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SOCIAL DISTANCE MONITORING ROBOT

[1]Divya Pawar, [2]Omkar Pawar, [3]Shraddha Dubale, [4]Prof. Ratnakar Kharade

Divya Pawar -Bachelor of Technology, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.
Omkar Pawar -Bachelor of Technology, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.
Shraddha Dubale -Bachelor of Technology, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.
Prof. Ratnakar Kharade, Electronics & Telecommunication Engineering Department, Dr. Daulatrao Aher College of Engineering, Karad, Maharashtra, India.

Abstract – *This main aim of the project is to monitor social distancing in the queue which is important during the COVID-19 pandemic. Due to the high infection rate of COVID-19, it is responsible for loss of life around the world. The robot can help to monitor social distancing to reduce the frequency of people coming into contact with others in the queue. We are not suitable to monitor 24×7 at each queue and aware the humans about social distancing violations. With the help of mobile robot we can detect human pairs and alert them where social distancing norm is not followed in the queue.*

1. INTRODUCTION

Social distancing is one of the best way to limit the spreading of COVID-19 in the queue. The precaution of maintaining social distancing norms in the queue has become an indispensable precaution to slow down the transmission of COVID-19. Usually we see long queues for hours every day in the banks, public offices, public places, malls, theatres etc. The queues are becoming main hotspot for spreading Covid-19 among the people. To maintain and monitoring the social distancing in the queues, we hereby design a mobile robot i.e. social distance monitoring robot. To drive the robot, we uses 4 wheel design system. With IR sensor the robot makes use of a line following principle to constantly move along with the queue. It also uses IR sensor for detecting distance between human pair in a queue. It any 2 individuals or in human pair are found having distance less than 1 meter between them, the robot instantly sounds a warning and alert them about the violation. Also it gives alerts about these violations by displaying message on LCD screen and aware the people who are not maintain social distancing.

2. Block Diagram

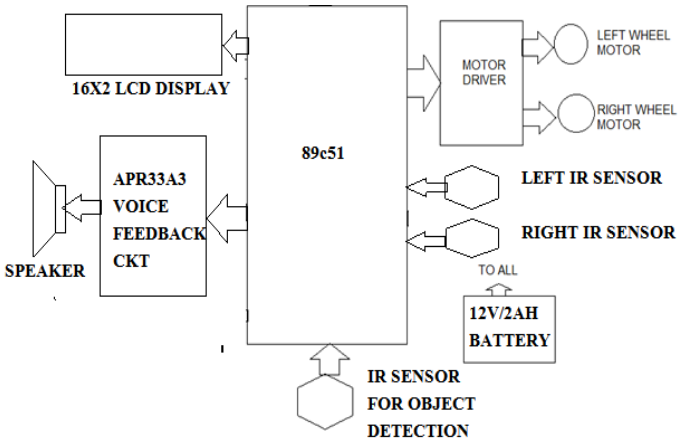

Fig -1 Block diagram of social distance monitoring robot

In the block diagram of social distance monitoring robot, microcontroller is used to connect different components and collects information from the IR sensor and gives output according to program which is burn in it. The robot is equipped IR sensor to detect social distancing in the queues. For movement of the robot, we uses L293D motor driver to drive 4 DC motors. LCD screen displays the welcome message and alerts message of "keep distance" of these violations along with a queue. In any queue, 2 individuals are found having less than 1 meter distance between them, the voice feedback module alerts them with help of speaker. This power supply converts 230V ac into +5 volt dc and +12 volts dc. +5 volts is required for Microcontroller, IR sensor & LCD display and + 12 Volts for motor driver circuit is required.

3. HARDWARE USED

1. Microcontroller (89C51): The AT89C51 is a low-power, 8-bit microcomputer with 4K bytes of flash memory.

2. DC Motor Driver L293D: The DC motors are controlled by the bi-directional motor driver IC – L293D. The motor driver can be connected through the microcontroller for interface between them.

3. DC Motor: DC motor- 30 RPM 12 V geared motors are generally a simple DC motor can be used in variety of robotic application. The input of this is current/voltage & its output is speed.

4. IR sensor module: The sensor consists of an Infrared Transmitter, Detector, and support circuitry. Sensor will send an output low when it detects an obstacle within range

5. LCD display: LCD display is an electronic display modules are preferred to display message on the screen.

6.APR33A3 Voice Record & Playback Module: The APR33A series is a powerful audio processor along with the simple key trigger. It is suitable in a simple interface to limit the length of a single message.

7. Light Emitting Diodes (LEDs): An LED is used as an indicator.

8. Voltage Regulator LM 78 MXX : The LM78MXX series of three terminal regulators is used for voltage regulation in system with several fixed output voltages.

9. Speaker: A speaker is an electronic transducer that converts an electrical audio signal into a corresponding sound.

10. Battery and BMS System: A battery management system (BMS) is an electronic system that manages a rechargeable battery (cell or battery pack) such as by protecting battery. It monitor state of battery.

4. SOFTWARE USED

1. KEIL for programming
2. Proteus for PCB designing and SCHEMATIC.

4. WORKING

The social distance monitoring robot uses a 4 wheel design system to drive the robotic vehicle in the queue. For movement of the robot we used 4 DC motor and to drive this we used L293D motor driver. When robot is turns ON, first the system is initialized and a welcome message is displays on LCD display screen mounted on the robot. The robot uses three IR sensors, in which two sensors used to constantly move along with the queue with the help of a line following principle. The robot is equipped with another one IR sensor for human detecting in order to detect person in the vehicle path. The IR sensor used for detecting distance between 2 individuals in a queue as in human pair.

In any 2 individuals are found having less than 1 meter distance between them, microcontroller gives signal to the voice feedback module. Then the robot instantly displays the message as a "keep distance" on LCD display. Then the voice feedback module alerts them via speaker and inform about these violations along with a queue. Thus this project helps for automatically monitoring and maintaining social distancing in queues to prevent spread of the viruses among the people.

5. FLOWCHART

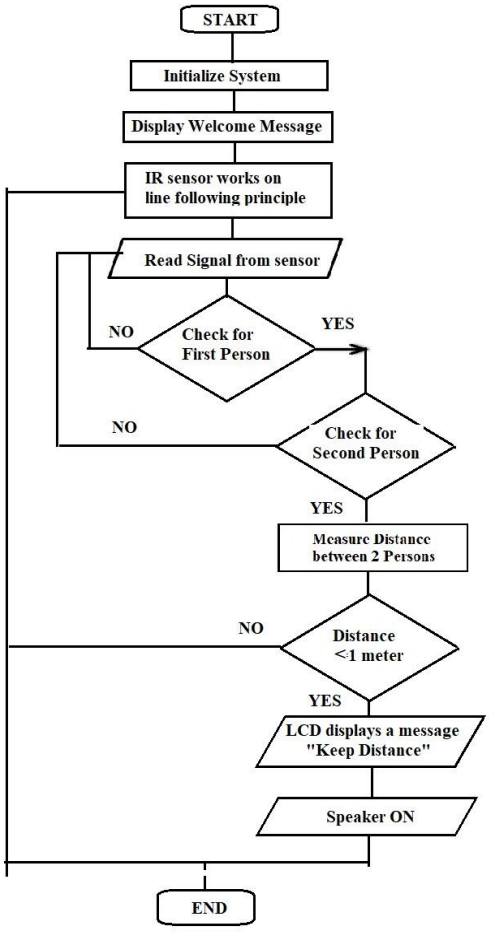

Fig -2 Flowchart of social distance monitoring robot

6. PCB Layout:

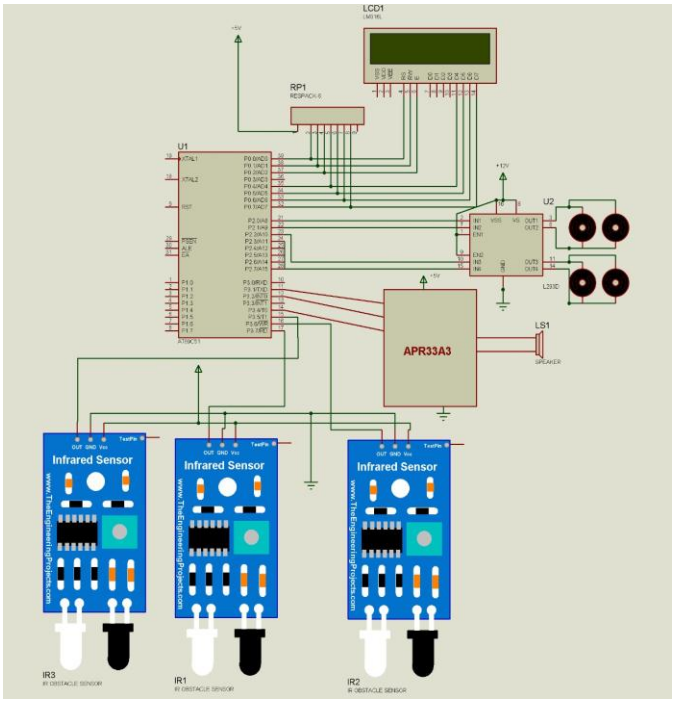

Fig -3 PCB layout on proteus software.

7. RESULT

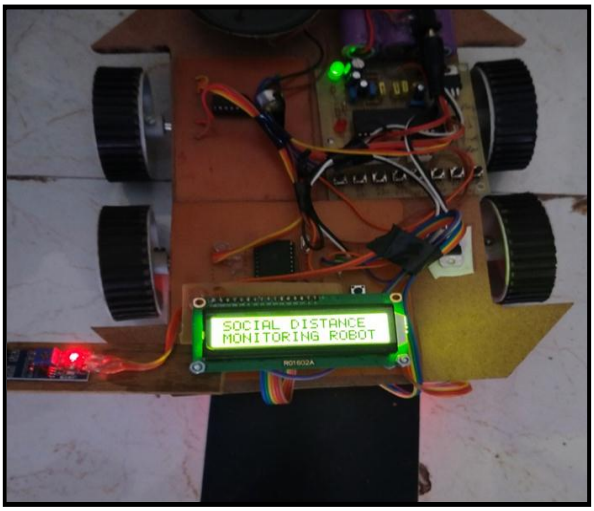

Fig -4: Social Distance Monitoring Robot (System Initialization)

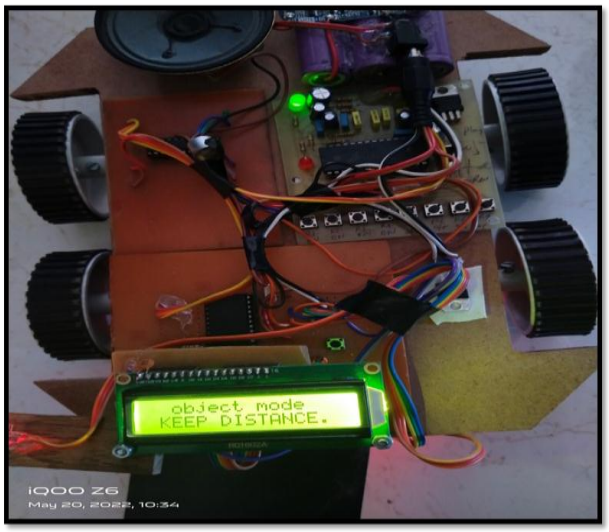

Fig -5: Social Distance Monitoring Robot (System Output)

8. CONCLUSIONS

Social distancing in public places like queues is important to reduce the total number of infected cases spreading by human contacting. The mobile robot can help to detect queue where the individuals who are non-compliant with the social distancing norm. Social distancing which is a fundamental method to tackle any pandemic. We use a mobile robot to attend to encourage people to move apart by displaying a message on a screen mounted on the robot.

9. ACKNOWLEDGEMENT

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