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Health Monitoring System for COVID-19

Pratiksha Kothale, Radhika Malu, KrutikaKhool, Co-author:Prof.P.C.Dhanawade
D.K.T.E's Society's Textile and Engineering Institute, Ichalkarnji

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ABSTRACT: Due to this current pandemic people are suffering through some kind of problem, may it be related to health , job, money crisis, social distance, disturbance of mental health. This is creating a huge impact on everyone's lives. In the current scenario there is usage of humans to monitor mask checking and temperature checking, so the possibilities of transmission of virus increases. So, some change is essential and important. We have to stop transmission and prevent the spread of viruses in order to save lives. We have to take small steps towards a big change. So the project is all about checking temperature, oxygen level, if the face mask has been worn or not and automatic hand sanitizer. The software and hardware based project would be a small step for this ongoing pandemic. It consists of detection of temperature, checking of oxygen level and whether the mask has worn or not, and automatic hand sanitizer. So this system is based on Image processing and the working principle of the sensors.Through this we can avoid any contact with the individual. And due to this we can break the change and also monitor the individual's health. This increases the demand for an efficient system for detecting face masks, oxygen level and temperature check as they are the basic symptoms on people for transportation means, densely populated areas, residential districts, large-scale manufacturers and other enterprises to ensure safety.

Keywords: Face mask Detection, Raspberry Pi, camera module, Arduino, Temperature sensor, oxygen level sensor.

I. INTRODUCTION

According to WHO(World Health Organization), 55.6 million people were infected with Coronavirus and 1.34 million people died because of it as of November 2020. After the person gets infected, it takes almost fourteen days for the virus to grow in the body of its host and affect them and in the meantime, it spreads to almost everyone who is in contact with that person. So, it is extremely hard to keep track of the spread of COVID-19. COVID-19 mainly spreads through droplets produced as a result of coughing or sneezing by an infected person. This transfers the virus to any person who is in direct close contact (within one-meter distance) with the person suffering from coronavirus. Because of this, the virus spreads rapidly among the masses. It has been found that wearing face masks is 96 % effective to stop the spread of viruses. And the system which can detect the oxygen level, temperature check and automatic hand sanitizer.The governments, all over the world, have imposed strict rules that everyone should wear masks while they go out. But still, some people may not wear masks and it is hard to check whether everyone is wearing a mask or not. In such cases, computer vision will be of great help. There are no efficient face mask detection applications to detect whether the person is wearing a face mask or not. This increases the demand for an efficient system for detecting face masks on people for transportation means, densely populated areas, residential districts, large-scale manufacturers and other enterprises to ensure safety and have a check of the people's health present around them which would be beneficial.

II. LITERATURE REVIEW

1.Covid-19 Face Mask Detection Using TensorFlow, Keras and OpenCV.

Published in: 2020 IEEE 17th India Council International Conference (INDICON)
Authors: Arjya Das, Mohammad Wasif Ansari, Rohini Basak .They illustrated the learning and performance task of the model. Using basic ML tools and simplified techniques the method has achieved reasonably high accuracy. They stated that it can be used for a variety of applications. Wearing a mask may be obligatory in the near future, considering the Covid-19 crisis.

2.Face Mask Detection Using OpenCV

Published in: 2021 Third International Conference on Intelligent Communication Technologies and Virtual Mobile Networks (ICICV)
Authors:HarishAdusumalli, D. Kalyani, R.Krishna Sri, M. Pratapteja, P V R D Prasada Rao.

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In this project, they have proposed a method which employs TensorFlow and OpenCV to detect face masks on people. A bounding box drawn over the face of the person describes whether the person is wearing a mask or not.

3.Pulse oximetry optical sensor using oxygen-bound haemoglobin

Authors: Z. J. V Cohen,S.Haxha, and A. Aggoun

This paper reports a unique approach to measuring oxygen saturation levels by utilising the wavelength of the haemoglobin instead of the conventional absorption difference.

4. Infrared thermometer on the wall (iThermowall): An open source and 3-D print infrared thermometer for fever screening

Authors:TomyAbuzairiaNurImaniatiSumantribAhli IrfanaRidhoMaulanaMohamada

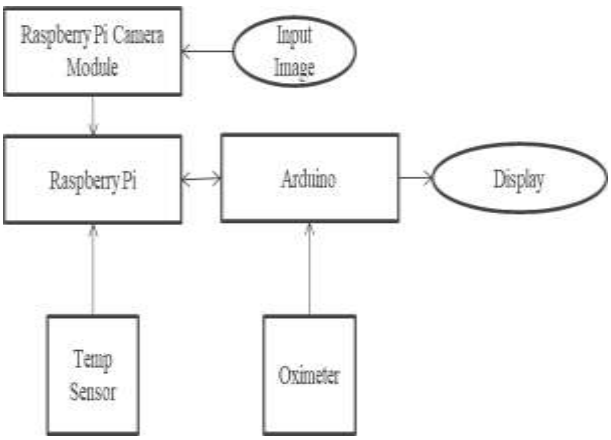
The results showed that the P-values for all the tests is more significant than 0.05, which means that the mean Celsius temperature for both groups (reference thermometer and iThermowall) are similar. This article provides the 3-D printable open-source and the full source code firmware for the developing and under-resourced communities.

III. SYSTEM ARCHITECTURE

A.Objectives of Developed Work

1) To build a low cost "Health Monitoring System for COVID-19".
2) To build a system with all the parameters like temperature checking, oxygen-level checking and facemask detection.
3) To provide a user friendly system.

B. Block Diagram



C. How is our system Different?

- The systems which are available in the market are found separately.i.e if you want a temperature check machine, oximeter then they are found separately. But our project would have them all together.
- The project would consist of Automatic hand sanitizer, Face mask Detection, Temperature check, oxygen level detector.
- So this system could be used in crowded places like malls, schools, factories, etc.
- The Automatic Hand Sanitizer consists of the very basic components like relay, pump,IR module. The IR module is used to detect the hand and then it would spray the sanitizer by using a pump and relay.
- The face mask detection subsystem is made with the help of image processing libraries such as Keras, OpenCV, TensorFlow. They are trained by the datasets provided and it creates a bounding box around the person's face standing in front of the pi camera module, and then it would notify whether the person is wearing a mask or not on an OLED display.
- The MLX90614 is a contactless IR temperature sensor that works on the Stefan Boltzmann principle. It states that everybody radiates IR radiation proportional to its temperature. This radiation is then measured through the sensor converted to a digital signal and is communicated through the I2C bus to the microcontroller. The measured temperature is in range or not could be concluded with use of the microcontroller it is connected to.
- The oxygen level sensor(MAX30100) is an integrated pulse oximeter and heart rate monitor sensor solution. It combines two LEDs, a photodetector, optimized optics, and low -noise analog signal processing to detect pulse oximetry and heart-rate signals.
- It would cost comparatively less, as it is available all in one.

D. Methodology

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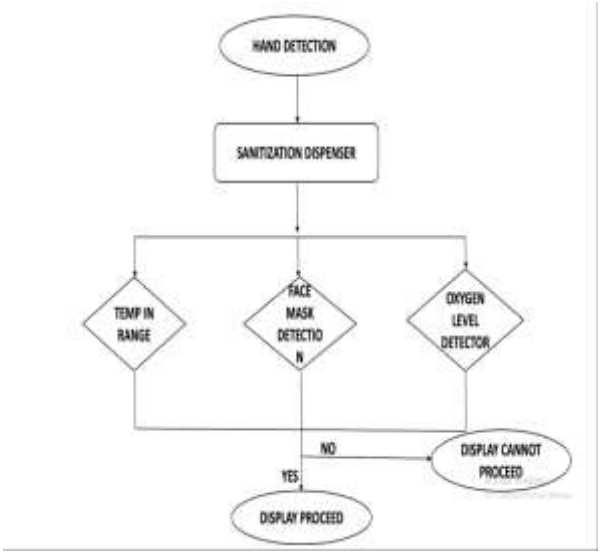
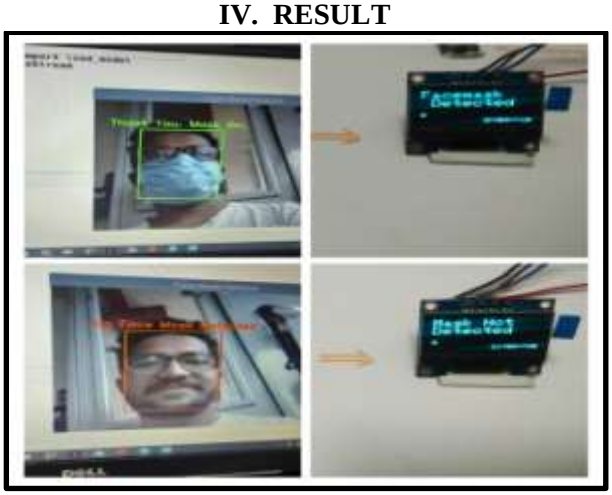
STEP 1: The first and foremost step is to 'detect the hand' . If the hand is detected then the smart hand sanitizer comes in the picture.
STEP 2: First of all there is a separate smart hand sanitizer dispenser. Which is made up of some basic components such as relay, motor, power supply. The hand is placed below the hand sanitizer and automatically it would sprinkle the sanitizer on the hands of the person standing over there.
STEP 3: After completing step 2, the next step is the face mask detection. So, the input image or the live feed is provided to the trained system i.e. to the raspberry pi which would detect whether the mask has been worn by the person or not.
(a) If the mask is not worn properly, then on the OLED display it would pop the alert message as " No mask detected"
(b) If the mask is worn it would pop the message as " You can proceed to the next step"/ " Thank you! Mask on"
STEP 4: The next step to the process is temperature check. If the temperature is below 100 F then the further process can be continued.
STEP 5: The further check is one of the most important steps in the process , it detects the oxygen level in our blood.
(a) If the oxygen level is below 93% then the individual cannot proceed .
(b) If the oxygen level is equal to 93% or above then the individual can proceed.

D. Flow Chart



The above flow chart shows the working flow of this developed system & the detailed information about these steps is given below in the methodology of this system.

IV. RESULT



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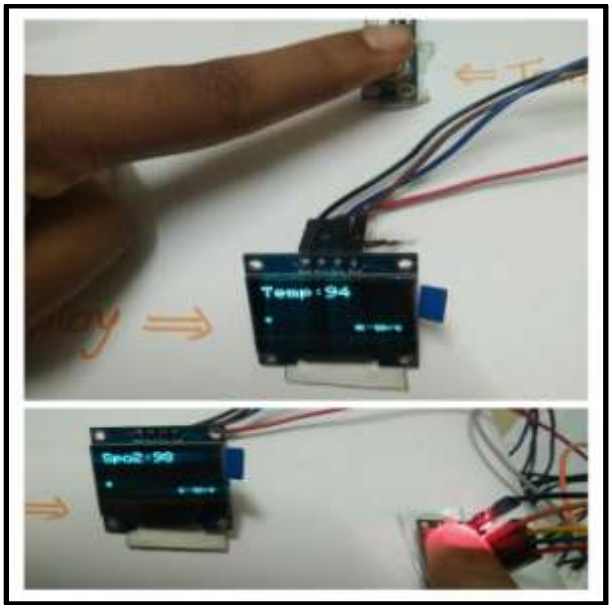

V. CONCLUSION

The project is primarily based on the crisis we all are facing, that is the covid pandemic. As we all know we have to take extra care of ourselves so that we can protect ourselves and people living around us. So taking precautions such as wearing a mask, frequently washing hands, to have a check on temperature and oxygen level is a must. We have built a smart hand sanitizer, by using an IR sensor, i.e. if the individual places the hand below the sensor the hand is detected and then it would leave some liquid or gel to wash the hands. Moving on to Face mask detection, it is made by using OpenCV and Tensorflow and some datasets to run it smoothly. The temperature sensor in the market requires a person that can hold the device and have a check, but in this project we are concerned with a purely contactless system, as covid chain needs to break so the system has to be contactless. And the oximeter sensor used, works on the principle of red and IR light absorbed by the finger and gives the SpO2 level in the blood.

A.Future Scope

1. The system can be improved by adding Email service which can notify the owner.
2. We can make use of servo motors which can be applied to the door, i.e. when all the conditions are satisfied then the door would open automatically.
3. It can also be modified to fit the corporate environment.

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