IJARCCE

ISSN (Online) 2278-1021
ISSN (Print) 2319-5940

International Journal of Advanced Research in Computer and Communication Engineering

Vol. 10, Issue 6, June 2021

DOI 10.17148/IJARCCE.2021.10626

SMART CORONA PROTECTOR

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Abstract: Corona is the new ailment that has not been identified in humans before. It is a contagious disease which makes it spread rapidly. Since the virus outbreak, thermal screening using IR thermometers are used to check human body temperature to identify infected person at public places. This method is not effective as it consumes lot of time and also close contact of infected person might lead to fast spreading of the virus. Smart Corona Protector is equipped with the facial mask detection, which will display person wearing mask or not. It also detects the person's temperature, oxygen level and pulse rate. This project also helps to maintain social distance to reduce the spread of corona virus.

Keywords: Arduino Uno, Temperature Sensor, Oximeter, Infrared Sensor, LCD, etc.

I. INTRODUCTION

In this new era we are experiencing a pandemic situation and people all around are advised to wear a mask, some people are not used to it and are avoiding to wear a mask. The motivation behind this project is that if we can take help of Machine Learning to detect people wearing mask or not in public places, which would help to increase our safety.

Through this project, which is totally digitized and automated device, we are converting a real world problem into a machine learning problem. The task here is to predict people wearing mask or not, giving an image or video. It is an object detection and classification problem with two different classes (Mask and Without Mask).

In this Deep Learning Model, temperature, oxygen level and pulse rate of the person will also be measured to make this system more efficient.

II. PROPOSED SYSTEM

The below shown is the block diagram of "**Smart Corona Protector**".

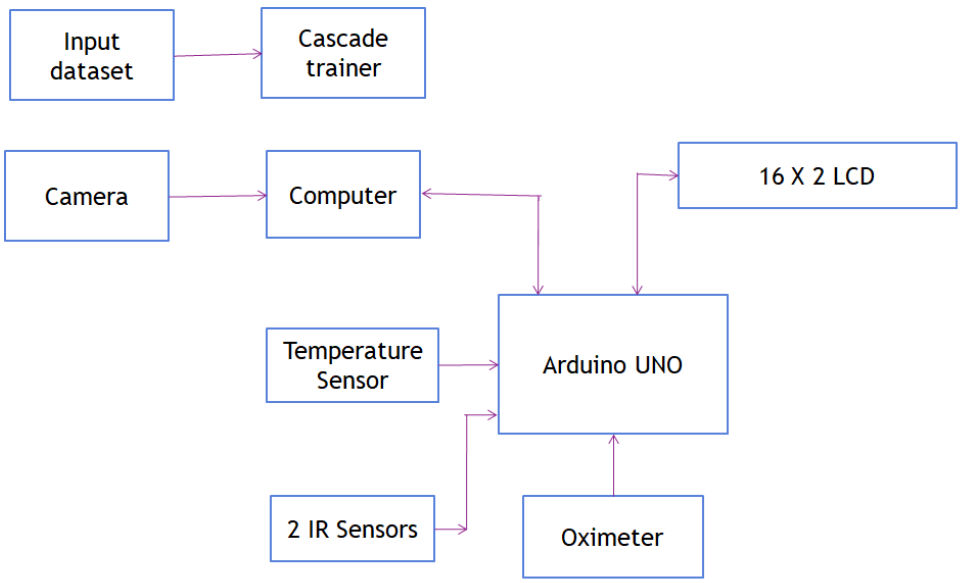

Fig. 1: Block Diagram of Smart Corona Protector

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1. Arduino Uno: The Arduino Uno is a microcontroller board based on the ATmega328. It has 14 digital input/output pins(out of which 6 can be used as PWM outputs and 6 can be used as analog inputs), a 16 MHz resonator, a USB connection, a reset button and a power jack. It can be used to communicate with a computer, another Arduino board or other microcontrollers.

Fig. 2: Arduino Uno

2. LCD(16 x 2): This LCD includes 2 rows. Each row can print 16 characters. It can work on both 8 bit and 16 bit. The LCD has two registers, namely, Command and Data. Command register stores various commands given to display. The Data register stores the data to be displayed.

Fig. 3: LCD

3. Temperature Sensor (LM35): It is a three terminal device. The three terminals are Vin, Vout and Ground. LM35 can measure temperature from −55°C to 150°C. The voltage output of temperature sensor increases 10 mV per degree celcius rise in temperature.

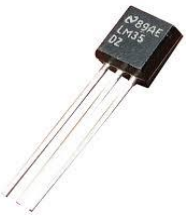

Fig. 4: Temperature Sensor

4. IR Sensor Module: Infrared technology addresses a wide variety of wireless applications. The main areas are sensing and remote controls. In the electromagnetic spectrum, the infrared portion is divided into three regions: near infrared region, mid infrared region and far infrared region. It has three pins, namely, power supply input, ground and output. It consists of Op-Amp (LM 358), variable register, output LED, transmitter and receiver.

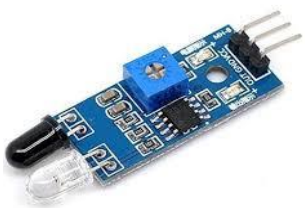

Fig. 5: IR Sensor Module

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5. Oximeter (MAX30100): The MAX30100 is an integrated pulse oximetry and heart-rate monitor sensor solution. It combines two LED's, a photo detector, optimized optics and low-noise analog signal processing to detect pulse oximetry and heart-rate signals. It can be used in wearable devices, fitness assistant devices, medical monitoring devices.

Fig. 6: Oximeter

6. Web Camera: A web camera (or webcam) is a real time 16 MP camera whose images can be accessed using the World Wide Web, instant messaging, or a PC video calling application. Webcam are typically small cameras that sit on a desk, attach to a user's monitor, or are built into the hardware. Webcam typically include a lens, an image sensor, support electronics and also includes inbuilt microphone for sound and auto while balance

.

Fig. 7: Web Camera

III. SIGNIFICANCE

Due to the rapid transmission of COVID-19 pandemic, the need for the public to follow social distancing and wearing masks is only increasing. According to World Health Organization, to follow proper social distancing, people in public places must maintain at least 3ft or 1m distance between each other.

Mask and face coverings can prevent the wearer from transmitting the COVID-19 virus to others and may provide some protection to the wearer. Multiple studies have shown that face coverings can contain droplet expelled from the wearer, which are responsible for the majority of transmission of the virus.

Many people with COVID-19 are unaware that they are carrying the virus. It is estimated that 40% of persons with COVID-19 are asymptomatic but potentially able to transmit the virus to others.

"Smart Corona Protector" use can significantly reduce the virus transmission in the community. This project is focused on using computer vision based object detection models to monitor masked faces and social distancing violations using real time images from web camera. This project can be implemented at the entrance of offices, malls, super markets, places of worship, movie theatres, gyms, play grounds, hotels and cafe's, etc.

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IV. INTERFACING DIAGRAM

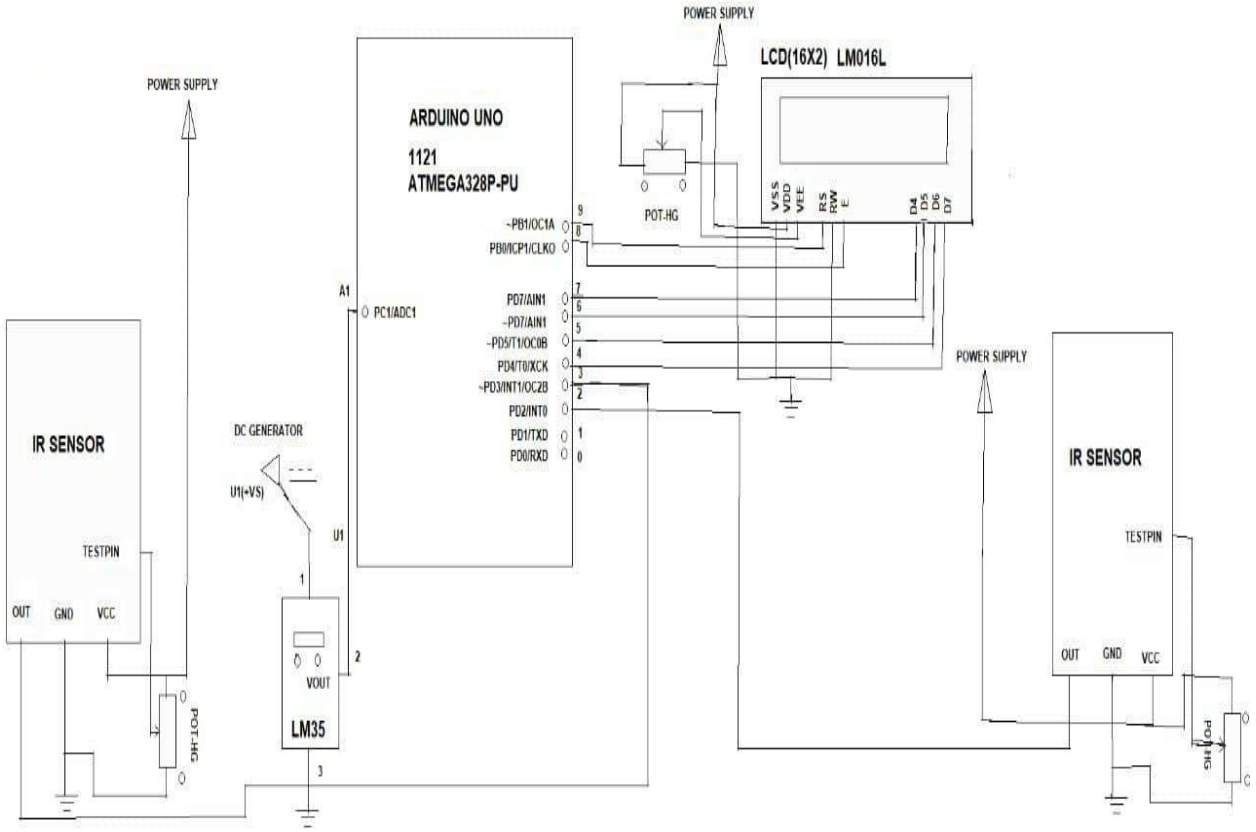

Fig. 8: Interfacing Diagram

V. WORKING

In this project, on the input side we are using Webcam to capture the video and the process it for Facial Mask Detection using Pycharm and Open CV functions to process on the video frame. We have used Haar cascade classifier in this Machine Learning model to classify and to detect whether the person in the frame have weared a mask or not. Haar cascade classifier is a computer vision technology which uses two datasets. First dataset contains positive images including the images of target and second dataset contains the images other than target objects. Haar cascade classifier uses number of stages for its working. Higher the number of stages, higher will be the efficiency of the Machine Learning model. Haar internally uses PCA algorithm to classify the input images. PCA is Principle Component Analysis which is the feature reduction or dimensionality reduction algorithm to tackle the over fitting problem. Over fitting problem occurs when there are more number of co-related random variables. In PCA, we find out principle components which are independent variables formed by the random variables. These principle components are built in such a way that first PC has maximum amount of information and so on.

If the person have not weared the mask the model gives alarming message on the screen “Please wear the mask to defeat corona” in red colour. If the person has weared the mask properly the model gives the message on the screen “Thank You for wearing a mask." Then the model sends the signal via serial port to the arduino uno for further working. The temperature sensor senses the temperature of the person and if it is within the range then oximeter senses the pulse rate and oxygen level of the person. Two IR sensors are used to keep the visitor count for the purpose of social distancing in the seminar hall. If all these parameters are within the range the message is printed on the (16x2) LCD “You can go inside.” If any of these parameters are not within the range then message will be printed on LCD “You are not safe”.

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VI. SIMULATION

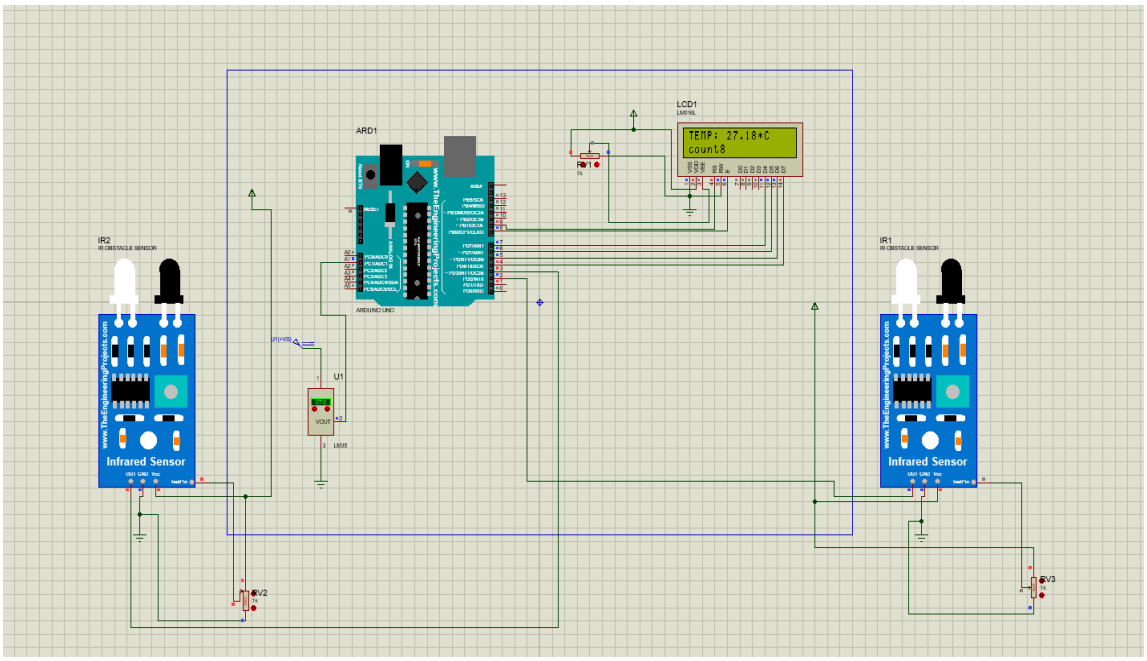

Fig. 9: Simulation of IR sensor and Temperature sensor with Arduino Uno

VII. RESULT

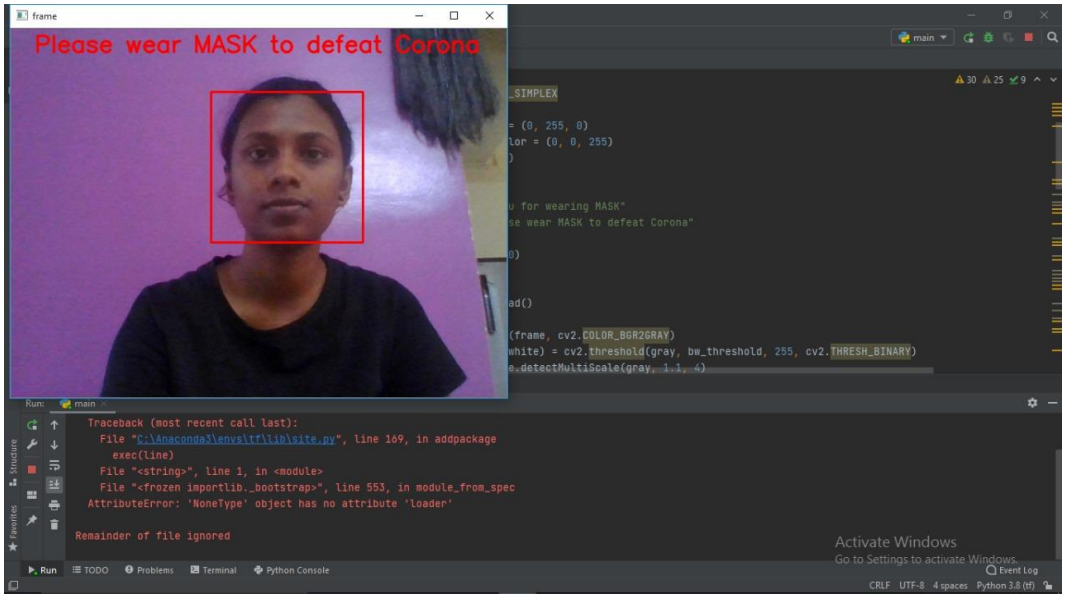

Fig. 10: Face without mask

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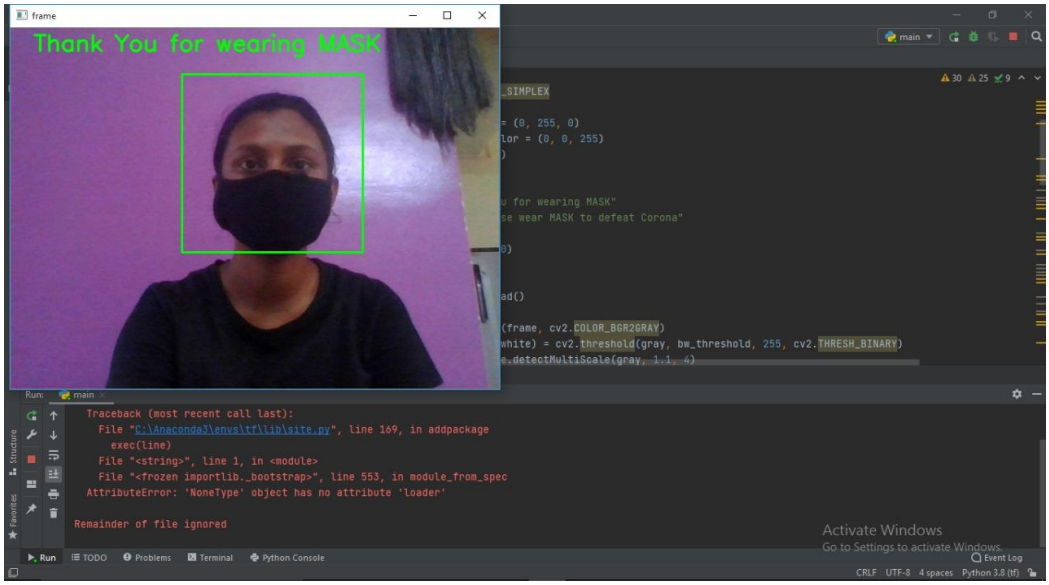

Fig. 11: Face with mask

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BIOGRAPHY

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