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IOT Based Robot for Social Distancing

Ms. Pallavi Katre[1], Dr. S.S.Shriramwar[2]

MTech student, Electronics Engineering (Communication), Priyadarshini college of Engineering, Nagpur,India[1]

Assistant Professor, Electronics Engineering (Communication), Priyadarshini college of Engineering, Nagpur,India[2]

Abstract: A social distancing monitoring robot that measures the distance between disease-spreading persons in order to minimise the spread of Covid. This approach is necessary since banks, government offices, malls, schools, and theatres all have long lines that last for hours every day. To assure social separation in lineups, a social distancing monitoring robot was designed. The robotic vehicle is driven by a robot with a two-wheel design system. It uses a line-following approach to keep up with the queue and keep an eye out for social distance breaches. In order to detect violations, the robotic employs IR sensors to traverse back and forth with the queue. To detect obstructions in the vehicle path, the robot now has an obstacle detecting ultrasonic sensor

Keywords: Smartphone, Automated, Wi-Fi, obstacle, Android robot

I. INTRODUCTION

This COVID19 The COVID19 pandemic, which started in Wuhan, China in December of last year, has created a whole new period and way of life—a new world in which social isolation has become a need for existence. With a global infection rate of 15, 012, 731 confirmed cases and 619, 150 deaths, as well as rapidly rising national infections and deaths, COVID-19 control and prevention in India necessitates the use of masks and a social separation of one metre between individuals, as the virus can spread through bloodstream and human contact. Imposing social separation, particularly in public spaces, is a major problem in preventing COVID19 transmission. As a result, I've created a social distancing robot powered by a Raspberry PI and equipped with ultrasonic, infrared, and infrared sensors.

The COVID-19 pandemic has impacted negatively on people's lives all around the world. There have been 19.8 million confirmed cases worldwide as of August 10, 2020, with over 730 thousand fatalities. In addition, the pandemic has had severe economic and social consequences. At the time, avoiding exposure to the coronavirus is one of the best ways to avoid developing COVID-19. To limit the possibilities of getting or transmitting the virus, organisations such as the Centers for Disease Control and Prevention (CDC) have recommended a number of rules, including maintaining social distance, wearing masks or other facial coverings, and frequent hand washing. In general, social distancing refers to actions taken to minimise the frequency with which people come into touch with one another and to keep a gap of at least 6 feet between those who are not from the same home. Several groups have approximated the virus's propagation and found that social distance reduces the total number of affected patients significantly. The development of standards and means to enforce these social distance limitations in public or private meetings, whether indoors or outdoors, is a critical topic.

By showing a message on the mounted screen, the robot encourages non-compliant people to move apart and maintain at least 6 feet of social distance. Our COVID-robot also takes pictures of the incident and sends them to the necessary security and medical officials. the new guidelines It's also critical to recognise when such regulations are broken so that proper countermeasures can be taken. Detecting breaches of social separation could also aid in contact tracing. Many systems for detecting excessive crowding or undertaking contact tracing have been developed, and the majority of them rely on communication. Some examples of this type of communication are: WiFi, Bluetooth, cellular connectivity-based tracking, RFID, Ultra Wide Band (UWB), and more technologies are available. The majority of these technologies are only useful in indoor settings, while cellular has been used to follow pedestrians outside. Furthermore, several of these technologies, such as RFID and UWB, necessitate the installation of extra infrastructure or sensors in order to follow individuals indoors. In other circumstances, technologies like WiFi and Bluetooth are useful for tracking only those persons who are utilising wearable devices or cellphones to connect to the technologies. This limits their application for crowd tracking and social distancing norms in general surroundings or public areas, and may make counter-measures more difficult. Main Findings: We offer COVID-robot, a vision-guided mobile robot that can monitor scenarios with low or high crowd density and prolonged contact with people. We employ people recognition and tracking algorithms to recognise groups of people who are closer than 6 feet apart in the camera's Field Of View (FOV). When social distance breakdowns are identified, the robot prioritises groups depending on their size, navigates to the largest group, and displays an alarm message on a mounted screen to encourage people to follow social distance standards. The robot tracks and pursues noncompliant mobile pedestrians, issuing warnings along the way. Our COVID-robot navigates and classifies individuals who break social distance limitations as non-compliant people using

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affordable visual sensors such as a Raspberry Pi ribbon camera. Our COVID-robot leverages the CCTV camera configuration (if available) in indoor environments to boost detection accuracy and inspection a bigger group of pedestrians for violations of the social distance constraint...

II. HARDWARE COMPONENTS REQUIRED

An Raspberry Pi: Raspberry Pi is a collection of small single-board computers developed by the Raspberry Pi Foundation in collaboration with Broadcom in the United Kingdom. It's a credit-card-sized computer with a normal keyboard and mouse that plugs into a computer monitor or TV. It's a capable small device that allows individuals of all ages to learn about computers and programming languages like Scratch and Python. It can perform all of the tasks that a desktop computer can, including accessing the internet and watching high-definition video, as well as creating spreadsheets, word editing, and playing games.

Fig 1 . Raspberry Pi

Ultrasonics Sensors: An ultrasonic sensor is an electronic device that uses ultrasonic sound waves to detect the distance between a target item and converts the reflected sound into an electrical signal. Ultrasonic / level sensors, as the name implies, use ultrasonic waves to measure distance. The sensor head sends out an ultrasonic pulse, which is reflected back to it by the target. Ultrasonic sensors emit short, high frequency sound pulses at regular intervals. If they strike an object, they are reflected back as echo signals to the sensor, which uses the time between producing the signal and receiving the echo to calculate the distance to the target.

Fig 2 . Ultrasonics Sensors

Dc Motor: A DC motor relies on the fact that like magnet poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates a electromagnetic field aligned with the center of the coil. By switching the current on or off in a coil its magnet field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°. A simple DC motor typically has a stationary set of magnets in the stator and an armature a with a series of two or more windings of wire wrapped in insulated stack slots around iron pole pieces armature and uses either single or parallel conductors (wires), and can circle several times around the stack teeth. The sequence of turning a particular coil on or off dictates what direction the effective electromagnetic fields are pointed. At high power levels, DC motors are almost always cooled using forced air.

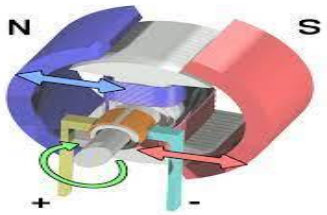

Fig 3. DC Motor

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Buzzer: A buzzer, often known as a beeper, is a mechanical, electromechanical, or piezoelectric audio signalling device (piezo for short). Alarm clocks, timers, trains, and confirmation of user input such as a mouse click or keyboard are all common uses for buzzers and beepers.

Fig 4. Buzzer

Transistors: A transistor is a semiconductor device that is used to amplify or switch electrical impulses. The transistor is a fundamental component of modern electronics. It is typically made of semiconductor material and has at least three terminals for connecting to an electronic circuit. The current through another pair of terminals is controlled by a voltage or current applied to one pair of transistor terminals. A transistor can magnify a signal because the regulated (output) power can be higher than the controlling (input) power. Although some transistors are packed separately, the majority are found embedded in integrated circuits.

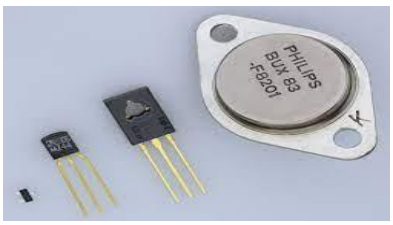

Fig 5. Transistors

Camera Module: The Pi Camera module is a camera that can take pictures and record high-definition video.
The CSI (Camera Serial Interface) interface on the Raspberry Pi Board allows us to directly connect the PiCamera module.
Using a 15-pin ribbon cable, this Pi Camera module may be connected to the Raspberry Pi's CSI port.

- Resolution – 5 MP
- HD Video recording – 1080p @30fps, 720p @60fps, 960p @45fps and so on.
- It Can capture wide, still (motionless) images of resolution 2592x1944 pixel.
- CSI Interface enabled.

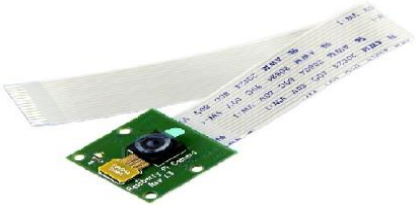

Fig 6. Camera Module

Capacitor: In an electrical circuit, a capacitor is a device that stores charges. The capacitance of a conductor increases noticeably when an earthed conductor is brought close to it, which is how a capacitor works. As a result, a capacitor has two plates with equal and opposite charges separated by a distance. The space between the conductors can be filled with vacuum or a dielectric, which is an insulating substance. Capacitance refers to the capacitor's ability to store charges.

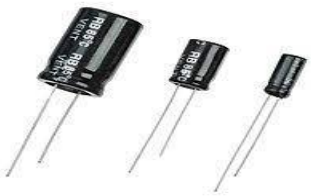

Fig 7. Capacitor

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Diode: A diode is a two-terminal electrical component with low (typically zero) resistance in one direction and high (ideally infinite) resistance in the other. It conducts current preferentially in one way (asymmetric conductance).
A vacuum tube with two electrodes, a heated cathode and a plate, in which electrons can only flow in one direction, from cathode to plate, is known as a diode vacuum tube or vacuum tube diode.

Fig 8. Diode

LED'S: When current passes through a light-emitting diode (LED), it produces light. Electrons recombine with electron holes in the semiconductor, producing energy in the form of photons. The energy required for electrons to pass the semiconductor's band gap determines the hue of light (equivalent to the energy of photons). [5] Multiple semiconductors or a coating of light-emitting phosphor on the semiconductor device are used to produce white light.

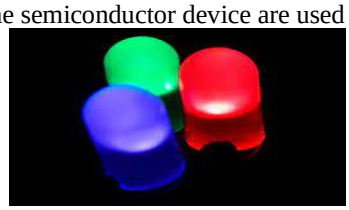

Fig 9. LED'S

PCB's: A printed circuit board (PCB) or printed wiring board (PWB) is a conductive and insulating laminated laminated construction. PCBs have two distinct purposes. The initial step is to solder electronic components to predefined positions on the outer layers. The second is PCB design, which is the process of creating reliable electrical connections (and also reliable open circuits) between the component's terminals in a regulated manner. Each of the conductive layers has an artwork pattern of conductors (similar to wires on a flat surface) that offers electrical connections. Vias, plated-through holes that allow connectivity between layers, are added in another manufacturing process.

Fig 10. PCB,S

III SOFTWARE SPECIFICATION

Python: Python is a high-level, general-purpose programming language that is interpreted. Python's design philosophy prioritises understandability, as evidenced by its extensive use of indentation. Its language elements, as well as its object-oriented approach, are aimed at assisting programmers in writing clear, logical code for both small and large projects. Python is garbage-collected and dynamically typed. Python aims towards a cleaner, less cluttered syntax and grammar while providing developers a variety of coding methods to choose from. To delimit blocks, Python employs whitespace indentation rather than curly brackets or keywords. An increase in indentation occurs after some statements, while a reduction in indentation indicates the block's end. As a result, the visual organisation of the programme accurately reflects the semantic structure of the programme. This feature is frequently referred to as the off-side rule, and it is shared by certain other languages, however indentation in most languages has no semantic meaning.

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IV. WORKING OF THE PROJECT

Using ultrasonic sensors, the line repeater can detect the obstacle and stop until the obstacle is removed.
For example, if the article is ten cm far away from the sensing element and also the speed of sound is 340 m/s or 0.034 cm/µs, the acoustic wave must propagate for roughly 294 seconds. As a result of the sound wave must move forward and replicate back, the scale of the pen should be doubled. To get the space in centimeters, we tend to multiply the transit note value of the echo output by 0.034 and divide it by 2. Calculation done is as depicted in figure 20.
It is simply based on the formula of ultrasonic

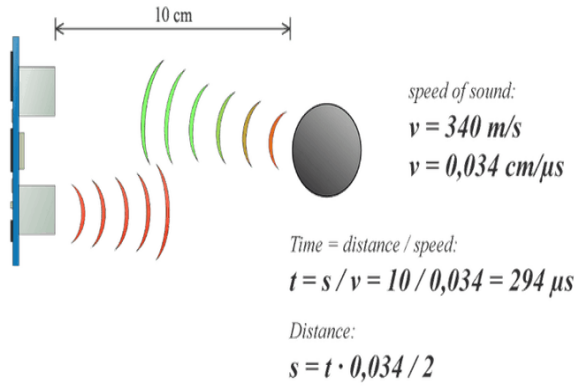

Fig 11. Calculation

V. TECHNICAL ARCHITECTURE

The robot has a four-wheel design system that is used to drive the robotic vehicle. It uses a line-following approach to keep up with the queue and keep an eye out for social distance breaches. We'll be using a ribbon camera that can communicate with the Raspberry Pi in this case. In order to detect violations, the robotic employs IR sensors to traverse back and forth with the queue

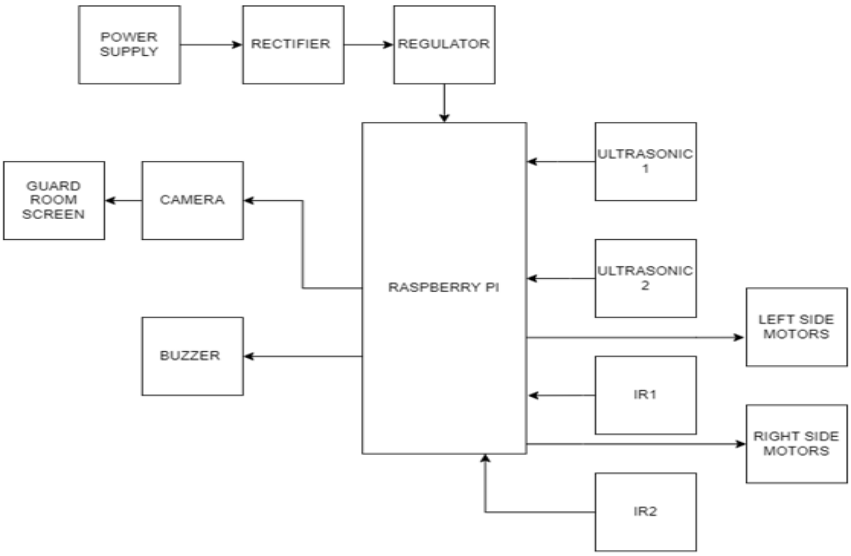

Fig12. Block Diagram

If the right IR is detected, the robot will move left to adjust itself to be in a straight line, and if the left IR is detected, the robot will move right to adjust itself to be in a straight line. The robot now has ultrasonic sensors that identify objects

Advantage:
- Fully Automated Monitoring
- 24 Hour Operation
- Automated path Following

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- No Manual Errors
- Contactless Working

Disadvantage:
- Requires Battery Charging
- Requires Internet Connection

VI. CONCLUSION

We have presented an Internet-of-Things-based concept for limiting the current pandemic. It aids in limiting the spread of covid by keeping track of the distance between disease-carrying persons. The robotic vehicles follow the queue and keep an eye out for infractions of social distancing. It calculates the distance between two people in a queue. If two people are detected to be within 3 feet of each other, the robot immediately sounds a buzzer with the message "maintain distance" to notify them to the infraction. It also takes pictures of those who commit breaches and sends them to higher authorities via a smartphone app.

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