e-ISSN: 2582-5208
International Research Journal of Modernization in Engineering Technology and Science
(Peer-Reviewed, Open Access, Fully Refereed International Journal)
Volume:04/Issue:06/June-2022 Impact Factor- 6.752 www.irjmets.com

IOT SOCIAL DISTANCE MONITORING AND FACE MASK DETECTION ROBOT

P. Hemanth Reddy[*1], B. Bhavya Sri[*2], K. Dheeraj Kumar[*3], D.V.S. Ramanjaneyulu[*4]

[*1]Assistant Professor, Department of Electronics and Communication Engineering, Ace Engineering College, Ghatkesar, Hyderabad, Telangana, India.

[*2,3,4]Student, Department of Electronics and Communication Engineering, Ace Engineering College, Ghatkesar, Hyderabad, Telangana, India.

ABSTRACT

Recently India along with almost all big and small countries stated emergency conditions for the novel corona virus. To control the spreading of this virus, people should wear a mask and maintain social distancing among them. Currently, there is no option to place one person in each row 24/7 to monitor social distancing violations and to detect the people without facemask at places like banks, authorities, shopping centers, schools, Theatres, etc. To verify the queuing social distance and to detect the people without face mask, we want to develop a IoT Social distance monitoring and face mask detection robot.

For achieving all the above tasks, we used a raspberry pi 4 model. With the help of this we can build a robot, monitor the social distance and detect the people without face mask. We build a robot using L289n dc motor driver which can drive 2 DC motors. By installing OpenCV and tensor flow software's in raspberry pi we can write the suitable code in python programming language to move the robot, to monitor the social distancing and to detect the people without face masks

Keywords: Raspberry pi 4, L298N, Pi camera, OpenCV.

I. INTRODUCTION

The main objective of this project is to build a robotic vehicle which is useful in monitoring the social distance between the people and to detect the people who are not wearing the masks in the crowded places like bus stands, railway stations, airports, public markets etc. We are using Raspberry Pi 4 model B as our main processor to build the robot. With the help of L298n DC motor driver we built the robot. For social distance monitoring and face mask detection we interface a camera module to the raspberry pi 4. We dump the suitable python code in the raspberry pi OS according to our project requirements. We use OpenCV for camera handling and tensor flow for the functioning of the code. OpenCV and tensor flow are the types of software which are widely used in machine learning and artificial intelligence. We use a buzzer to indicate if anyone do not follow proper social distancing and not wearing masks

WORKING

This paper deals with the design and implementation of IoT Social distance monitoring and face mask detection robot. The aim is to identify the people who are not following the minimum social distance and the people who are not wearing the masks. We are using Raspberry Pi 4 model B as our main processor to build the robot. With the help of L298n DC motor driver we built the robot. For social distance monitoring and face mask detection we interface a camera module to the raspberry pi 4. We dump the suitable python code in the raspberry pi OS according to our project requirements. We use OpenCV for camera handling and tensor flow for the functioning of the code. OpenCV and tensor flow are the types of software which are widely used in machine learning and artificial intelligence. We use a buzzer to indicate if anyone do not follow proper social distancing and not wearing masks.

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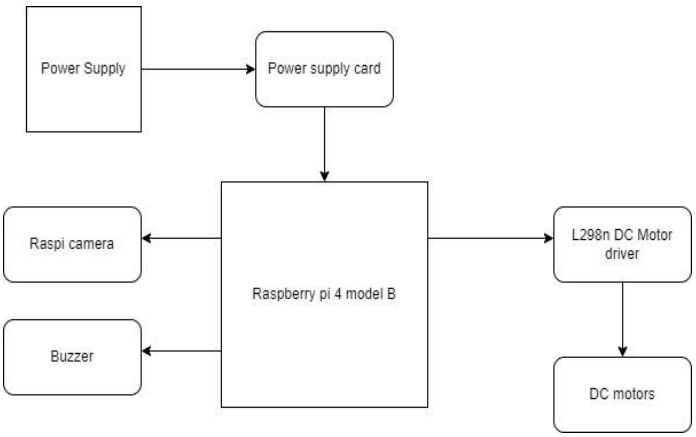
BLOCK DIAGRAM



Block Diagram

II. EXPLANATION OF EACH BLOCK

RASPBERRY PI 4 MODEL B

Raspberry Pi 4 Model B is the latest product in the popular Raspberry Pi range of computers. This powerful credit card sized single board computer can be used for many applications in the world of electronics and communication. It offers ground-breaking increases in processor speed, multimedia performance, memory, and connectivity compared to the prior-generation Raspberry Pi 3 Model B+, while retaining backwards compatibility and similar power consumption. For the end user, Raspberry Pi 4 Model B provides desktop performance comparable to entry-level x86 PC systems. This product's key features include a high-performance 64-bit quad-core processor, dual-display support at resolutions up to 4K via a pair of micro-HDMI ports, hardware video decode at up to 4Kp60, up to 4GB of RAM, dual-band 2.4/5.0 GHz wireless LAN, Bluetooth 5.0, Gigabit Ethernet, USB 3.0, and PoE capability (via a separate PoE HAT add-on). The dual-band wireless LAN and Bluetooth have modular compliance certification, allowing the board to be designed into end products with significantly reduced compliance testing, improving both cost and time to market.

PI CAMERA MODULE

The Camera Board on the Raspberry Pi is a small printed circuit board with a camera on it. The PCB is connected to a ribbon cable which connects to the Pi itself on its own port. The ribbon can be extendable. The camera on the board is very small (5MP camera). As for now it is the only Camera made specifically for the Pi therefore these specifications cannot be updated. Since it uses 250mA, externally powering the Pi should be sufficient enough for the camera. Specific configuration settings are required to initialize the camera plus Python scripts to enable it take picture.

L298N DC MOTOR DRIVER

This L298N Motor Driver Module is a high-power motor driver module for driving DC and other type of Motors. This module consists of an L298 motor driver IC and a 78M05 5V regulator. L298N Module can control up to 4 DC motors, or 2 DC motors with directional and speed control. We can also use L293D motor driver.

BUZZER

A buzzer or beeper is an audio signalling device, which may be mechanical, electromechanical, or electronic. Typical uses of buzzers and beepers include alarms, timers and confirmation of user input such as a mouse click or keystroke.

DC MOTORS

DC motors are widely used, inexpensive and powerful for their size. They are most easy to control. DC motor transforms electrical energy into mechanical energy. One DC motor requires only two signals for its operation. For robot application they are widely used because of low-cost variable speed, required high starting torque than running torque. The usual voltage of DC motors used in robotics is 6V or 12V.

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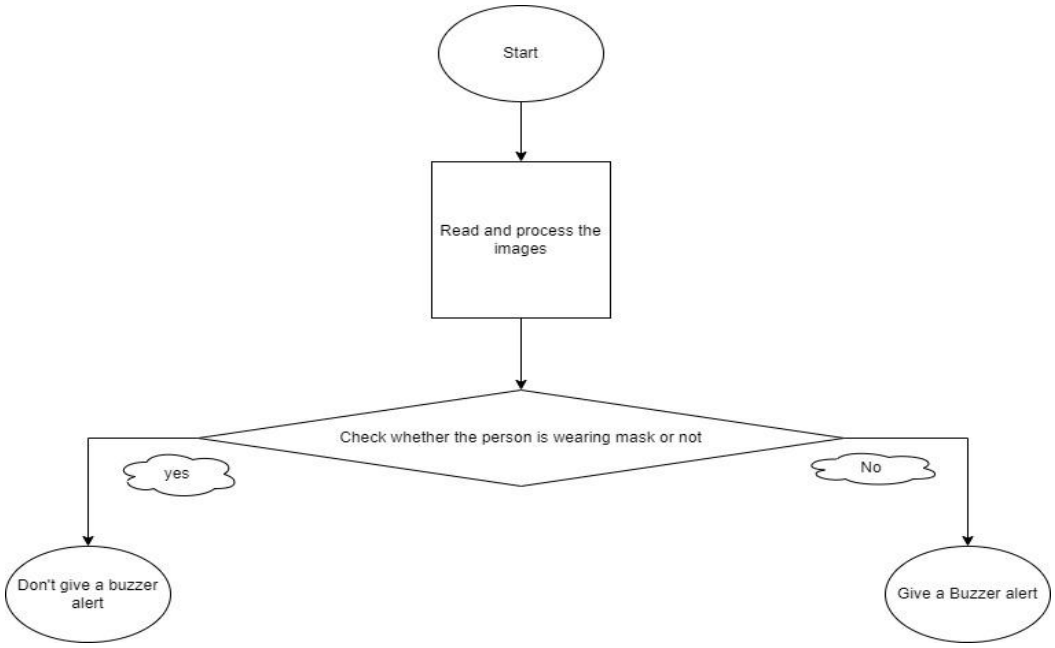
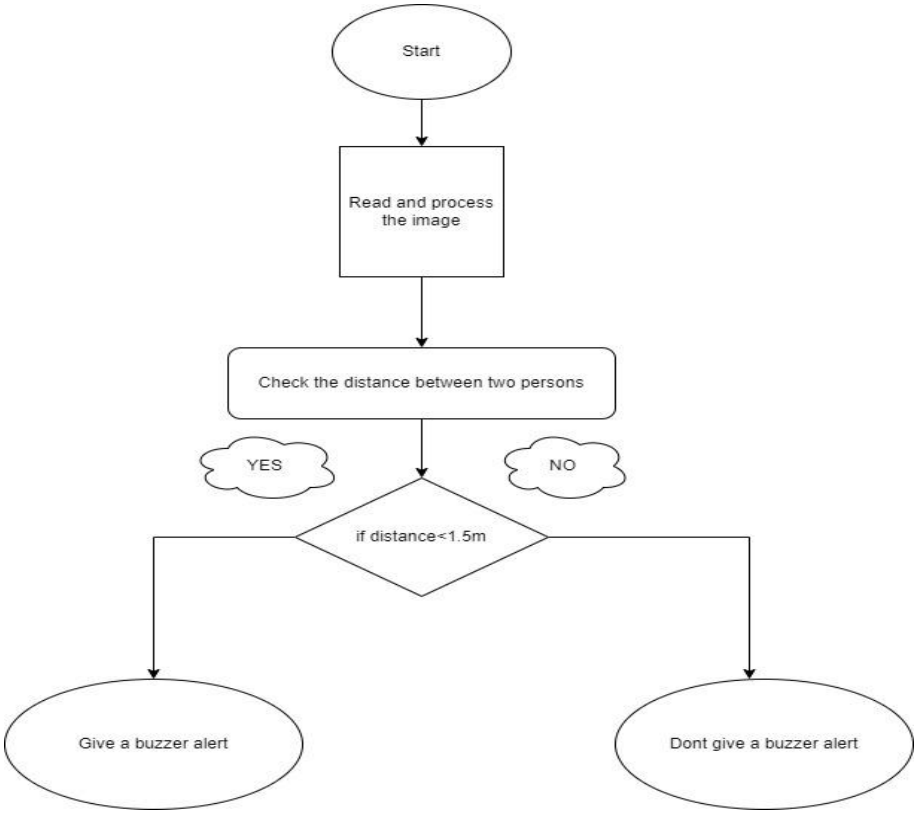
POWER SUPPLY

Power supply circuits are the source of recharging for electronic systems and circuit boards. Some boards contain power supply sub circuits; however, it is common for PCBs to serve as power supplies as well. These boards are converters, as they convert an input energy source to an output that meets the requirements of a load, system or circuit. In this project we use a six 2V batteries total 12V as our power supply to run the robot car.

FLOWCHART



Flow chart for face mask detection



Flowchart for Social distance monitoring

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RESULTS

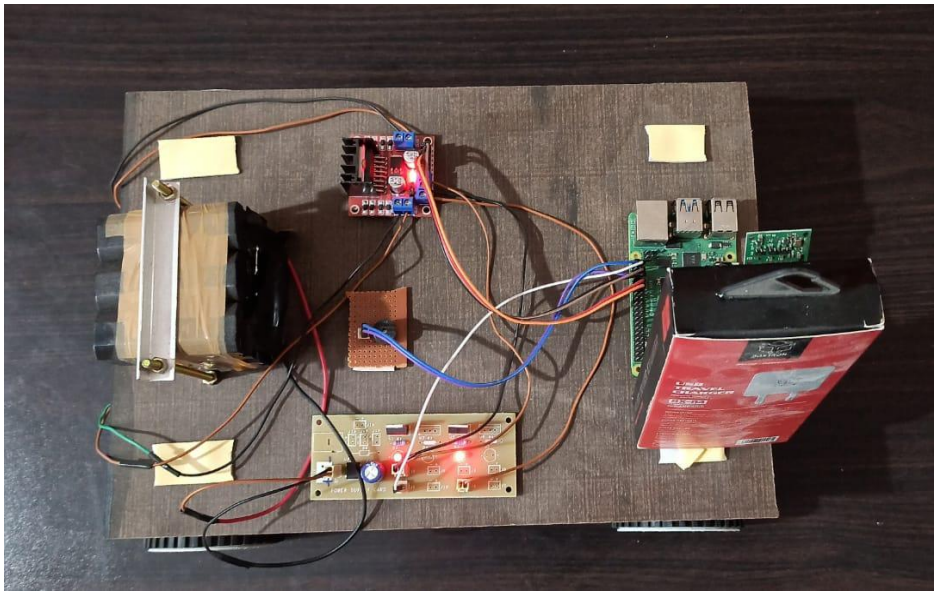

Photo of project module with Power supply

Result photo 1

Result photo 2

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Result photo 3

III. CONCLUSION

An effective solution to ensure covid-19 safety compliance is presented in this work. According to the recent statistics limiting face-to-face contact with other people is the best way to minimize the spread of covid-19 and another safe way is to wear the mask whenever we go outside. The main contribution of the proposed work is that it efficiently and cost effectively guarantees safe social distancing between outdoors and indoors and detects the people who are not wearing the masks.

In this project we developed a robot which monitors the social distance between the people and warns them if they do not maintain specifies distance between them and to detect the people who are not wearing the masks**.** We are using Raspberry Pi 4 model B as our main processor to build the robot. With the help of L298N DC motor driver we built the robot. For social distance monitoring and face mask detection we interface a camera module to the raspberry pi 4. We dump the suitable python code in the raspberry pi OS according to our project requirements. We use OpenCV for camera handling and tensor flow for the functioning of the code. OpenCV and tensor flow are the types of software which are widely used in machine learning and artificial intelligence. We use a buzzer to indicate if anyone does not follow proper social distancing and not wearing masks. We can install this module in every crowded place wherever social distancing is required.

ACKNOWLEDGEMENT

We are grateful to our guide Assistant Prof. Mr. D.V.S. RAMANJANEYULU for this continuous support and guidance. Through his guidance, we were able to successfully complete our project. Our sincere thanks go to Dr. P. SATISH KUMAR, Head of the Department of Electronics and Communication Engineering at ACE Engineering College, for his support and time.

IV. REFERENCES

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