

AUTOMATIC FLOOR CLEANING ROBOT

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UNDER THE GUIDANCE OF
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Abstract:

Manual work has been taken over by robot technology, and many of the related robot appliances are being used extensively as well. This represents the technology that proposed the use of a robot for floor cleaning. Households today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering homes and people's daily lives, but it is still a relatively new and immature market. However, growth is predicted, and the adoption of domestic robots is evolving. This robot makes the floor cleaning process easy and fast by utilizing a wireless robotic cleaning system. This wireless system consists of a transmitter application that runs on an Android mobile app, which allows the robot to follow commands given by the user through the transmitter app. The proposed robot consists of an Arduino Nano controller, which has fourteen digital input and output pins, and a robotic arm with a cleaning pad and a water sprayer for efficient cleaning. The Arduino Nano, on receiving commands from an Android device through a Bluetooth receiver, decodes the given commands and controls the motors to achieve the desired path and direction.

Introduction:

"In earlier days, robotic cleaners have taken major attention in robotics research due to their effectiveness in assisting humans in floor cleaning applications at homes, hospitals, restaurants, offices, workshops, universities, warehouses, etc." Uman Khalid. "Generally, in recent years, people prefer to use trains or buses for travel, and hence the biscuit covers, cold drink bottles, and chocolate wrappers are littered around. So, it is important to clean the bus or railway station regularly." M. Ranjit Kumar. "The main aim of the project is to develop and modernize a process for cleaning the surface. The surface washer is a new mechanistic type for solving problems of floor cleaning, pipe cleaning, and surface cleaning that make life more difficult. Floor cleaning is more important for our health and reduces the manpower requirement." Mayank Lalka. "Automatic floor cleaners are designed in such a way that they are capable of cleaning the surface and reducing human efforts. It can easily move around freely and clean a specific area. Brushes are attached to its sides for cleaning the surface while moving." Manya Jain. "Every cleaning and operating mechanism of robotic floor cleaning has its own merits and demerits. For example, robots using laser mapping are relatively faster, less time-consuming, and energy-efficient, but expensive. Obstacle avoidance based on robots is relatively time-consuming and less energy-efficient due to random cleaning, but cheaper." Harshvardhansinh Parmar. "Floor cleaning machines are very much required in places like schools, colleges, hospitals, bus and railway platforms, airport lounges, stadiums, parking areas, footpaths, and many other commercial areas, especially because these places have large areas to be cleaned. These machines can be manually operated,

mechanically operated, fully automated, semi-automated, wire-controlled or remote-controlled, fuel-powered, or solar-powered." B Vishwas.

Future Scope of Project:

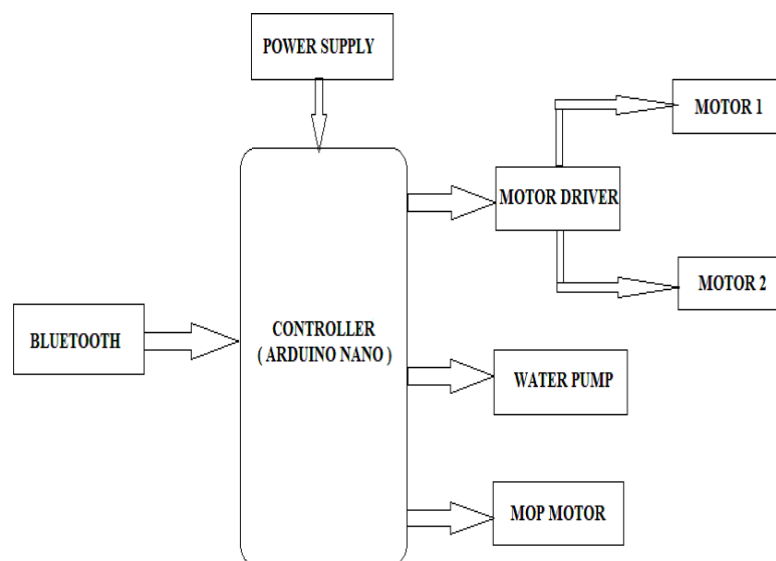
The setup can be fully automated without a manual. Image processing techniques can be used to analyse surface cleaning efficiency using a high-quality onboard. Germ-less cleaning using UV exposure installed on the vehicle.

Objective of Project:

To design and implement a surface cleaning robot prototype by using Arduino Nano, DC motors, a water pump, a Bluetooth module, and a motor with wheels to achieve the goals of these projects. These projects deal with designing floor cleaning machines. The aim of this project is to develop and modernize a process for cleaning the wet floor. To design smart robots to reduce human efforts.

Block Diagram of Project:

The block diagram of the proposed “Smart Robot Sweep Cleaner” is shown above. In this system, an Arduino Nano microcontroller serves as the system’s brain. The circuit function is controlled by this microcontroller. This microcontroller interacts with various components to perform the desired system operation. The hardware components in this system require a regulated power supply to function. When power is applied to the device, the Arduino Nano interfaces with the Bluetooth module, and the relay circuit activates the DC motor. Two DC motors are mounted on the back side of the robot to control the direction of the robot. There is a motor driver. The IC L293D is used to control two motors simultaneously. A water pump is used to spread water on surfaces. Two mop motors (DC motors) are mounted in front of the robot and used to clean the surface area.



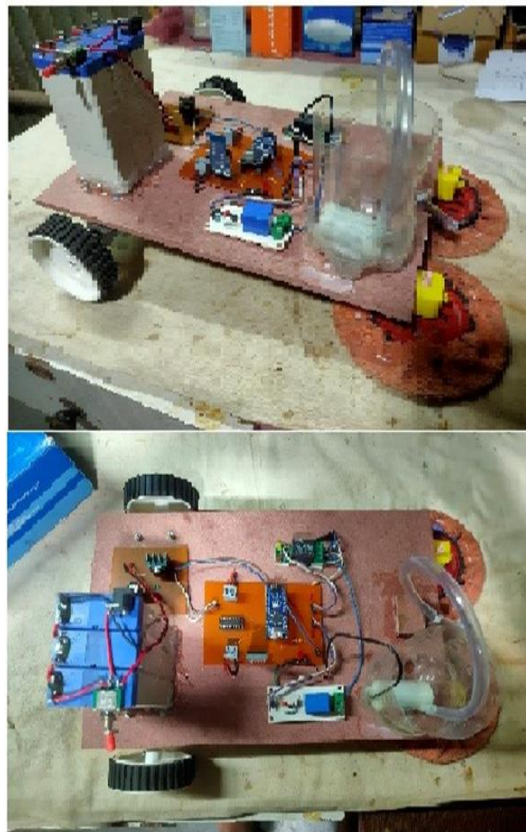
Software requirements:

1. ARDUINO IDE: To program the Arduino, the Arduino IDE is used, which is free software that enables programming in the language that Arduino understands. In the case of Arduino, the language is based on C/C++ and can even be extended through C++ libraries. The IDE enables writing a computer

program, which is a set of step-by-step instructions that is then uploaded to the Arduino. Arduino will then carry out those instructions and interact with whatever has been connected to it. In the Arduino world, programs are known as "sketches." The open-source Arduino Software (IDE) makes it easy to write code and upload it to the board. It runs on Windows, Mac OS X, and Linux. The environment is written in Java and based on Processing and other open-source software. This software can be used with any Arduino board.

2. BLUETOOTH SERIAL RC CONTROLLER APP: The Bluetooth RC Controller application is used to send and receive signals between the Android phone and Arduino hardware. Here, Arduino acts as the main controller of the device, which receives signals or commands and sends these commands to motors and motor drivers to perform a particular task. This app is the latest version of "Bluetooth Serial Controller." By using blue-tooth SPP, you can do wireless serial communication with an AVR, PIC, Arduino, Raspberry Pi, etc. Please change the button size to fit your device's screen size. A blue-tooth RC controller application is used to send and receive signals between the Android phone and Arduino hardware. Here, Arduino acts as the main controller of the device, which receives signals or commands and sends these commands to motors and motor drivers to perform tasks.

Result:



Conclusion:

This project facilitates efficient floor cleaning with sweeping and mopping operations. This robot works by hand for user convenience. This proposed work provides hurdle detection in case of any obstacle

that comes in its way. A water sprayer is attached, which sprays water for mopping purposes for the convenience of the user. It reduces the labor cost, saves time, and provides efficient cleaning. Operations such as sweeping, mopping, and changing the path in case of a hurdle are performed manually. Nonetheless, there are still new ideas to improve the developed system and add new functionality to it. Instead of an RF module, the Xbee Pro Series module can be used to improve the range of wireless communication. The GSM module can be used to send a message that the robot has completed the cleaning task. A camera can be used for navigation purposes. Vacuum cleaning can also be done with sweeping and mopping. Further, the robot can be made to move randomly in any direction, and its speed can be controlled.

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