SOLAR POWERED MULTIFUNCTION FLOOR CLEANING ROBOT

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ABSTRACT

The paper is to design and construct solar powered multifunctional floor cleaning robot. Cleaning is important in every place. For cleaning manpower is required, so in order to compensate for this problem we go with the automated floor cleaning robot. Automatic floor cleaner is a compact robotics system that provides floor cleaning service in rooms and offices reducing human labor. The robot is small and compact in size. So, it can carry wherever required. The components used are a solar panel, battery, regulator, Arduino, ultrasonic sensor, and L293D motor.

Keywords: Solar Energy, Solar panel, Ultrasonic sensor, Arduino, Dc motor.

I. INTRODUCTION

Cleanliness is the activity of creating a clean, beautiful, green, and comfortable environment. A cleaning machine is very much useful in cleaning floors and outside ground in hospitals, houses, auditoriums, shops, bus stands, public places, etc. In modern days interior as well as outside cleaning are becoming an important role in our life. Cleaning of waste is a very important one for our health and reduces the manpower requirement. Many floor cleaning robots are available but we developed a machine that is very simple in construction and easy to operate. Anybody can operate this machine easily. Hence it is very useful in hospitals, and any large area space. Cleaning the floor or a room may seem very simple, but actually, it consumes a lot of time and energy. Some places have a large floor area where we need more than one person for cleaning. So, we required some techniques to compensate for these problems we go with the “SOLAR POWERED MULTIFUNCTION FLOOR CLEANING ROBOT". Automation is a great solution to this problem. So, we make an autonomous floor cleaning robot. The ultrasonic sensor is the most important for autonomous floor cleaning robots because the ultrasonic sensor works as the eyes of a robot. Ultrasonic sensors are useful for turning robots by sensing obstacles or walls. Sensing distance range set by programming. In this range, the robot senses the obstacle and turns back. Cleaning is important to work in exact each spot. In recent years, conventional floor cleaning is most widely used in airports, railway stations, malls, hospitals, and in many commercial places, as cleaning is one of the important parameters for sanitation and government regulations. For maintaining such places, cleaning the floor is a major task which is necessary.

II. METHODOLOGY

After studying the various research papers on floor cleaning machines, we concluded that there are certain limitations in floor cleaning machines that can be worked upon. For example, in the existing system floor cleaning is done by using the advanced Bluetooth module to control the floor cleaning robot, for these also human efforts are required. To reduce human effort, an obstacle-detecting sensor is used for the robot's operation. The main purpose of this paper is to design a Solar powered multifunction floor cleaning robot to make the cleaning process easier than manual operation. Solar power is free from the environment. The robot starts working with solar energy. Here the solar panel is used to convert the light energy into electrical energy. To run the robot, we require hardware and software. The software used is Arduino IDE.

HARDWARE COMPONENTS

- **SOLAR PANEL**
The above shows the monocrystalline cell. Among the three cells, mostly mono crystalline is used because of its higher efficiency. To receive sunlight here solar panel is used.

- **DC GEAR MOTOR**

![DC Gear Motor]

**Figure 3: DC Gear Motor**

DC Motor which converts the electrical energy into mechanical energy. The speed of the motor is 60 rpm and its voltage is of 12v. The torque produced by the motor is 0.5 kg. The No load current is 60 mA and the load current is 300 mA.

- **ARDUINO NANO**

![Arduino Nano]

**Figure 2: Arduino Nano**

An Arduino Nano is a very tiny and simple microcontroller. Arduino’s operating voltage is 5v. The Arduino Nano has pin headers that allow for an easy attachment to a breadboard and it features a connector mini-USB.

- **L293D MOTOR**

![L293D Motor]

**Figure 4: L293D Motor**

L293D is known as a motor driver. L293D motor is a low-voltage operating device like other ICs. The other ICs also have the same functions as L293D but they cannot provide high voltages to the motor. L293D provides the Continuous bidirectional direct current to the motor.

- **ULTRASONIC SENSOR**

![Ultrasonic Sensor]

**Figure 5: Ultrasonic Sensor**
An ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. The ultrasonic sensor senses the object and wall.

**SOFTWARE:**
Microcontroller is just a board without any code; hence software is prescribed for providing the commands for the board so that it can perform operations according to our desire and wish. The software programming language used for AURDINO NANO is Embedded C. Embedded C is a programming language very much similar to C language. The Arduino IDE is used as a platform for programming in Embedded C. It is an Open-source IDE available on the web.

Arduino IDE software is used for program dumping.

Version 1.8.13
IV. RESULTS AND DISCUSSION

Below is the pictorial representation of the hardware prototype we have developed.

Figure 9: Prototype components

Figure 10: Prototype Working

When the regulator is switched ON, L293D, the Ultrasonic sensor, and Arduino get activated. If the given command is matched with the obstacle detected, if it is yes robot stops and changes its direction or else if it is no, Robot runs continuously.

ADVANTAGES
- Power consumption is less.
- It requires low maintenance costs.
- Reduces human effort.

DISADVANTAGES
- Difficult to clean corners.

APPLICATIONS
- Hospitals
- Colleges
- Computers centers
- Shopping malls etc.

V. CONCLUSION

The development of a robot that can pump out water, mop the floor, and vacuum up dust was the main focus of this paper. The robot operates automatically, and the work provides hurdle detection in case any obstacles get in its way. If a hurdle gets in the robot's way, it changes course.
VI. REFERENCES


