PROJECT REPORT

Remote Control Vacuum Cleaner Robot

Department of Electronics and Communication Engineering

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Name of the project:

Remote Control Vacuum Cleaner Robots.

Introduction:

This project involves creating a Bluetooth-controlled vaccum cleaner car using an Arduino, an L298 motor driver, HC-05 Bluetooth module, relay module and vaccum pump. The system allows the user to control the movement of the car and turn the vaccum pump on and off using an Android smartphone.

Robots are being used extensively in automated retail, industrial manufacturing, security and inspection. Nowadays, a variety of users are now showing interest in home automation. There are now expensive floor cleaning robots

on the market, considerably the means of the average family in a third world country.

we have shown the first steps towards creating a floor cleaning robot that is dependable, efficient and affordable. We designed and implemented a cleaning robot using a vacuum cleaning framework. The indoor localization techniques, a working floor cleaning robot prototype will be developed by employing image processing to locate corners and position the device. A micro-controller was used as the robot's processor. This robot can map out and tidy a certain section of a floor of a building. A micro-processor helps the robot navigate in the proper direction and gathers information about its environment. The only tasks that need human assistance are maintenance and trash removal.

Components:

1. Arduino uno:
   Micro-controller to control the components.
2. L298 Motor Drive:
   To control the motors.
3. HC-05 Bluetooth Module:
   for wireless communication.
4. Relay module:
   To control the vacuum pump.
5. Vacuump pump:
   For Suction.
6. power supply:
   for powering the motor and vacuuming pump.
7. Dc Motors:
   for moving the vacuum cleaning Cart.
8. Breadboard and jumper wires:
   for connections.

Hardware Requirement:

(i) Arduino:

Arduino is a single board micro-controller to make using electronics in multi-disciplinary project more accessible. The hardware consists of a simple open source hardware board designed around an 8-bit Atmel AVR micro-controller or 32 bit Atmel ARM. The software consists of a standard programming language compiler that executes on the micro-controller. Arduino is an open-source electronics prototyping platform based on flexiable, easy to use hardware and software.

(ii) Bluetooth:

For global connectivity, Bluetooth is global standard. Bluetooth is an essential Component in this project. Exchange the data Bluetooth is connects to the micro-controller and Android smartphone. The module used here is HC-05 Bluetooth module. It is an easy to use Bluetooth ssp with

typical -80dBm Sensitivity up to +4dBm RF power, low power 1.8V operation and several software properties that the connectivity. The range of Bluetooth is up to 10 meter. And it operates on 2.4 GHz frequency.

(iii) Motor Sheild:

A sheild is convenient since you can just plug it in to your Arduino and wire the motors direct to it, but it lacks the flexibility of a raw driver chip which you can wire up precisely as your demand.

(iv) Jumper Wire:

Jumper wires are used for making connection between items on your breadboard and your Arduinos header pins. Use them to wire up all your circuit.

(v) DC Motor:

Electric machine are means of converting energy. Motors make electrical energy and produce Mechanical energy. Electric motor is used to power hundreds of devices. Micro-machine are electric machine with parts the size of red blood cells and find many applications.

(vi) Vacuum cleaner:

A vacuum cleaner is a device that cause suction in order to remove debris from floors, upholstery draperies and other surfaces. The dirt is collected by a dustbag or a cyclone for later disposal. The most common of these tools are:

* Hard floor brush
* Dusting brush
* Upholstery nozzle.
* power floor nozzle.
* Crevice tool

The performance of a vacuum cleaner can be measured by several parameters:

* Airflow in L/s or cubic feet per minute.
* Airspeed in m/s or miles per hours.
* Suction, vacuum or water left in pascles.

The Suction is the maximum pressure difference that the pump can create.

(vii) Ultra Sonic Sensor:

An ultra-sonic Sensor is an instrument that measures the distance to an object using ultrasonic sound waves. High frequency sound waves reflect from boundaries to produce distinct echo pattern.

Ultra-sonic Sensors work by Sending out a Sound wave at a frequency above the range of human hearing. The transducer of the Sensor acts as a microphone to receive and Send the ultrasonic sound. The Sensor determines the distance to a target by measuring time lapses between Sending and receiving of the ultrasonic pulse. By calculating the travel time and speed of the Sound, the distance can be calculated.

Software Requirement:

(i) Arduino UNO:

The Arduino Uno is a 8-bit micro-controller board based on the AT mega328. It has 14 digital pins and 6 analog pins and other power pins such as: GND, vcc. It has 14 digital input/output pins, 6 analog inputs, a 16MHz ceramic resonator, USB connection, power jack, an ICSP header and a reset button. It has SRAM 2kb and flash memory 32kb. EEPROM is with 1KB. Arduino is open source hardware board micro-controller with many other external component like LED, motors, IR sensor. It is need to connect it to a computer using a USB cable or power with an AC to DC (7-12v) Adapter. The Arduino circuits acts as an interface between the software part.

(ii) Android studio:

Android studio is the official integrated development environment for google android operating system, built on Jet Brains Intelij IDEA software and designed specifically for Android development.

(iii) Windows OS:

Windows 10 enables developers to make device that combine the hardware driving capability if Arduino with the software capabilities of windows.

Significance of the project:

(i) No need to stay at Home to clean the Home:

A key benefit to the Bluetooth-controlled vacuum cleaner is its remote operation capability. Users can activate and control the vacuum cleaner from any location using their mobile devices. This feature ideal for busy individuals as it removes the necessity of being at home to manage cleaning tasks.

(ii) Flexible about types of surfaces they clean:

The vacuum cleaner is designed to adapt to various surface types, including carpets, hardwood floors and tiles. This flexibility allows for optimal cleaning performance across different floor types, ensuring that each surface is treated appropriately without causing damage.

(iii) Sets Boundaries:
With the ability to set virtual boundaries, users can define specific areas for the vacuum cleaner to avoid or prioritize. This feature is particularly useful for protecting delicate items or focusing cleaning efforts on high-traffic zones within the home.

(iv) Built-in Sensors Detect Dirt for spot cleaning:
The vacuum cleaner is equipped with advanced sensors that detect concentrations of dirt and debris. This sensors enable the device to perform spot cleaning, targeting areas that require more thorough cleaning. This ensure that no area is overlooked, enhancing overall cleaning efficiency.

(v) No Manual cleaning:
Users can schedule regular cleaning sessions and control the device remotely, freeing up their time for other activities.

Result:

The result of using arduino based vacuum cleaner is that is less cost compared to the regular automatic vacuum cleaners and it can do the cleaning of the surroundings effectively.

Real-time Monitoring: The vacuum cleaner can be equipped with sensors to monitor its environment in real-time, providing data on the level of dirt and dust in the environment.

Flexibility: With an Arduino based vacuum cleaner user to chose to use different sensor, motors & other components allowing for design and functionality.

Remote Control: The ~~remote control~~ vacuum cleaner can be remotely controlled through a smartphone allowing users to operate it from anywhere in their home.

User friendly: Our proposed module will handle by anyone means anyone can operate it easily.