

# Solar Based Vacuum Cleaner and Floor Cleaner Robot

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## ABSTRACT

Modern households are becoming increasingly mechanized and intelligent. Convenience and more time for individuals are two benefits of home automation. Although the domestic robot business is still relatively new and, in its infancy, it is already permeating homes and people's daily lives. On the other hand, increase is anticipated, and domestic robot usage is changing. While there are several robotic vacuum cleaners on the market, not all of them clean floors using water. This project aims to create and deploy a vacuum robot with two cleaning modes: autonomous and manual. The manual mode operates through a phone application. Unlike human vacuums, vacuum cleaner robots are made to simplify the cleaning procedure. This project's primary goal is to design and build a vacuum robot prototype utilizing an Arduino Uno, sensors, a DC motor, a motor driver L298N, an ultrasonic sensor, and a vacuum suction unit. The Vacuum Robot will feature a number of user-friendly criteria.

**Keywords:** Analysis, investigation, embedded, machines, results.

## I. INTRODUCTION

Robots are intelligent machines with built-in brains that are fed computer logic to perform tasks based on predetermined algorithms. The logic controller is what directs the vehicle's autonomous movement. Every aspect of life involves the use of robots. It is employed in businesses, particularly both in homes and institutions. These days, robot intelligence is almost matching that of humans. In his daily existence, the average human uses two to three robots. Some components of robotics are: - Pneumatic devices Mechanical control devices such as valve microcontrollers and sensors are

examples of actuators and sensors. The flow or movement of materials or any other components inside the device is managed by mechanical control mechanisms.

## II. METHODOLOGY

It first determines if manual mode is selected. If so, the keypad is checked. It detects whether any key Left, Right, or Centre is pushed on the keypad. If so, the information is shown appropriately on the LCD screen of our smartphone, which we use as a remote control to manually operate the robot. The bot receives the transmitted data. Next, it sees if any obstacles have been found. If so, the robot is told to stop and returns to manual mode when the signal is flashed.

## III. MODELING AND ANALYSIS

The obstructions in this system are detected using ultrasonic sensors. The sound waves produced by ultrasonic sensors fall inside the ultrasonic spectrum (20 KHz), making them inaudible to human hearing. After striking the obstruction, the sound waves return to the detectors. The robot's direction can be changed and objects or obstacles can be detected using the ultrasonic sensor. Robot motion will be managed by GSM technology. It will also be done via ultrasonic obstacle avoidance. Here, the microcontroller is an Arduino Uno.

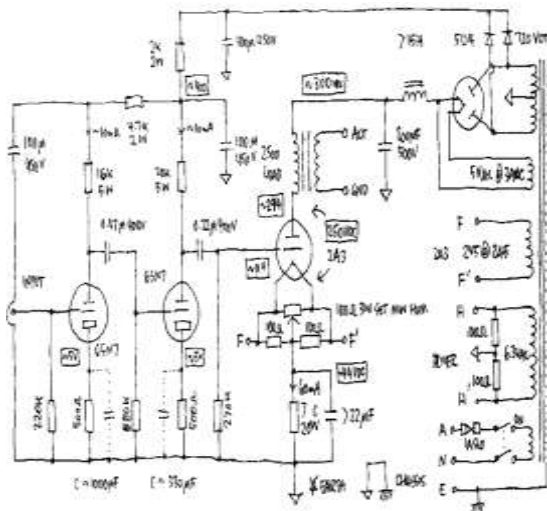


Figure 1: Circuit Diagram.

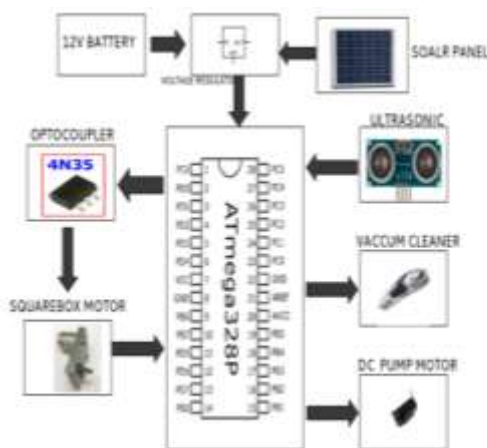


Figure 2: Block Diagram

#### IV. RESULTS AND DISCUSSION

When the robot is turned on it's in the manual mode where the user can connect the robot to his phone via bluetooth and control the robot as his choice. By changing the state of the mode selection switch robot is pushed to the automatic mode and move in a 'S' path. Based on the type of cleaning required i.e., dry or wet cleaning the suction unit or dripping unit can be turned on or off. It was observed that the robot was quite efficient in its cleaning, around 80% of efficiency was achieved.

#### V. CONCLUSION

A small and efficient vacuum cleaner robot was created for possible office and home use. They are simple to use and consume little power. It saves humans time and energy.

The main goal of this project is to design and implement a vacuum robot prototype

using an Arduino Mega, an Arduino Shield, an LDR Sensor, a Real Time Clock, a Motor Shield L293D, an Ultrasonic Sensor, and an IR sensor in order to achieve the project's goal.

Vacuum Robot will have several user-friendly criteria.

#### REFERENCES

- [1]. Ryo Kurazume, Shigeo Hirose, "Development of a Cleaning Robot System with Cooperative Positioning System" in Autonomous Robots (2000) Volume 9, Issue: 3, Publisher: Springer, Pages: 237-246
- [2]. Sewan Kim, "Autonomous cleaning robot: Roboking system integration and overview" in IEEE International Conference on Robotics and Automation 2004 Proceedings ICRA 04 2004 (2004) Pages: 4437-4441 Vol.5
- [3]. Chih-Hao Chen and Kai-Tai Song: "Complete Coverage Motion Control of a Cleaning Robot Using Infrared Sensors", Proceedings of the 2005 IEEE International Conference on Mechatronics July 10, 2005, Taipei, Taiwan.
- [4]. Charles A. Schuler, Willam L. Mcnamee, "Industrial Electronics and Robotics," Mcgraw-Hill International Edition, Industrial Electronics Series, 2003.
- [5]. Manreet Kaur, Preeti Abrol "Design and Development of Floor Cleaner Robot (Automatic and Manual) "International Journal of Computer Applications (0975 – 8887) Volume 97– No.19, July 2014.
- [6]. J Frolizzi C. Disalvo. Service robots in the domestic environment: A study of Roomba vacuum in the home". In int. conference on human robot interaction HRI, PAGE 258-265 March 2006.
- [7]. G Tuangzhi Dai and Tiequn Chen. Design on measurement and control system of cleaning robot based on sensor array detection . In IEEE International conference on control automation Guangzhou, CHINA-MAY 30 to June 1, 2007.
- [8]. H. Asada and J.-J E. Slotin, robot analysis and control, a wiley-interscience publication, 1986, pp. 29-4