



Autonomous Robot for Sanitization

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Abstract : Robotics is very important these day , robotics is use in many of industries. In pandemic time it was observed that there was short of health care workers or workers for manual cleaning purposes. Therefore , for this problem we came up with solution of using autonomous sanitization robot which can be use in any commercial places to sanitize the disinfected areas. With the use of line follower and PIR sensor robot will work automatically without any external guidance and sanitize the given area. Specially in hospitals use of this robot is important to stop the spread of contiguous diseases. This project highlights the importance of medical robotics.

Keywords – Robotics, health care, autonomous sanitization, line follower, medical robotics .

I. INTRODUCTION

As an advancement during the emergence of networked robots within the cloud, the web of Robot Things was implemented where they'll do many different tasks to make life easier. To prevent the spread of the coronavirus inside hospitals and other public places, it becomes essential to keep surfaces disinfected. But the manual cleaning process is less effective and considering the chance of getting infected.

The autonomous robot will play a vital role during the present pandemic situation. During this pandemic situation, many hospitals are facing the biggest issue is a shortage of health care workers. Recently many high-risk and high-touch areas, intelligent navigation, and detection systems are used. In recent days house cleaning robots are famous for their hygiene room cleaning system.

Sanitization, which has become a essential aspect in these pandemic times and plays a crucial role in preventing us from exposure to this deadly virus and thus helping in the eradication of this global pandemic. The objective of this project is to minimize human association as much as possible and make it easier and automatic. In this case, the use of robots can reduce human interference in sanitizing process. Even To develop a user-friendly system so anybody with very basic knowledge can handle the machine.

The objective of this project is to minimize human association as much as possible and thus automating the tasks such as sanitization with the help of robots. Using robot for sanitisation will reduce human involvement. Even a user friendly system can be made, So anybody with very basic knowledge can handle the machine.

This robot is designed to provide autonomous solution for sanitizing and disinfection which we faced In covid-19. It Plays vital role in preventing from virus in global pandemic. It Reduces human efforts and risk to personels, non skilled person can handle this robot. Cleaning process will be fast, comfortable and easily handled. also there is Use of sensors like PIR (Human Detection).

II. LITERATURE REVIEW

| Sr. No. | Author Name | Title of Paper | Name of Publication, Year | Technique Used | Conclusion |
|---------|--|--|---------------------------|---|--|
| 1. | Mr. Ashok Kumar. M, Arun Kumar N, Hemanth M , Krishnan N , Anil Kumar N | Development Of Iot Based Robot For Hospital Floor Cleaning | 2021 | Additional improvement in route execution of the robot, input sensors, for example, optical encoders can be incorporated. | Robotic cleaners are distinguished on their cleaning expertise like floor mopping, dry vacuum cleaning, etc. |
| 2. | Apeksha Wadibhasme, Yedhubooshan M M, Kaushik Moolya, Shireen Farhath, Dipti Darade, Sumana Hati | Sanitization Robot | IRJET 08 AUG 2020 | We a bacteria are exposed to UV-C light of the DNA absorbs light energy and causes cell damage. | Effective management of COVID- 19 can significantly reduce the number of infected patients. |
| 3. | Aladin BegićTechni cal Faculty, University of Bihac | Application Of Service Robots For Disinfection | 2017 | By UV-C disinfection robot provides an economical and effective measure in limiting the spread of bacteria. | When bacteria are exposed to UV-C light of their DNA absorbs light energy and causes cell damage that prevents new infecting others. |
| 4. | M. A. Gadi, A.S.Lonkar, A.S.Wankhede ,S.D.Gandate | Multi- Purpose Sprayer | 2016 | Automation for spraying in the field of agriculture has increased the productive output. | Tries to develop a new mechanical system which will overcome agriculture problem. |

Table No. 1 : Literature Review

III. RESEARCH GAP

In the research gap the Water Tank was absent for emergency condition which include sprinkler mechanism. There is a Absence of Hazard alarm sensor which we can use in emergency situation.

IV. ACTUAL PHOTOGRAPH OF PROJECT

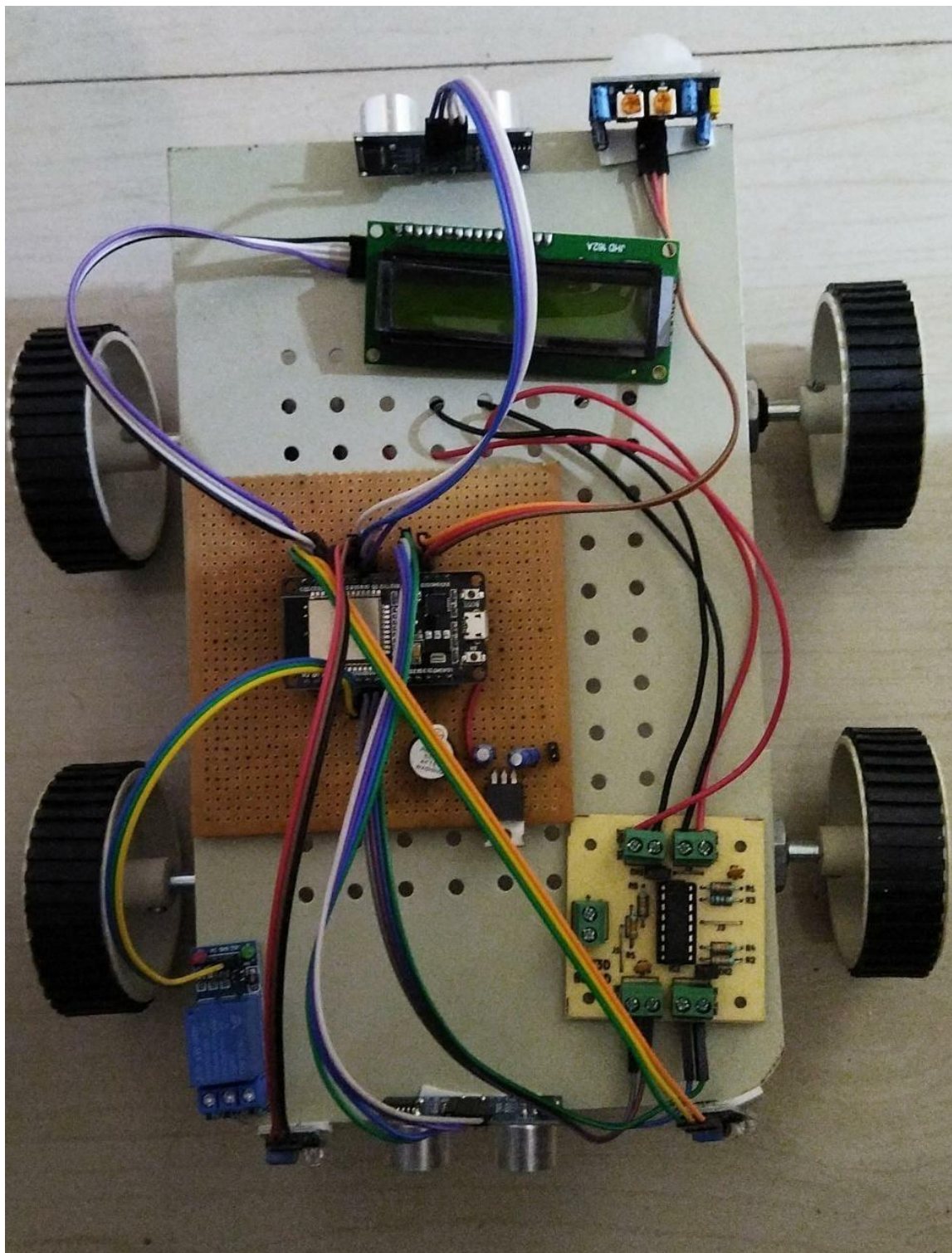


Fig No. 3.1: - Actual photograph

V. COMPONENTS AND SPECIFICATION

| Components | Specification |
|-----------------------------|--|
| Microcontroller | ESP32 Microcontroller Low power system with integrated Wi-Fi and Bluetooth |
| Ultrasonic Sensor | Detects Ultrasonic noise |
| IR Sensor | Detects motion and heat of object |
| PIR Sensor | Detects human in sensor range |
| Buzzer | Converts signal from audio to sound |
| Single Channel Relay Module | Control high power devices Supply voltage 5V 3 pin servo-style header 2xLED's show the current state of relay |
| Pump Motor | 6-12V |
| LCD Module | 12C |
| Motor Drive | L293D 16-pin IC |
| DC Geared Motor | 12V 200 RPM |
| Zero PCB | Square grid of 0.1 inches (2.54mm) spacing |
| Connecting Wires | Solid core wire of equal size |
| Jumper Wires | Connector pins at end |
| USB | Data cable for programming as well as for supplying power |
| Adapter | 12V 2 Amp Input- 100-240 VAC 50/60 |

Table No. 2 : Components and Specifications

VI. METHODOLOGY

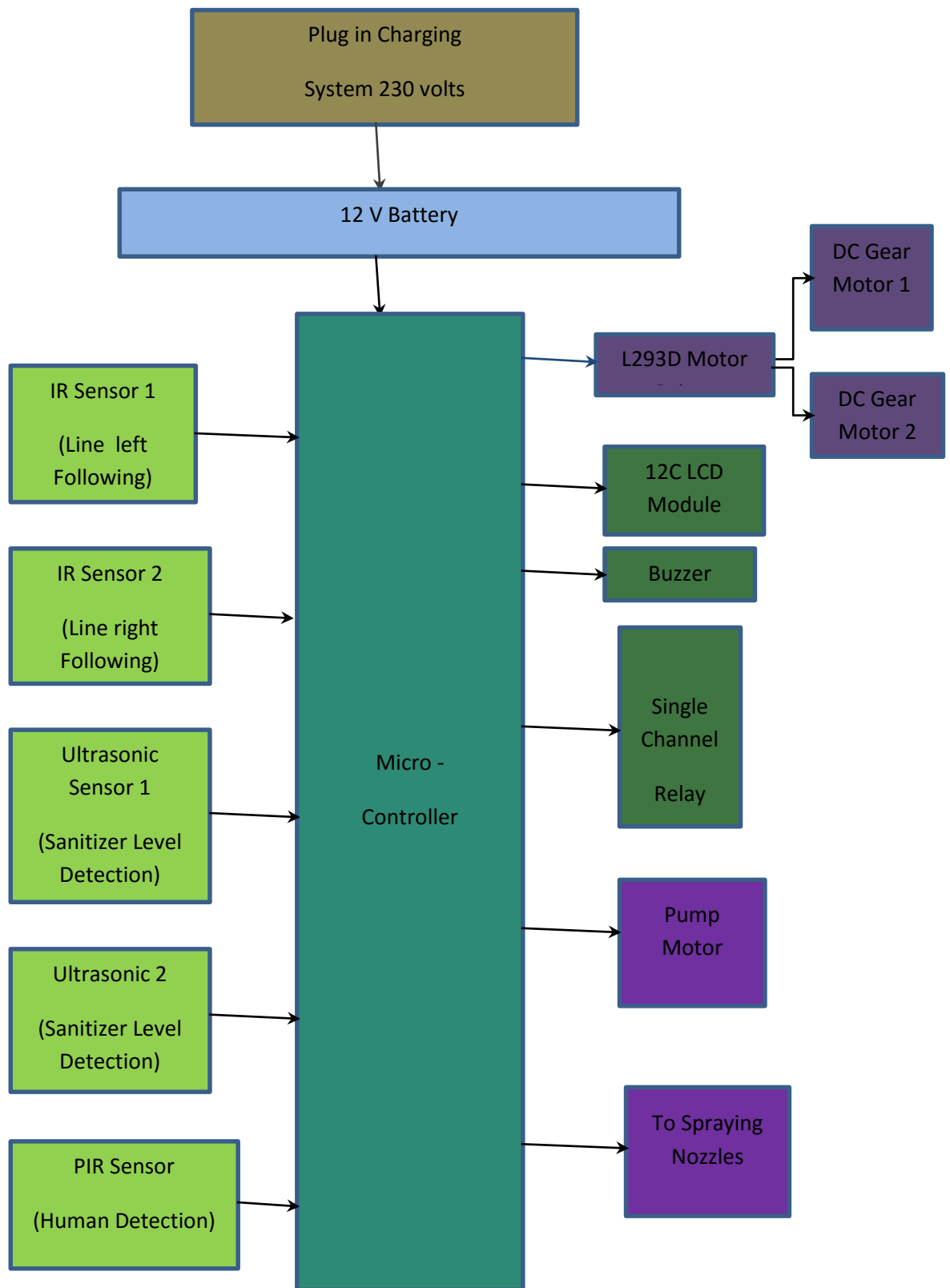


Fig No. 3.2: - Block Diagram

The ESP32 is the microcontroller that would be used in this system. An L293D motor driver will be used to drive the motors connected to drive the robot. Out of the 4 wheels of the robot, 2 wheels of the robot will be powered using motor while 2 wheels would be dummy wheels. The robot will be powered using rechargeable batteries. The robot uses line following mechanism using two IR Sensors which makes it completely autonomous. An ultrasonic sensor is used for obstacle detection. PIR Sensor is used to detect presence of humans in order to avoid spraying on them. Another ultrasonic sensor would be used to keep a count of liquid used for sanitization. A pump motor along with a sprayer nozzle will be used to spray liquid. This would be controlled using a relay. An I2C LCD is used to display battery level as well as sanitizer level. A buzzer is used for alerting in different cases. This robot can be used for other purposes also such as spraying pesticides, fertilizers or also for watering the plants etc.

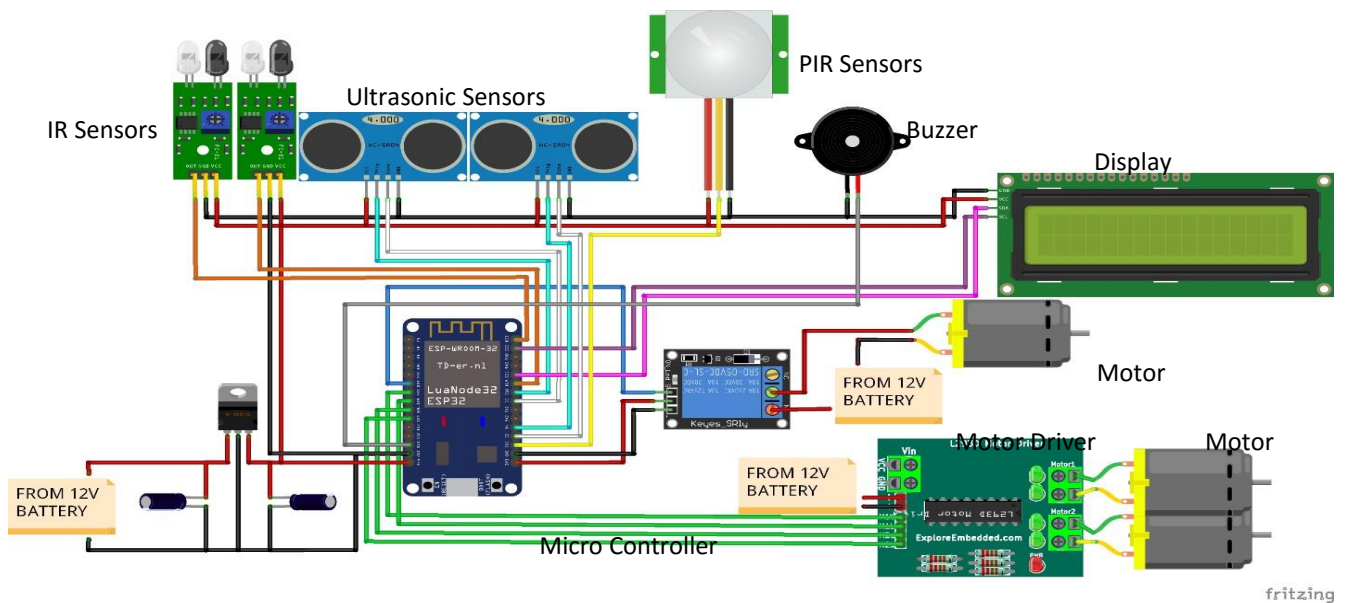


Fig No. 3.2: - Circuit Diagram

Representation of wires:

- Red And Black wires- Power Pins (5V).
- Yellow Wires- Signal Pins.
- Magenta Color Wire- Connected To SDA.
- Purple Color Wire- Connected To SCL.
- Gray Wire- Connected To Buzzer.

In Buzzer System:

If any 1 is on then Buzzer will Activate, otherwise Buzzer is in deactivated position.
 If the PIR sensor detects someone the value of PIR sensor goes high which in turn gives a signal to the buzzer to switch on.
 The buzzer also activates when the sanitizer in the container goes below a threshold level.

VII. CONCLUSION

This sprayer bot serves as a reliable and efficient system for sanitation facilities. It is cost efficient and consumes less power. The system can easily be used in the current scenario of COVID-19 to sprinkle sanitizers in hospitals. The robot reduces physical work by spraying sanitizer and can be used for spraying other liquids too. This sprayer bot completely works autonomously, is cost-efficient and saves time.

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