Smart Robot with Facial Recognition Feature for Thermal Screening

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Internet of Things

PROJECT REPORT

Under PROF SUMATHI G

Abstract— **A robot with a vision capable of scanning body temperature. Specially helpful in many places in this COVID-19 situation**

INTRODUCTION

This IOT-based device, which eventually can be converted into a robot, will be a boon to humanity in the basic need of this COVID-19 situation. This device is capable of detecting the face of a person, if they are wearing a mask or not and if they wear a mask then it checks if the person's body temperature is greater than a max usual level .

Objective

•The robot can measure the temperature of people contactless which will be really helpful in this Covid 19 Scenario

•The person detector can also be used to identify the patient's body temperature and take quick response according to the result

Motivation

Many new innovations in the field of Robotics are made to tackle the crisis of Covid 19. The small innovation may be helpful to detect some initial stage of problems and cause caution in the early stage only. One of the main problems, contact lessness, may be solved by this small robot easily. The robot can be modified and be used in various ways with some programming changes. So overall the value of the project can be evolved with its modification. All of the thinking are motivating factors for us to make progress in this project

Methodology

1st of all the raspberry pi will be programmed to recognize the face of a person. After detecting the person the sensor will detect the temperature of the person. The temperature will be shown on the screen. The temperature will be detected below or above the caution level. Then the whole system will be installed in a moving robot. The robot will be programmed to be moved by the raspberry pi

NOVELTY

•The whole project has the main idea to increase the usage of an IOT driven device to fight against the COVID 19

•The basic IOT device which I tried to build

can increase the no contact thermal temperature measurement

•I also tried to build this system and had an idea to inculcate that to a bot which may be an innovative field of low cost robotics

•The project is inspired from many of the basic existing models out in the market or research but at the same time cost effectiveness of the project is also very high.

•The idea of the project is innovative and not taken from any other projects. But to build the project I needed to take help from a lot of research works, videos and error removal sites

COMPLETION OF THE PROJECT

My project is incomplete. It couldn't reach the final outcome by myself till now

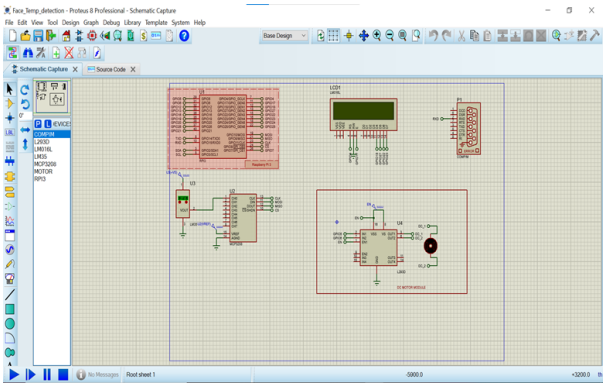
First of all I tried to build a face detection model and that ran successfully

So after that I build a circuit in hardware and bought a number of components and tried to connect the. First issue came for the high price of rpi and rpi cam. So I switched to ESP32 cam and ESP8266 and connected them to MLX9064 thermal cam module. But the sensor came faulty. So I took help from one of my friend having the components and the codes ran properly. I will include all those 1st step details in the Report itself

After that fail I tried to do it software only. Meanwhile I improvised my face detection model to face mask detection model

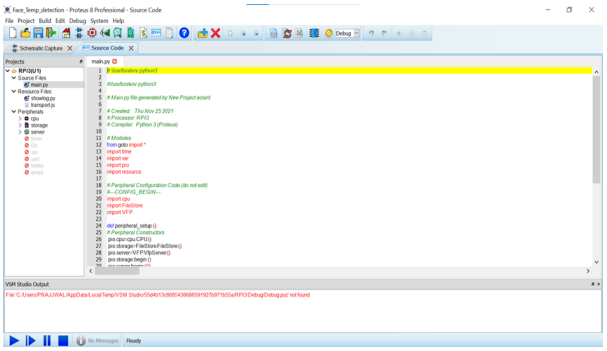
Here I built the whole circuit in proteus. Here I used virtual Rpi and all the detailed software components used are mentioned in the previous slide.

So 2nd issue I faced that the connection between the proteus model and the python model. So after searching a lot I got the solution via one external software called VSPE



After that when all the things came to a place. The models were running individually nice but not together. So there was an issue in tensorflow installation in my system. So the final outcome again couldn't be done.

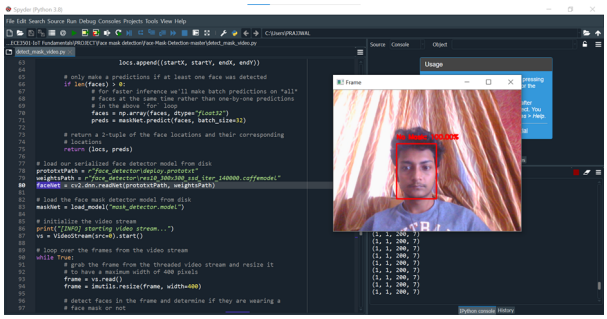
So again I sent the whole files to my friend and as he got the successful installation of the tensorflow so he got the correct outputs with the same code. I will also link those all details in the report itself.



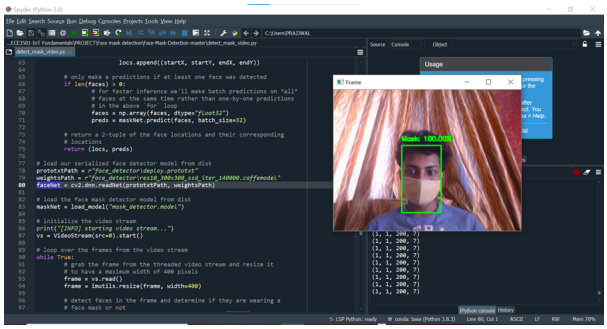
FACE MASK DETECTION

The patients must wear mask during the entry of the hospital. For that this detector is made and the application from the hospital side would be able to recognize if the person is wearing mask or not and shows the probability

of how much percentage the system is sure about its result



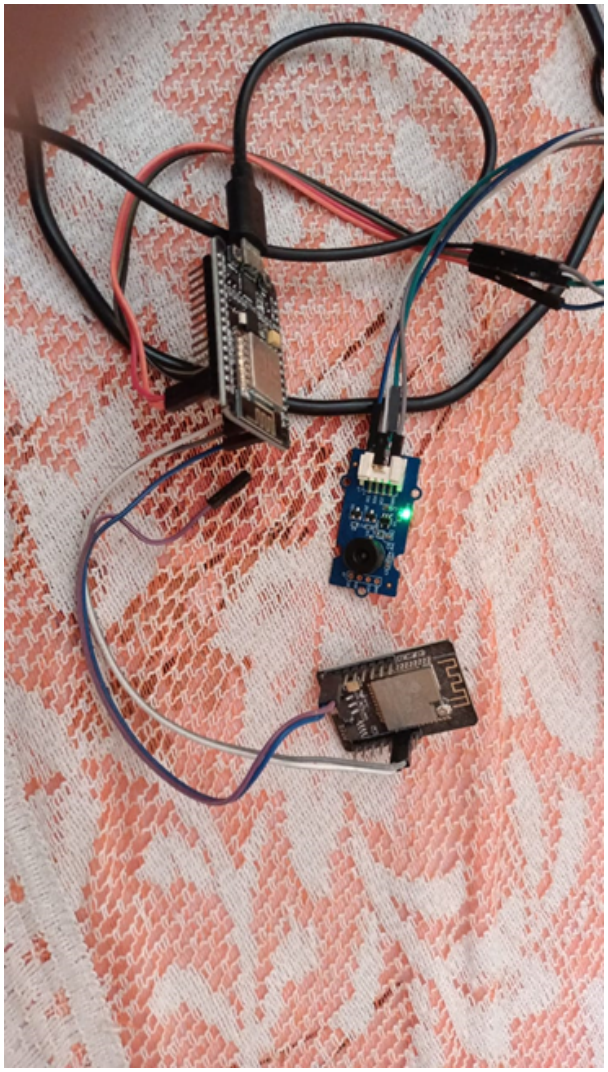
Here I used machine learning algorithm using dataset with 2500+ masked and unmasked images each. Then i trained the model using k means algo and finally the programme is able to detect that the person is masked or not in real time scenarios using camera feed



HARDWARE WORK

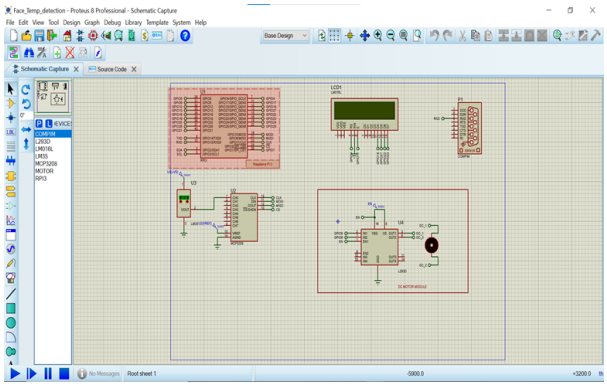
LINK:

https://drive.google.com/file/d/1h_Lk5s9ScuGe9ekwpEggTlrNKamhlxCf/view?usp=drivesdk

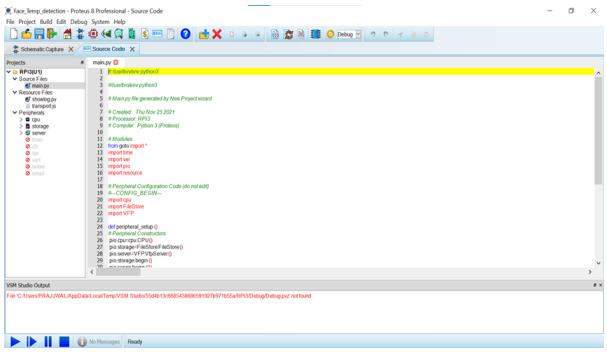


As I tried this hardware circuit the temperature sensor didn't work properly and my code didn't run. So when my friend simulated the same circuit it worked properly and the video link is in the link given

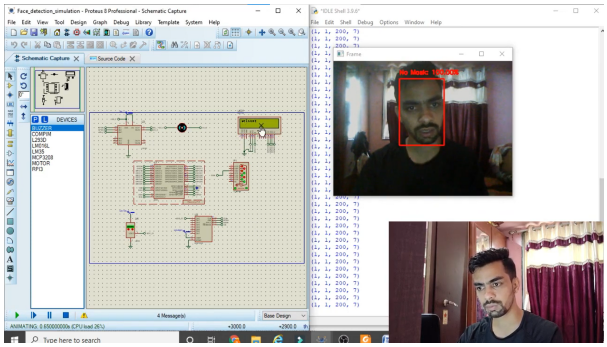
SOFTWARE WORK



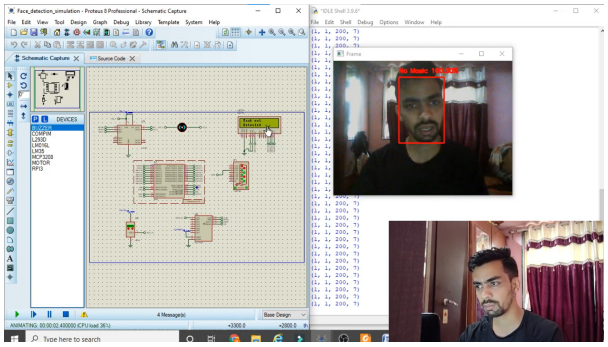
PROTEUS SIMULATION



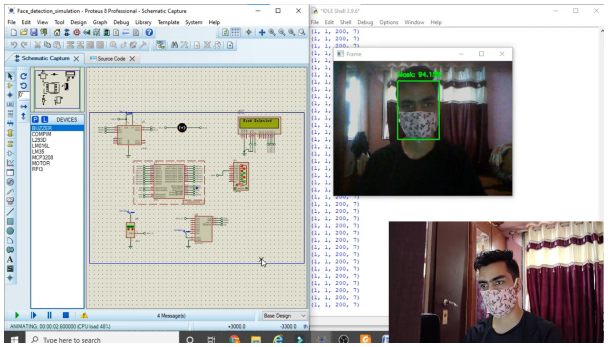
Again after some problems i sorted the things out and finally the work was done properly and the pictures of the working model is below.



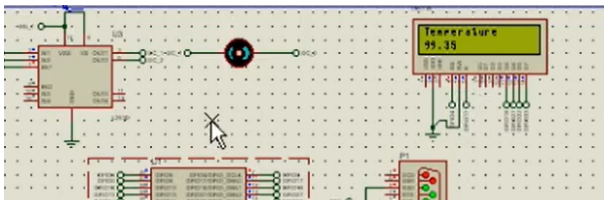
This is the welcome screen of the device



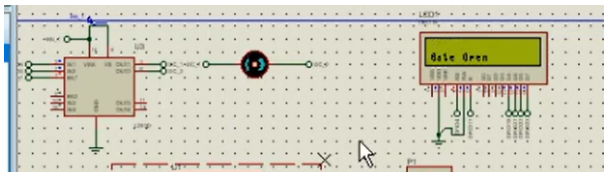
Here it shows that the mask is not detected. So the motor doesn't rotate. So the bot will not move and the gate will not open.



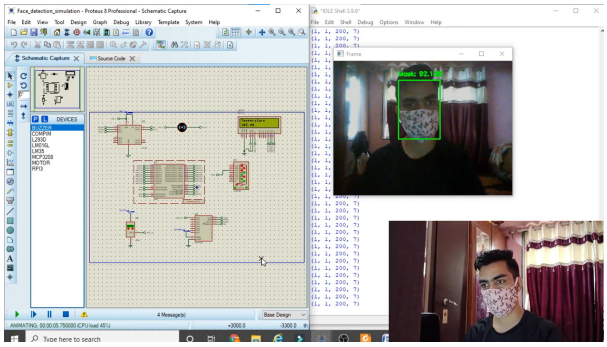
It says that gmask is detected



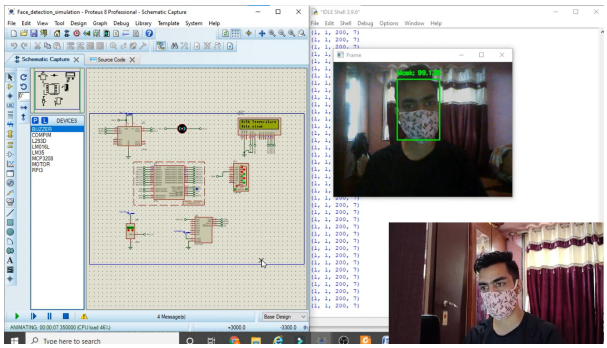
The temperature is in the given range and so it measures the temperature



So, the gate opens and the person is allowed inside.



Now we give the temperature in the sensor as greater than the restricting value



So the device gives the result as high temperature and gate is closed.

INTERPRETATION ON RESULT

The project is of course incomplete but lots of work and research went into it

Both the software and hardware were a little bit lacking due to some unfortunate failures. But these small issues can be resolved in no time

The project is completed partly but couldn't be shown in a full working model so I'll try to do that in future

FUTURE WORKS

There is a lot of work left for this project

Many improvisations also can be done in the project such as the motors for a robot to move towards a person when it detects face and mask

The gate can be opened after the thermal check by the bot. so it can be a roaming robot which need not to be used by any individuals

Also I have to fix the sensor issue in hardware and also the tensorflow installation issue in software

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