



Automatic Floor Cleaner

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Abstract:

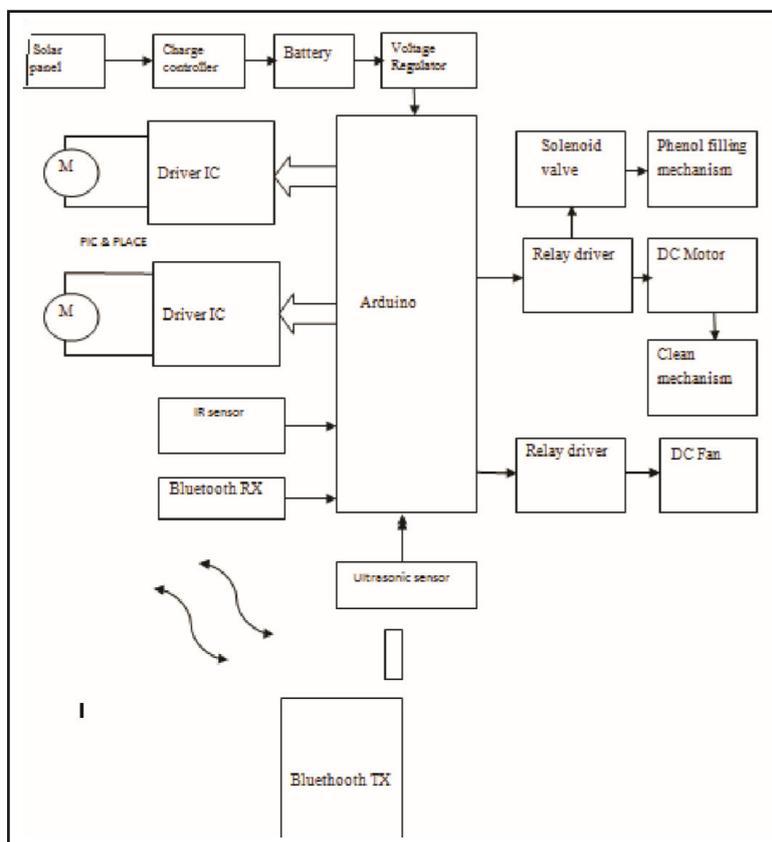
The research paper details the development of Automatic Floor Cleaner. The project is used for domestic and industrial purpose to clean the floor automatically or manually. When it is turned ON, it sucks in the dust by moving all around the floor or any other area as it passes over it. The remote controller or mobile is used to drive the motors and the suction unit also a couple of sensors are used to avoid the obstacles. This can be useful in improving the lifestyle of mankind.

1. INTRODUCTION

In our day to day life clean of floor is most important factor for human beings. So for that reason we developed robotic cleaners in robotic research due to their effectiveness in assisting humans in floor cleaning applications at homes, hotels, restaurants, offices, hospitals, workshops etc. As it is eco-friendly and less time consuming. It is corded instead of manual cleaning. The Main function of this project to clean floor in less time or to developed low cost system Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. This floor cleaner robot can work in any of two modes i.e. Automatic and Manual. RF modules have been used for wireless communication between remote and robot. This robot is incorporated with IR sensor for obstacle detection.

2. RELATED WORK

Power supply(5-12V). From solar panel we charge the battery. Voltage which is coming from the sun is not constant for that we use charge controller. This voltage is stored in battery. But this voltage is more than the required voltage of Arduino so that we use voltage regulator. Here we use relay driver, A relay as we all know is an electromechanical device which is used in the form of a switch .it is connected to solenoid valve. It consists of one input and one output. By using the relay driver we can operate dc motor and cleaning mechanism. Also for hardware controlling purpose we use RF transmitter and receiver. Here IR sensor is used for obstacle detection and ultrasonic sensor is used for fall detection. Driver circuit is connected to Arduino. Driver circuit is connected to motor. For moving the wheels in clockwise or anticlockwise direction motor is used also for pick and place operation we use motor.



Figuer.1

A. Arduino

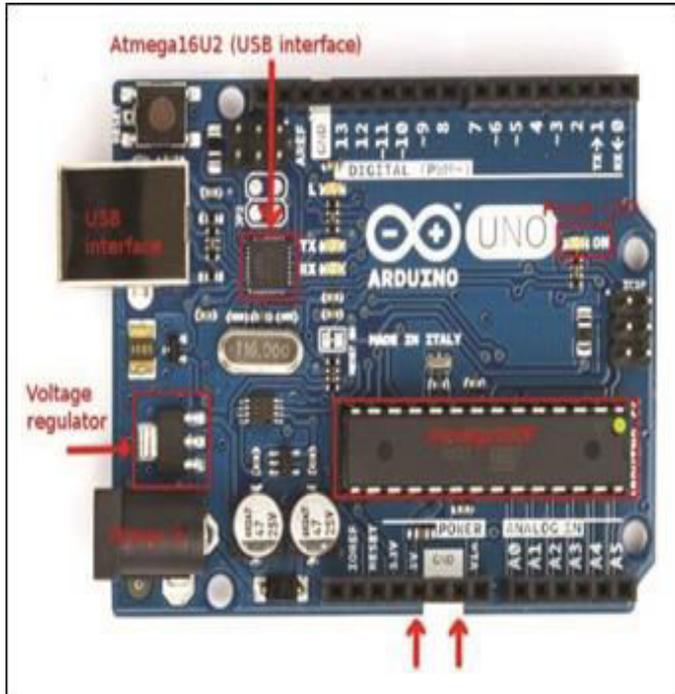


Figure.2.

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer using a USB cable or power it with a AC-to-DC adapter or battery to get started.

Arduino is open source prototyping platform based on easy to use hardware and software. “Uno” stands for one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards, and the reference model for the Arduino platform; for a comparison with previous versions

B. DC Motor

Almost for every parts or mechanical movement that we see around us is accomplished by an electric motor. Electric machines are means of converting conventional energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life. An example of motor used in day to day life is automobiles, food blenders and so is vacuum cleaner.

C. Bluetooth (HC - 06)

For the communication of the robot with the cell phone or a mobile we are using the Bluetooth device. The Bluetooth device (HC-06) is attached to the robot that receives the data from the mobile and also it can transmit the data.

It is used for converting serial port to Bluetooth. It has two modes: Master and Slave. Bluetooth is a wireless communication protocol running at the speed of 2.4 GHz with the architecture of client-server and which is suitable for forming personal area networks. It is designed for devices such as mobile phones (low power). Bluetooth protocol uses the MAC address of the device. Bluetooth gives the connectivity between two devices using their MAC address.

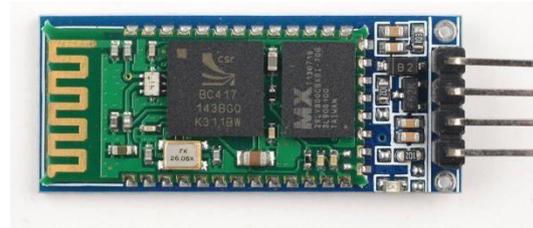


Figure.3. Bluetooth Module

D. Gears

Gears will be used in the system to send power to the wheels and brushes and will also help reduce rpms. See attached calculation for power and torque transfer from gear to gear. The main brush will have a spur gear mounted to its shaft and the drive motor will have another one send power to it through its drive shaft. The material selected for these spur gears was acetal. The reason for acetal is its high shear strength and also that it can be purchased off the shelf. Spur gears are suitable for this situation because they are inexpensive and are satisfactory for this simple application. The gears will serve as power transmitters, but also speed reducers because the motor will be spinning at approximately 14000 rpms.

E. RF Transmitter and Receiver

RF system, the digital data is represented as variations in the amplitude of carrier wave. This kind of modulation is known as Amplitude Shift Keying (ASK). signals through RF can travel through larger distances making it suitable for long range applications.

F. Relay Driver

Relays are one of the most important components in electronic circuits. Especially in circuits where high power transfer or mains AC load switching is involved, relays play the major role in implementing the operations. A relay, as we all know is an electromechanical device which is used in the form of a switch. It is responsible for switching an external load connected to its contacts in response to a relatively smaller electrical power applied across an associated coil. Basically the coil is wound over an iron core, when a small DC is applied to the coil, it energizes and behaves like an electromagnet. A spring loaded contact mechanism placed at a close proximity to the coil immediately responds and gets attracted toward the energized coil electromagnet force. In the course the contact however the low level signals from an electronic which may be derived from an IC stage or a low current transistor stage may be pretty incapable of driving a relay directly. Because, a relay requires relatively higher DC currents which may be normally not available from an IC source or a low current transistor stage. HC-05 module is an easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial port Bluetooth module is fully qualified Bluetooth V2.0+EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore 04-External single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping derived from an IC stage or a low current transistor stage may be pretty incapable of driving a relay directly. Because, a relay requires relatively higher DC currents which may be normally not available from an IC source or a low current transistor stage. In order to overcome the above issue, a relay driver stage becomes imperative for all electronic circuits which need this service. A relay driver circuit is nothing but an additional transistor stage attached with the relay which needs to be operated. The transistor is typically and solely employed for operating the relay in response to the commands received from the preceding control stage.

5. The good battery should have Short recharge time.

5. CLEANING

A smaller orifice means more suction force because of the increase in pressure that can be attained by the system. Increasing the number of fans improves the cleaning by increasing airflow. The power produced by the suction motor can also dramatically affect actual vacuum cleaner performance. To understand the motor and fan design and their role in performance and durability on the system, one must understand two things: impellers and suction motors. The suction motor has to provide a fast enough speed because the impeller is placed directly on its shaft. Suction is derived by centrifugal force. The force acts on the spinning air with the fan because as it rotates, the air moves away from the hub. This creates a slight vacuum which causes more airflow into the fan. The more powerful motors contain multiple stage fans pulling in series. Our suction motor will be greater than that used in the current Roomba because it will be more powerful and it will be two not one. The cleaning system of the vacuum consists of the brushes in action and the blower power. These components determine how well the dirt is collected. As of now, we feel that by adding brushes and increasing the motor size will do the job. Instead of the one brush underneath Roomba, we will be using four brushes to maximize cleaning on each side of the robot. The durability of these motors comes into play in the long run, but we have noticed that Roomba does not offer a market which tends to parts replacement. With that in mind, our robot will give the user the opportunity to change what is broken. The reason we decided to go with a Mabuchi motor is because iRobot uses this company. The company must have done intensive research to be able to place this motor into their product. Unfortunately, a small scale project like ours does not possess the capital iRobot does, so one can assume that if the company is good enough for iRobot, it will also be good for our product.

4. CONCLUSIONS

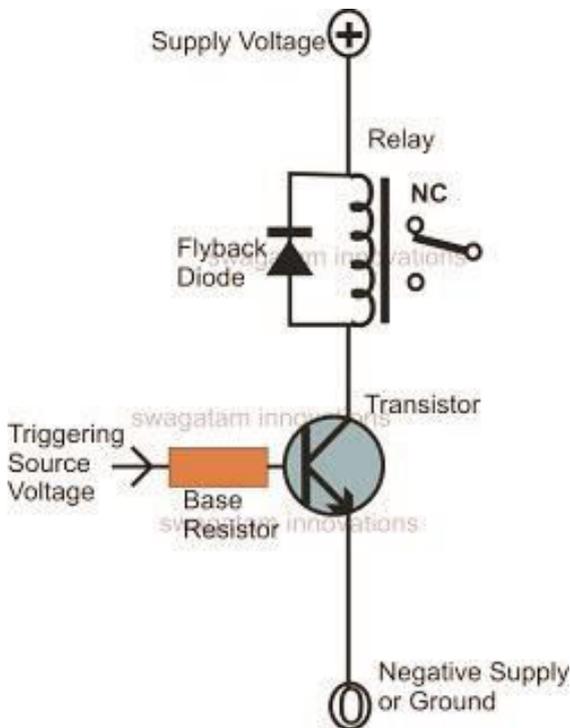
This setup of hardware with a combination of software gives Floor Cleaning and reduces the work load. Man power is minimized. It has Low cost. It is a Time Consuming Device Making a small machine brings a flexibility to do work

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6. BIOGRAPHIES

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3. PROCESS DESCRIPTION

In this Project we use Arduino Microprocessor which is connected to Power supply(5-12V). From solar panel we charge the battery. Voltage which is coming from the sun is not constant for that we use charge controller. This voltage is stored in battery. But this voltage is more than the required voltage of Arduino so that we use voltage regulator. Here we use relay driver, A relay as we all know is an electromechanical device which is used in the form of a switch .it is connected to solenoid valve. It consists of one input and one output. By using the relay driver we can operate dc motor and cleaning mechanism. Also for hardware controlling purpose we use RF transmitter and receiver. Here IR sensor is used for obstacle detection and ultrasonic sensor is used for fall detection. Driver circuit is connected to Arduino. Driver circuit is connected to motor. For moving the wheels in clockwise or anticlockwise direction motor is used also for pick and place operation we use motor.

4. OBJECTIVE

Identify and design an autonomous robot that will assist people at home who are too busy for daily or weekly floor cleaning, especially for family's with children. In particular for the elderly who live by themselves and do not have the strength or ability to clean. Robotic vacuum cleaners in the market are expensive and inefficient in terms of cleaning time and cleanness. The goal is to design an omni directional platform with infrared sensors, wireless sensors, bumpers, ultrasound, reshape, and four bristle brushes on every side to improve the cited cleaning performance problems.

Customer Needs

Based on customer need obtained through questionnaires and market research the following have been identified as the key points for the battery:

1. The battery should must have Clean room on a single charge.
2. The battery shoule requires good Power sensors.
3. The motor should have good Power numerous battery.
4. Full-charge current cutoff

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