Ramachandra Hebbar, Chandan C, Lavanya B

Final year BE student, AIET, Mijar, Moodbidri

Abstract: This article gives an explanation about constructing the system that helps in preventing the open out of the virus and also minimizes human association with possible and reduces costs associated with hiring employees for manual thermal screening and readings. Thus, automating the tasks such as automatic temperature screening, face mask detection using image processing methods, and automatic hand sanitizer dispenser with the help of the Internet of Things (IoT). In a world battling against novel corona virus disease, technology has been a lifesaver. This amalgamate system has features like a quick and efficient contactless automatic temperature screening and automatic mask detection along with an automatic hand sanitization system which will be a prototype built at a reduced cost which will helpfully be ensuring safety for Corona Virus Disease (COVID19) Pandemic.

Keywords: *Infrared Sensor (IR), Raspberry pi, Image Processing, Open CV, Servo motor, IoT, Artificial-Intelligence (AI).*

I. INTRODUCTION

In the mist of the current global pandemic COVID19, student screening and hygiene practice is a critical component of reopening educational institutions, but the price major consideration. Screening involves a designated individual asking symptoms related questions and performing a temperature check of students as they enter the premises. Sanitization and wearing masks for their safety and concerned with reducing the flow of viruses and the infected amount of people reduction. Demonstrating positive hygienic practices has become a very necessary aspect in this pandemic time and plays a very important role in preventing us from exposure to this deadly virus. The high risk zones of exposure to the deadly virus is in the area where students

How to Cite:

D'souza *et al.*, "Design and Implementation of COVID19 Safety Amalgamation". *AIJR Preprints*, 326, Version 1, 2021.

get crowded in the institutions. But despite of all these high-end measures taken, there is continuously a risk associated with it.

In the fight against the corona virus, contactless safety measures and social spacing have proven to slow down the spreading of the virus. This system will generate if any violations are found. It will generate an alarm when the high facial temperature is detected and using mask detection using visible stream gives an alarm when face masks are not detected. A user-friendly system allows monitoring and alerts generated by the system and recorded values stored in a database with the help of a high-speed processor and Artificial Intelligence (AI) interfaced to IoT.

II. LITERATURE SURVEY

Hand sanitization remarkably lowers the transmission of healthcare associated with the prevalence of Health Care Associated Infections (HCAI). The need for a touchless automatic dispenser is identified after observing that it is the point of contact for contamination. The system can help to achieve a contactless sanitizer dispenser. It reduces the danger of community transmission of the virus [1]. The automatic dispenser used is a proximity switch that is connected to a relay that controls the water solenoid which acts as a valve to control the water flow to the tap. The automatic water dispenser can be made more remotely accessible by integrating the machine with the concepts of IoT [2]. The physique of the system includes at the minimum of one section exposed to boundary of the body. The body is revolve between a first positions, in the compartments is facing connection with the box to receive the hand sanitizer and a second, in which the box has place for the filling of hand sanitizer through the opening. The present invention provides an anti-microbial hand sanitizer [3].

The measuring temperature of a person should be a contactless amalgamated system which should be product based. While it is necessary to construct an amalgamation that has features like quick and efficient automatic temperature screening. Using remote-sensing Infrared Thermography (IRT) the records were get from several positions of the front-side of face and compared simultaneously for determining body temperature range using standard means [4]. The thermal imager employs more promise for group screening once the records from a particular region which have a high correlation among face temperature. With the regression scanning, the best record is considered from the maximum temperature by face region [5]. The precision of infrared thermometry that exactly records temperature on forehead, for determining case with fever. The negative value was excellent up to 0.99 [6].

With the ongoing research and developments on the novel coronavirus, it is believed that COVID19 is spread direct through the respiratory droplets of a diseased person. The virus can be transmitted to other people if they come in contact with the infectious droplets or inhale the aerosols. Hence face mask is helpful to prevent the spread. The mask detection needs face tracking, pose estimation, and expression recognition. The dispute of the work is to detect the face in the image accurately and then recognize if it has a mask is there or not. Using basic AI

tools and simplified approaches the amalgamation has achieved high accuracy [7]. The mask position of who wears the masks and who are not both in outside and crowded places by VOLOv3 [8]. The YOLOv3 used for detection of face that is based upon deep learning network architecture called darknet-19 the Celebi database and Wider face databases were operated to train, and then the evaluation was produced using the Face Detection DataBase (FDDB) [9]. The pre-train models with the Wider face dataset, and fine-tune with the masked face training set. The evaluated masked face detection algorithm on the Masked face testing achieves very satisfactory performance [10].

III. METHODOLOGY

The whole task of the framework is monitoried by a Raspberry-pi. When the system switch ON device, the sensor attached to the Raspberry-pi gets activated. The system will have three systems to work simultaneously with each other. First the automatic sanitizer and secondly the contact-less temperature measuring and thirdly, face mask detection.

The automatic hand sanitizer model consists of a sensor, power supply, motor, board, and motor controller as in Fig. 3.1. The power supply allows current and voltage for the working of the board and motor, and the power source be battery. IR rays from the light emitting part, and it is return by surface by the body and absorbed at a light receiving part. The motor controller powers the motor as per the input value as for the sensor. The Direct Current (DC) motor provides a main force for the device and this is controlled individually by the motor driver. Here IR sensor has a range of 5m to 12m and detection in the defined range do activate the hand sanitizer and do sanitize the surroundings by initiating the spray pump accompanied with a blower so that the sanitizer reaches the surrounding by a small tube. The sanitization is made at the same time with the action of the sensor, keeping the particular region sanitize and free from bacteria or virus, or any infectious agents.

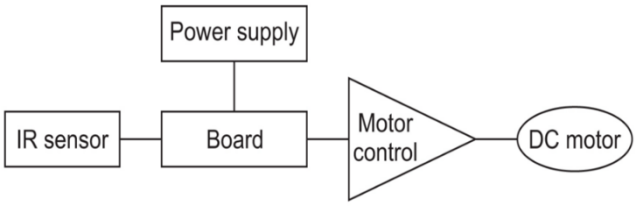

Fig 3.1 Automatic hand sanitizer block diagram.

The temperature thermal sensor senses the body temperature of the person as he comes near to the door and displays the temperature in °F with LCD as shown in Fig. 3.2. If the temperature sensed is above the normal body temperature i.e., 98.6°F the buzzer starts alarming and the gate does not open. In case the sensed value as for sensor is equal to or below 98.6°F then the buzzer is OFF and the gate is opened to enter inside premises, which depicting a symbol of safe and safety.

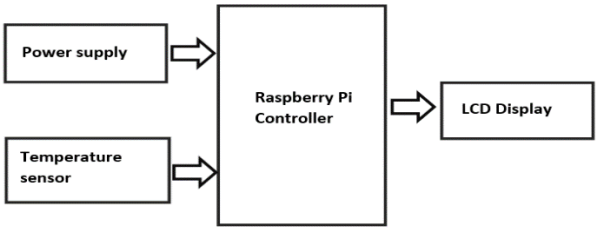

Fig 3.2 Automatic temperature screening using Raspberry-Pi.

Using the Raspberry-pi camera the image of the person is detected, such that it extracts the features of face like nose, ears, and eyes, etc. A few images which include wearing of a mask and no mask is stored in a database such that using AI the image recognized is differentiated with stored images. The process for mask detection is shown in Fig. 3.3. If the mask is detected from the captured imaged the system allows the person inside otherwise it warns the person to wear a mask properly.

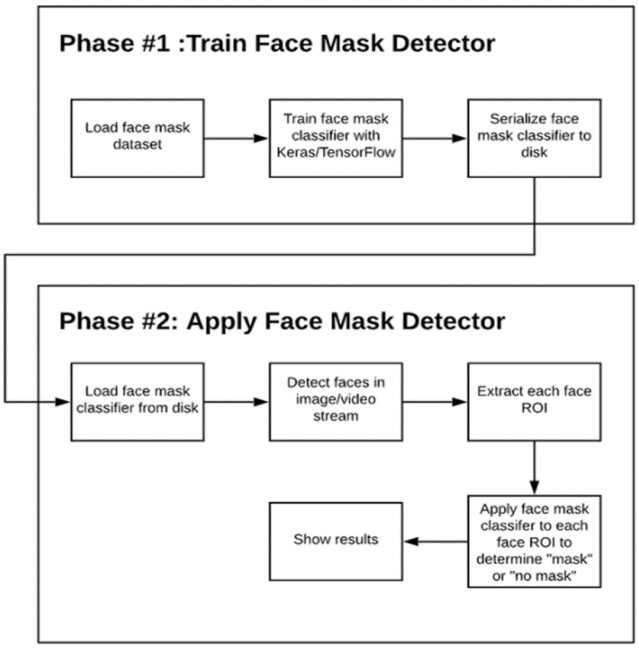

Fig 3.3 Automatic face mask detection using image processing.

IV. CONCLUSION

The proposed study effectively introduces the low-cost amalgamation system that has been created for COVID19 virus protection and working in real-time activities for students. The key physical features considered in the implementation of this amalgamation features a quick and efficient automatic temperature screening and automatic mask detection along with an automatic hand sanitization system. The technology assure definitive and real-time mask detection of people wearing masks and temperature detection and sanitizing. The system is easy to establish into an existing system while protecting the s privacy and safety of user. So this amalgamate will be the safest way for most educational institutions, especially retail, industries,

corporate sectors, and healthcare. This assist and serves the people with the help of modern technologies.

References

[1] Ashish Gupta, Rajesh Kumar, "Novel design of automatic sanitizer dispenser machine based on ultrasonic sensor", IEEE, ISSN No: 0932-4747, Vol. 06, pp. 228-233, 2020.

[2] Akash Chowdry, Prathap S. Gautham, Dwarakanath S K, "Automatic Water Dispenser", MAT Journals, Vol 04, Issue 03, 2018.

[3] Paul Alan Woelbing, Jayme D. Woelbing, Claudio Lucio Kolling Lins, "Hand Sanitizer and Dispenser", Patent Application Publication Journal, 2013.

[4] Lung-Sang Chan, Giselle T. Y. Cheung, Ian J. Lauder, Cyrus R. Kumana, "Screening for Fever by Remote-sensing Infrared Thermographic Camera", Journal of Travel Medicine, Vol. 11, No. 5, PP. 273-279, November 2020.

[5] Eddie Y.K. Ng, G.J.L. Kaw W.M. Chang, "Analysis of IR thermal imager for mass blind fever screening", Elsevier, Microvascular Research 104–109, 2004.

[6] Pierre Hausfater, Yan Zhao, Stephanie Defrenne, Pascale Bonnet, Bruno Riou, "Cutaneous Infrared Thermometry for Detecting Febrile Patients", EID Vol. 14 No. 8, August 2008.

[7] Arjya Das, Mohammad Wasif Ansari, Rohini Basak, "COVID19 Face Mask Detection Using TensorFlow, Keras, and OpenCV", Jadavpur University Kolkata, India.

[8] Rafiuzzaman Bhuiyan, Sharun Akter Khushbu, Sanzidul Islam, "A Deep Learning Based Assistive System to Classify COVID19 Face Mask for Human Safety with YOLOv3", IEEE 11th ICCCNT, IIT- Kharagpur, July 2020.

[9] G. Jignesh Chowdary, Sanjay Kumar Sonbhadra, Narinder Singh Punn, Sonali Agarwal, "Face Mask Detection using Transfer Learning of Inception", Vellore Institute of Technology, Chennai, IIIT Allahabad, Oct 2020.

[10] Wei Bu, Chuanhong Zhou, Jiangjian Xiao, Chengbin Peng, Minmin Yang, "A Cascade Frame-work for Masked Face Detection", IEEE Xplore, 2017.