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Robot Based Vacuum Cleaner (ROBOVAC)

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Abstract— The laborious task of floor cleaning has evolved into one that may be completed without expending an excessive amount of effort. We have realised that, especially for families with children, people at home are too busy to clean the floors on a daily or weekly basis. The cost of hiring a maid is high, and the elderly who live alone lack the strength or skill to clean on their own. In the workplace, night office cleaning nearly typically entails sweeping the floor, which depletes resources from other clean-ups or requires a full person. The cost of labour is high and rises quickly. A robot vacuum might be an absolute godsend for people with difficulties or those who tend to be too weak to use an upright or container vacuum. Robot vacuums may assist keep dirt and grime under control with minimal intervention on the part of the resident and offer a higher level of freedom in the house.

Keywords— *depletes,excessive,floor cleaning, robot vacuum.*

I.INTRODUCTION

Cleaning is the essential need of the current generation. Basically, in household the floor has to be cleaned regularly. This device is used in the design and manufacture of floor cleaning equipment. The main aim is that it combines operation of all three different device's operation i.e., vacuum cleaner, dryer & mop. For floor cleaning, many types of machines are available in the market are of high ranges and big weights. Because of their high price and heavy weight, not everyone can afford them. Considering weight criteria, machine assembly, handling the machine is very flexible. It is very simple in construction and easy to operate. Anybody can operate this machine easily. The size of the machine is also flexible, thus rendering it extremely simple for us to navigate from one spot to another. This machine is applicable for various floor cleaning activities. Hence there is a need of bringing revolution in science and technologies, which could help easily in repetitive tasks which we perform daily. It also considering the intensity of labor required and improving qualities to its optimum level.

II.EASE OF USE

A.Background (Heading 2)

Robot vacuum cleaners are well-known products. Still there are continuously new

products introduced on the market, products with new or improved functionality. Robot vacuum cleaners are mainly used in domestic areas for removing particles from indoor floors.

The objective of this thesis was to have a better understanding of the design and its requirements, possibly be able to improve some functionalities, and eventually have a working prototype for challenging to continuously view all the videos by a guard to prevent the suspicious .

B.Purpose

How does a Hoover prototype powered by an Arduino and constructed from low-cost components compare to commercial models? How should sensor and code be created to produce a working Hoover?

- Where, what, and how many sensors are there?

- Driving style?

How can a feature that, when the battery charge level is low, sends the cleaner back to a battery charging station be designed?

III.SCOPE

The major goal of this thesis was to create a robot vacuum cleaner that could complete

duties that an existing normal vacuum cleaner could. Ideas and various concepts were tested during the design phase. The physical prototype included the most intriguing ones. Low cost, a long driving time, design shape, and proportions were required for fascinating ideas. The prototype's budget was capped at 1000 SEK. As a result, inexpensive parts were utilised, which in some ways limited the prototype's design because, for instance, no tooling for the included parts was created. The robot has sensors to monitor its surroundings, and its size was intended to allow it to navigate common obstacles and clean in a household setting.

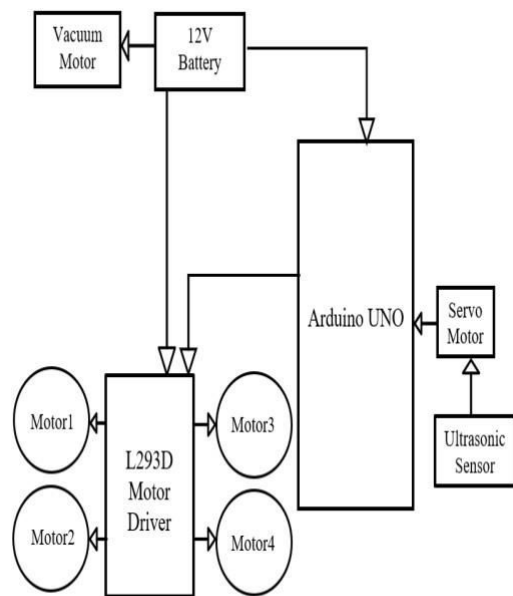
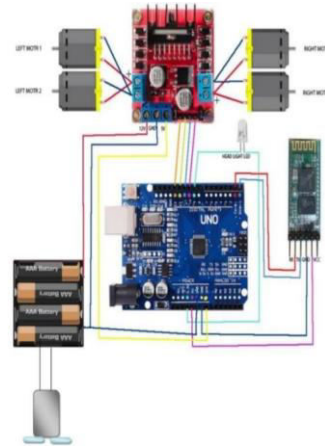
A. Abbreviations and Acronyms

LED, GND, RAM, UV, IR, VCC, IC, DC, AVR, PWM, USB, IDE.

B. Method

This project's initial step was to look into what a robot hoover cleaner needs to do its job. This step offered details on the requirements that customers have for the product. The outcome was a significant contribution to the design work. Dimensions and essential components could be determined. A first prototype was created after the design phase. The design process was continued and the product was improved depending on how the prototype performed. The idea is evolving in economically developed nations, but it is not widely used because to design complexity, machine cost, and operational costs in terms of electricity tariff. A device which manually mops the floor which is a cleaning device is suggested in this paper. Early in the morning, a floor is cleaned by different cleaning things like broom stick which is done by human. This is done by constant motion from the hand, which is tiring and time-consuming.

C. Block Diagram



D. Schematic Diagram

Schematic consists of the clear pictured view of the Robot Based Vacuum cleaner. The pictorial representation and all the relevant connections are shown in the schematic diagram. Different types of Li+ ion batteries and dual shaft motors along with gear motor connection and the way how the HC-05 bluetooth module is connected to it.

The overall pictorial top view of ROBOVAC is shown.

E. Operation

A confined suction cleaning machine and intellectual computing algorithms are utilised in an automated robotic vacuum cleaner which is called as vacuum cleaner, or robovac, or RoboVac. We have developed this idea to overcome the problem of floor cleaning with involves us. This robotic vacuum cleaner has a dust bin which stores the dust present on the floor .Through the pipe it absorbs the dust and it get stores in the dust bin. With the help of 4 DC motors the robotic machine will move in all the directions and with the help of bluetooth controlling app we can control the motion of the robotic car. We are also having a led light at the front which can be turned on and off with the help of app. This light will help us when there in no availability of light under the sofas, bed etc. We can also recharge the battery when it gets discharged and can be reused. One can sit and operate the car with the help of this app. The range of the sensing signal will range up to 50m. It reduces the human work. This robotic vacuum cleaner is less in cost and can be more effective for cleaning. The original design included manual operation via remote control.

When the robot is turned ON, both of its motors function normally, and it starts to move. The proximity (IR) sensor continuously measures the separation between the robot and the reactive surface during this period. The Arduino processes this data, and if there is less than 3 cm between the robot and the obstruction, the left wheel motor reverses direction while the right wheel motor continues to run normally. The robot will turn to the right as a result. This cycle carries on until the distance between the robot and obstacle is greater than 3cm.The robots remain advancing throughout this procedure, without encountering any barriers. The motors have a motor driver IC (L293D) that can supply 1A of supply current; as a result, this driver receives data from the Arduino and controls the motor to function as desired.

F.Arduino uno technical specifications

Microcontroller	ATmega328P- 8 bit AVR family microcontroller
Operating Voltage	5V
Recommended Input Voltage	7-12V
Input Voltage Limits	6-20V
Analog Input Pins	6 (A0 – A5)
Digital I/O Pins	14 (Out of which 6 provide PWM output)
DC Current on I/O Pins	40 Ma
DC Current on 3.3V Pin	50 Ma
Flash Memory	32 KB (0.5 KB is used for Bootloader)
SRAM	2 KB
EEPROM	1 KB
Frequency (Clock Speed)	16 MHz

G. Bluetooth RC Controlling Application

An Android software called Bluetooth RC Controller connects to a Bluetooth-enabled device using the Bluetooth functionality of the phone. It is primarily designed to control mobile platforms, like an Arduino installed on a platform with two motorised wheels and equipped with a Bluetooth shield. In addition, it communicates with the mobile platform using sensors. Device selection, activity selection, and the actual activity are the three key components of the programme. Since all Bluetooth connections take place at the application level, any activity within the programme has the ability to transfer data at any time to a Bluetooth device. Once paired, a device will show up in a list of paired devices. The user may pair and connect to Bluetooth-enabled devices using the device pick action, which searches for them. where it may be chosen by the user without waiting for Bluetooth to locate it again. where it may be chosen by the user without waiting for Bluetooth to locate it again.

In the case of a two-wheeled robot, the Bluetooth device receives instructions that must be decoded and processed. The command to go forward is s,50,50, where 50,50 represents the speed of the left and right wheels in percentage from -100 to 100, and 0

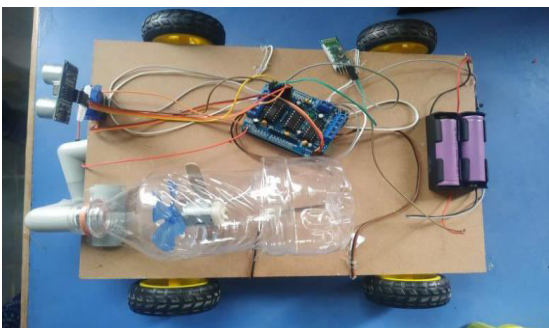
represents the halted position. Unfortunately, this is only applicable to robots with two wheels.

This app is especially important for electronic hobby creators. That is, the main purpose of this app is to give you everything you need to create an electronic hobby project in one place. For that, this app will guide you step by step. It has a very clean, appealing appearance. A few procedures will allow us to connect to the Bluetooth module. This remote control can be utilised for any Bluetooth control project.

An Android software called Bluetooth RC Controller connects to a Bluetooth-enabled device using the Bluetooth functionality of the phone. It is primarily designed to control mobile platforms, like an Arduino installed on a platform with two motorised wheels and equipped with a Bluetooth shield. In addition, it communicates with the mobile platform using sensors. Device selection, activity selection, and the actual activity are the three key components of the programme. All Bluetooth conversations take place within the application in order to allow the application to deliver data to the Bluetooth device at any stage during any kind of operation. Once linked, a device will show up in a list of linked devices so the user may choose it without waiting for Bluetooth to re-discover it.

5.2. BLUETOOTH RC CONTROLLER

This application is designed to be used with a MODIFIED RC car. You have to replace the car's stock control circuit with a micro controller. This involves programming.



This application consists of virtual buttons which moves in different kind of directions. It also comprises an accelerometer which increases the speed of the robovac machine. It consists of a feature of light which can be enabled based on the user requirement.

H.Applications

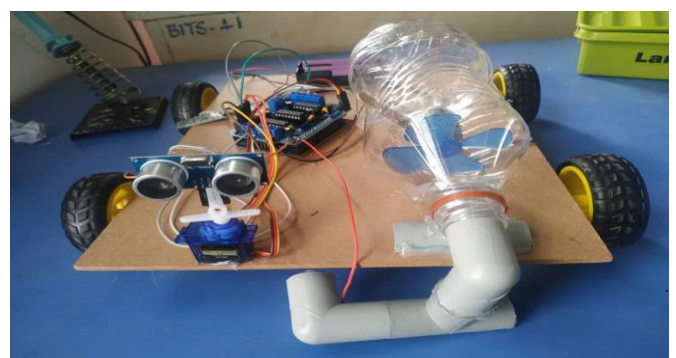
- Air Blowing Treatment.
- Water Jetting Treatment.
- Household Cleaning.

I..Advantages

- Time is saved, and it's great for people with mobility problems.
- Interesting Features.
- Recognises Surface Changes.
- Enables the option of automatic charging.
- You Can Establish Boundaries With Virtual Walls.
- Determines the amount of dirt in various locations.
- You can keep your house clean while you're away.

J. Results

The Robot based vacuum cleaner is the multiple action robot which moves automatically and also has obstacle detection sensing technique, it also absorbs the dust through the suction head which is the pipe placed in front of the vacuum machine and stores in the dustbin, the robot can be operated in multiple manner by turning on the switch that is the ultra sonic sensor detects the object and stores the dust nearby, it can also be controlled via using a RC Bluetooth controller application and this ROBOVAC also works based on the voice commands given by the user.



Conclusion

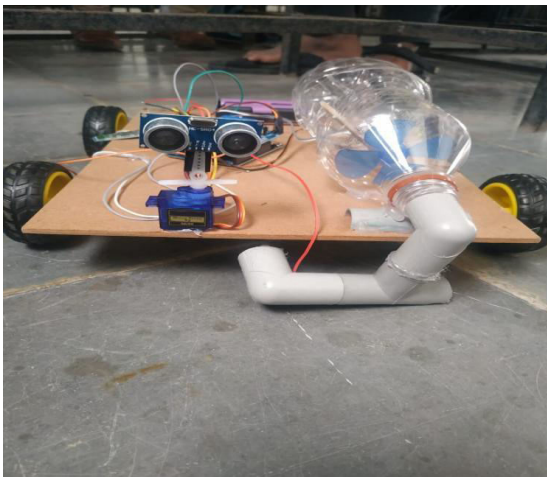
We can state from experience that the electronics necessary to make our robot, which effectively copied the random walk algorithm

built into the most popular commercial robotic sweeper.

For this project, it was definitely possible for us to reproduce such a design. Yet, it was quite challenging to refine the mechanical features of our crude prototype. It should come as no surprise that since commercial robots are composed of durable materials, they would be more dependable than our DIY sweeper robot. However, if we were to do this project again, we would start with more durable pieces, notably wheels, and be slower to hurry to the glue gun to finish things off because the mechanical element of the project became more difficult as time went on.

K. Future Scope

- Robotic Hoover cleaners have a very bright future, and we may anticipate more developments in this field in the years to come. Here are a few suggested directions for improvement:
- Improved Navigation: The current generation of robot vacuum cleaners uses sensors and cameras to navigate around obstacles and avoid falls, but there is room for improvement. Future models may incorporate machine learning algorithms and advanced sensors to navigate more efficiently and accurately.



- Increased Automation: Currently, robot vacuum cleaners require some manual intervention to set up cleaning schedules and empty their dustbins. Future models may offer more automation, allowing them to start cleaning automatically when needed and even

empty their dustbins without human intervention.

- Better Battery Life: One of the limitations of robot vacuum cleaners is their limited battery life, which can restrict their cleaning range and require frequent recharging. Future models may use more advanced battery technology, such as lithium-ion batteries, to offer longer cleaning times and faster recharging.
- Integration with Smart Home Systems: Many robot vacuum cleaners already offer connectivity with smart home systems such as Amazon Alexa and Google Home. In the future, we can expect to see even more integration, allowing users to control their robot vacuum cleaners through voice commands and automate cleaning based on various criteria.
- Multi-Purpose Cleaning: While most robot vacuum cleaners are designed for floor cleaning, future models may expand their capabilities to include other tasks, such as window cleaning and dusting. This could make them even more useful for homeowners and businesses alike.
- In general, robot Hoover cleaners have a promising future, and we may anticipate major technological breakthroughs in the years to come.

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