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BLUETOOTH CONTROL FLOOR CLEANER ROBOT

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Abstract: Bluetooth control floor cleaning machines are only used in households for only dry and wet cleaning but not as infection remover. So it is only used in households and not in hospitals or small areas in public. The automatic floor mops like hydro robot are bulky and they also require large power and are used for commercial purpose. But we think this (Our cleaner) will solve all in one go. We will basically focus on a smart and smaller and good designed robot which can be used in many sectors like healthcare and educational areas (which are of course small areas) and also for household use. So it will be both for terminal cleaning like medicals and indoor floor cleaning. In future we will focus on indoor air cleaning service as an additional feature to this machine.

Keywords: Blue tooth control, Surface cleaner robot, Healthcare

1. INTRODUCTION

Household cleaning is a repetitive task carried out by number of people every day. Hence there is a as per the input from ultrasonic sensor mounted in front and the machine would stop automatically. Need of bringing revolution in the area of science and technologies, which could help easily in repetitive tasks which we perform daily. And also giving consideration to the intensity of labour required and improving qualities to its optimum level. Here we had designed a cleaning machine is operated using smartphone. A Smartphone is a mobile phone built on a mobile computing platform, which has more advanced connectivity and computing ability than what a feature phone has. An implication on cleaning machine was done by using various techniques such as using Rasp-berry Pi, Arduino, PIC controller and so on. Every implications has its advantages and limitations too. On the basis and study of those limitations new inventions are carried out. Here in this project we are using Microcontroller. The innovation in this project is obstacle avoidance and control using android app via

Bluetooth. Here we are using sensor to detect obstacles. The cleaning machine uses a microcontroller to detect obstacles and manipulates its direction.

Clean Sweep is a smartphone controlled robot that cleans your house's floor. The rotating mops on the front of the robot along with a foam roller at the back can do the job perfectly. There's also a water pump and water reservoir which can be switched on when required to throw water on the floor and make the mops moist for a proper clean. The foam roller is movable, which means you can lift it when not in use. I've also added speed controls for the driver motors. The project uses Bluetooth communication via an HC-05 Bluetooth module to send the commands to the most commonly used microcontroller- Arduino UNO[1]. The robot is powered on a 12V lead acid battery, the ideal voltage for all motors used here.. The driver motor pair are 100rpm ones while for the mops I've used 75rpm plastic ones. The best part is that the mops used were homemade, from old scrubbers and rags and they clean just perfectly. This is a smaller version so might not be suitable for a large area. There can be tons of other features

added, like making it completely autonomous, which I couldn't due to shortage of time.

1.1 OBJECTIVE OF PROJECT

- Injuries due to slips on the floors are cause of accidental injuries or death. Bad practice in floor cleaning is a major cause of accidents.
- To beautify the floor.
- Debris and obstructions are to be removed.
- Allergens and dusts are to be removed.
- Surface wear to be avoided.
- To make the environment sanitary (kitchens).
- The floor is mopped going along grains. If the floors are polyurethane, the mop has to be dipped with water and a few drops of dishwashing liquid. The mop should be ringed out thoroughly before it is used on the floor.
- The floor is to be buffed using a soft fabric to remove soapy dirt. The softer the cloth, the better it works because they have good absorbent capacity.

1.2 PROPOSED CONCEPT

The Project that is being presented here is a complete autonomous android based machine [2]. It is capable of cleaning the room with just a little human interaction and all the mechanisms work simultaneously. The main purpose of our project is to support the —Swachh Bharat Abhiyan initiated by our honorable Prime Minister Mr.Narendra Modi. General Specifications:

- Battery operated floor cleaning machine .
- Requires little human intervention.
- Convenient product that can be used to clean the room without much physical effort.
- Saving person valuable time.
- All mechanisms work simultaneously.

2. SYSTEM DEVELOPMENT:

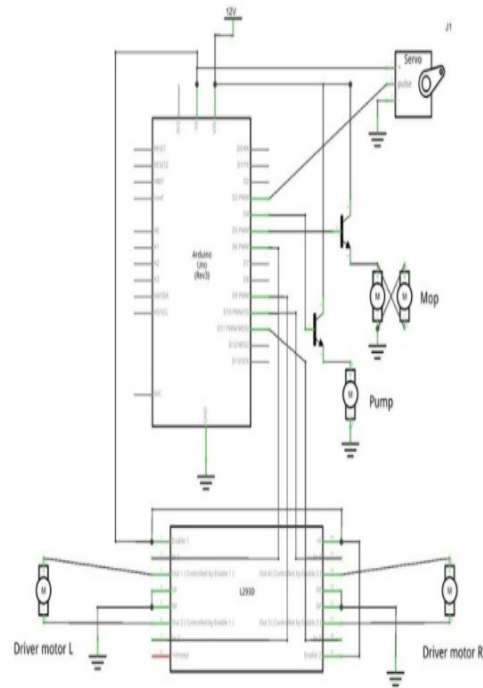


Fig. 2: Block Diagram

2.1 ELECTRONICS PARTS USED

Different parts are directly used in the product. Such as Relay module, dc motor, micro-controller.

2.2 DC MOTOR

DC motor is an electrical machine that utilizes electric power resulting in mechanical power output. Normally the motor output is a rotational motion of the shaft. The input may be direct current supply or alternating supply. But in case of DC motor direct current is used. The mechanism of dc motor is like a bar wound with wire is placed in between 2 magnets having north and south pole. When it is provided with electric supply the wire becomes energized resulting in rotational motion which leads to rotational output.



Figure 2.2: DC Motor

2.3 RELAY MODULE

A relay is an electrically operated switch that allows to turn ON or OFF a circuit using voltage and/or current much higher than the ARM could handle. There is no connection between the low voltage circuit operated by ARM and the high power circuit. The relay shown in Figure 2.3 protects each circuit from each other. It is a simple mechanical switch which activates when the input reaches 5 V and turns OFF when the input is 0 V.



Figure 2.3 : Relay Module

2.4 ARDUINO



Figure 2.4: Arduino

Arduino plays a major role of a incoad the programe in flool cleaner robot .It acts as brain of the robot .It operates around the voltage of 3.3 volt. It uses atmega16 on its core which uses ARM processor .It has 54 digital I/O pins and 12 analog output pins. From 54 digital pins 12 are PWM (Pulse Width Modulation) pins.

2 DAC pins use 16 bit resolution and operates by the help of analogWrite() function. It has 2 USB ports. Such as:-

- Programming USB port
- Native USB Port

We can feed the program through programming usbport . Every program has 2 functions in its body. Such as :-

- loop() function
- setup() function

2.4.1 WORKING OF ARDUINO

LCD interface: Normally, Arduino boards do not have an LCD on board. However, for development work it is very essential. Provision of an onboard LCD is very easy because no extra wiring or component is required; only data pins are to be connected. Push-to- on switches: Four push-to- on switches are provided onboard for testing purpose; no extra wiring is required, hence testing is fast and easy [3].

2.5 MOTOR DRIVER:

We are using here L293D motor driver which has 16 pins 8 on each side. We can control maximum 2 motors connecting on each side.

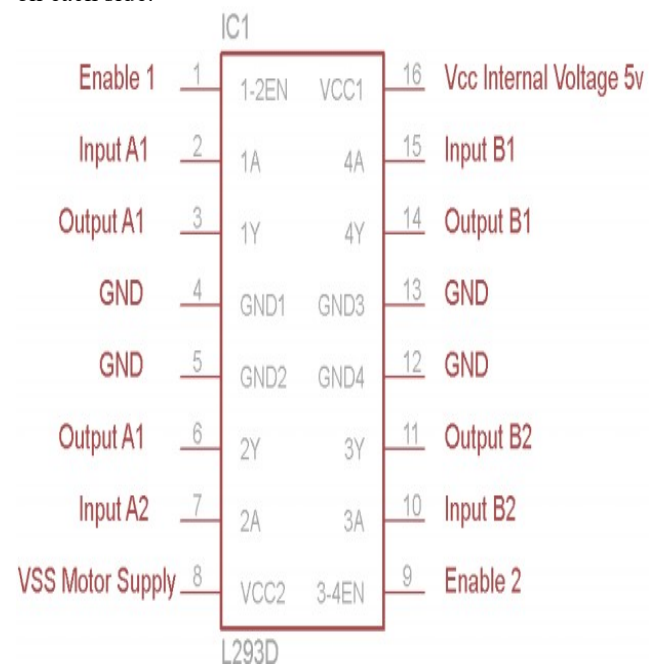


Figure 2.5: Motor Driver

On the left side two terminals OutputA1 and OutputA2 are connected to two terminals of motor and similarly on the right hand side OutputB1 and OutputB2 are connected to motor terminals. The inputs from the arduino board are connected through InputA1, InputA2, InputA3, and InputA4. Accordingly

motor moves forward, backward, left side and right side. If positive terminal of motor (i.e. pin3) is high and -ve terminal of motor (pin6) is low motor moves forward. If pin3 is low and pin4 is high then motor moves backward. If both the terminals are same then motor stops rotating. First the obstacle is sensed and then the signal to arduino is sent and accordingly showing the distance of obstacle. Then arduino sends a signal to motor driver for respective turning motion of the bot. If the obstacle distance is 19 cm then bot starts rotating either sharp right or left. If the right wheel moves backward and left wheel moves forward then bot takes sharp left movement. If the left wheel turns backward and right wheel turns forward then bot takes sharp right movement.

2.6 BLUETOOTH

For the communication of the robot with the cell phone or a mobile we are using the Bluetooth device. The Bluetooth device 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.



Figure2.6: Bluetooth module

3. LITERATURE REVIEW

Traditionally floor is cleaned by hand using different handmade instruments. Initially it was being washed by different reed brushes. According to Egyptian houses were

built of sun dried mud bricks at times white-washed and the floors were stamped earth. The floor of the outdoor kitchen too was simply the ground baked stone hard by the sun. Unless it was raining, which happened only rarely, these floors were easy to keep clean by sweeping. Like most ancient Egyptian tools, these brushes did not have long handles which would have rendered their use less irksome, and required bending low when employing them. For the ease of human beings different designs of brushes are evolved. Again during the age of monarchs carpets of different designs are utilized to cover the floor to keep it clean. As the time passed new scientific era begins a lot of new methods are used to clean the floor. The first among those was the reciprocating action of brush actuated by muscular force. The brush design is changed time to time depending upon the floor structure and ease of washing personnel. As the electricity came into role vacuum cleaner are invented to clean a dry surface. Moving forward different floor cleaning machines are being invented to clean the floor with less application of muscular power. Then came the concept of mobile robot. Mobile robots have the capability to move around in their environment and are not fixed to one physical location. By contrast, industrial robots are usually more-or-less stationary, consisting of a jointed arm (multi-linked manipulator) and gripper assembly (or end effector), attached to a fixed surface. For the help of mankind the first floor cleaner was manufactured during 1980s. In those equipment the aim was to wash the floor with less power utilization. There sweeping machines of mop is actuated by a timing motor which was controlled by the dc circuit. Here water is sprinkled on the mop and hence the wet mop is used to clean the debris from the floor. But the problem here was it can't use any chemical solvent or disinfectant. Again for soaking purpose only hot air is used. Again for moving the machine a worker has to be engaged. To overcome these conflicts current study was done to enable the cleaner move automatically throughout any kind of room. The mopping mechanism is also modified to lessen the cost. In current study the mop is continuously revolving about a axis perpendicular to the motion of the cleaner which also helps in directing water on the floor backward. Instead of using a wet mop a sprinkle mechanism is used to make the floor wet which is scrubbed by the mop. A vacuum cleaner was used to soak dirty water from the floor surface and side by side cleaning the surface. For automatic motion of the cleaner mobile robotics is used. Mobile robots are a major focus of current research and almost every major university has one or more labs that focus on mobile robot research [4].

Mobile robots are also found industry, military and security settings. Domestic robots are consumer products, including entertainment robots and those that perform certain household tasks such as vacuuming or gardening. From then on more sophisticated robot is designed for household equipment for automating the tasks including washing

machine, micro woven. After that only the revolution of mobile robotics came to household usages [5].

4. ADVANTAGES

1. Manual effort is less.
2. It consumes less cleaning liquid.
3. Power consumption is less.
4. Design is very simple.
5. Easy fabrication.
6. It occupies less floor area.
7. Net weight is less.
8. Maintenance cost is less.
9. Easy control of cleaning solution supply.
10. It can be used in various floor.
11. Smoother operation.

4.1 LIMITATIONS

1. 1.Vibration will be produced when used on rough floors or surfaces.
2. 2.The washed surface has to be wiped out for thorough cleaning.

5. CONCLUSION

The product thus developed is fully operational and gives desired motion. It is being tested in a room which results in successful outcome. The scrubber design should be modified in future because the current design has few problems. Few of those are the motor is not detachable and the high rpm leads to vibration of the whole system. If these features will be modified, this will work well. In our case servo motor are used which leads to loss of power. This can be reduced by substituting these 2 pumps with one pump having 2 path ways. This will be the next development stages. This not only decreases cost but also increases reliability of the instrument.

Overall the concept is very much helpful and there is scope of a lot of development in mechanical parts. The optimization will continue till achieving the best one. Overall the project is successful to its intent and will definitely change the era robotics and floor cleaning. In the automation part the algorithm are designed to give 90% efficiency which is too high in current scenario. The development can be made in the field of sensing. But this product has the capability to detect as well as move in the direction of dust and thus resulting in better cleaning of floors. As a whole this is a successful product developed that can be used in current Indian household.

REFERENCES

- [1]. Subankar Roy et. al., Arduino Based Bluetooth Controlled Robot, International Journal of Engineering Trends and Technology (IJETT) – Volume 32 Number 5- February 2016, ISSN: 2231-5381 <http://www.ijettjournal.org> Page 216
- [2]. Piyare, R. and Tazil, M. (2011), Bluetooth based home automation system using Android phones. IEEE 15TH International symposium on consumer electronics (ISCE), 14-17 June 2011, Singapore
- [3]. Javale, Deepali, et al., Home automation and security system using android adk., International journal of electronics communication and computer technology (IJECCCT) 3.2 (2013).
- [4]. V. Naga phanindra, B. Suresh Ram — Wireless Remote Control Car Based on ARM7. IJETT, Volume 5 Number 5 - Nov 2013.
- [5]. <https://howtomechatronics.com/tutorials/arduino/arduino-robot-car-wireless-control-using-hc-05-bluetooth-nrf24l01-and-hc-12-transceiver-modules/>