Arduino Based Floor Cleaning Robot

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Abstract— Smart Dust collector as its name represents it works smartly or we can say that it is an automatic Dust collector. It detects the dust objects and collects the dust. So, there is some sensor work to detect the object around the dustbin. Sometimes due to dust cleaning activities take a long time then there are other activities that are overlooked. For this reason, we are trying to develop a smart floor cleaning robot that can navigate & clean dust.

Indexed Terms-- Arduino, Dust Collecting Robot, Ultra-Sonic Sensor, DC Shunt Motor, Motor Driver

I. INTRODUCTION

Cleaning is important work approximate in every place. Sometimes this is easy and sometimes Cleaning is Important work approximate difficult. Sometimes we assigned people for purpose of cleaning and pay money and sometimes cleaning is required in areas where presence of living being dangerous so we cannot assigned living being in every place. In advancement of science a robot come in light but it operate by a personnel. To avoid this limitation of personnel we require more technologies.

Automation is a great solution of this problem. So we make an autonomous floor cleaning robot that operated by internet of things and Arduino Nano programming. Ultrasonic sensor is the most important component for autonomous floor cleaning robot because ultrasonic sensor works as eyes of robot. Ultrasonic sensor useful for turning of robot by sense the obstacle or wall. Sensing distance range of robot set by Arduino Nano programming. In this range robot sense the obstacle and turn back.

Cleaning is the essential need of the current generation. Basically, in household floors the floor has to be cleaned regularly.

SECTION - I

PARTS OF FLOOR CLEANING ROBOT:
In Floor cleaning robot there are several parts. They are

1.Chassis, 2. Wheels, 3. DC shunt motor, 4. Batteries, 5. Ultra - sonic sensor, 6. Motor driver, 7. Node MCU, 8.Wiper motor and other components.

SYSTEMS USED IN FLOOR CLEANING ROBOT:

As like floor cleaning robot have various systematic or principle components as, below we described briefly about each component.

WORK HAS BEEN DIVIDED INTO FOLLOWING

1. Design
2. Fabrication
3. Motor

- Arduino Nano:

The Arduino Nano is a surface mount breadboard compatible version of the ever- popular Arduino micro controller. It's small with integrated on-board USB and is breadboard friendly. As the function It has almost all the analog and digital pins that the UNO or Demilune and the same function as Duemilanove or

UNO. With the smaller and portable package Arduino Nano would be more friendly and convenient for users to enter the Arduino world and make use of Arduino to make their dream into reality.

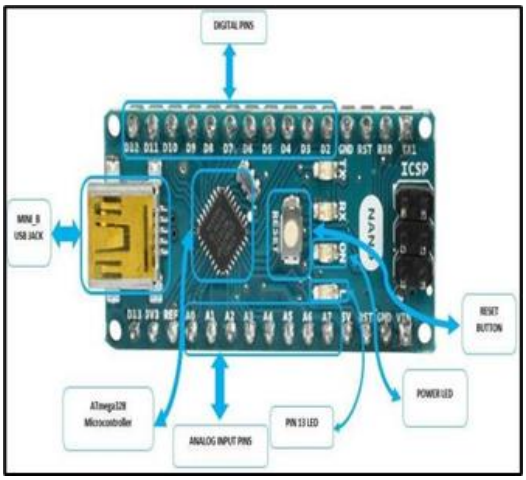

Fig.1 Arduino

- Motor driver L293d/ RELAY:

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher - current signal. This higher current signal is used to drive the motors. L293D contains two inbuilt H - bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse directions.

Fig.2 Motor Driver

- Ultra-sonic sensor:

Ultrasonic ranging and detecting devices use high frequency sound waves called ultrasonic waves to detect presence of an object and its range. Normal frequency range of human ear is roughly 20Hz to 20,000Hz. Ultrasonic sound waves are sound waves that are above the range of human ear, and thus have frequency above 20,000Hz. An ultrasonic sensor necessarily consists of a transducer for conversion of one form of energy to another, a housing enclosing the ultrasonic transducer and an electrical connection.

Fig.3 Ultra Sonic Sensor with pins

- Node MCU:

Node MCU is an open source IOT platform. It includes firmware which runs on the ESP8266 Wi-Fi SOC from Express if Systems and hardware which is based on the ESP-12 module. The term "Node MCU" by default refers to the firmware rather than the development kits. The firmware uses the LUA scripting language.

It is based on the ELUA project and built on the Espressif Non-OS SDK for ESP8266.
It uses many open-source projects, such as LUA-CJSON and SPIFFS.

Fig.4 Node MCU Chip

- DC Shunt Motor:

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly, all types of DC motors have some internal mechanism either electro - mechanical or electronic, to periodically change the diection of current flow in part of the motor


Fig.5 DC Shunt Motor

- Wiper Motor:

Wind screen wiper motor brushes have played very important role in the construction of wiper motors. The motors used in wind screen wipers are aslo known as ferrite magnet type motors as permanent magnets are used in them. These three brushes include a high speed brush, a low seed brush and a common brush for the ground. The gear section of the wiper motor also contains a cam switch to stop the wiper everytime at the same position.


Fig.6 Wiper Motor

SECTION – II

- Methodology:

The power supply is given to the motors, sensors and the arduino using the battery. The sensor and arduino are always in ON condition. We will dump the code in the arduino by using arduino app. After completion of dumping of code in the arduino, we'll switch ON the power supply then the robot will start moving. As long as the sensor senses any obstacle the robot will continue to move forward.

Whenever the sensor senses any obstacle infront at a distance of 100 cm then the sensor gives the signal to the arduino. Then the arduino will make the motor of the right wheel to stop and only the left wheel motor will remains in motion and the direction of the robot will changes. The delay time of 1000 millisec is given to the robot so that it will not collide with the edges of the obstacle.

The motors which are connected to the brushes will also always in ON condition after the supply is given and these brushes will collect the dust from the floor and there is a dust collecting plate in the robot. That collected dust is stored in that dust collecting plate.

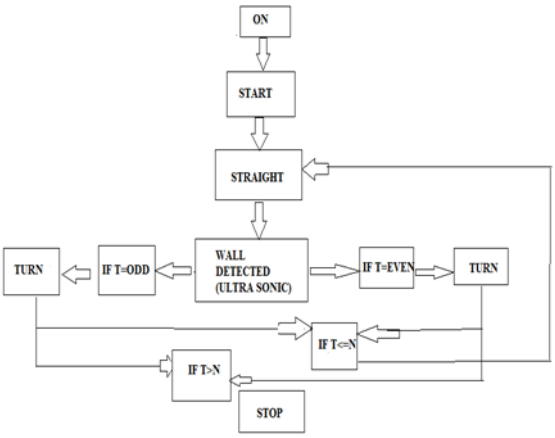

Fig. 7 Flow Chart

AFTER THE FABRICATION OF FLOOR CLEANING ROBOT:

Fig. 8.1 Top View

Fig. 8.2 Back View

Fig. 8.3 Front View

SECTION - III

FUTURE SCOPE:

This robot can modify in future for a better effective work and multipurpose. Efficiency of cleaning can be improved. By using IR sensor and to add other features we can make a device that perfectly work for cleaning. If we add a timer than it can work for a special time with starting automatically.

This floor cleaning robot is limited to clean floor stairs cannot be cleaned by this so it can be modified for cleaning of stairs.

This robot can be modified for cleaning of more than one room by one robot. This robot cannot clean circular room we can programmed for cleaning every shaped room. So, these are the future scope of floor cleaning robot.

II. CONCLUSION

We have successfully completed the Arduino based floor cleaning robot and this project presents the implementation of an Automatic cleaning System controlled by using Arduino. It reduces the man power as it is automatic and senses the obstacles using the sensor.

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