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Multipurpose Smart Floor Cleaning System by Using Android Device

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ABSTRACT

Recently, the innovation is going on in every field. The exploration in science is developing quickly for the comfort of the human life. The principle point of this paper is to plan an automated Smart Floor Cleaner which can be controlled by android device for sucking up tidy and soil, for the most part from floors and from different surfaces, for example, upholstery and draperies. The controller 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. With the advancement of technology, robots are getting more attention of researchers to make life of mankind comfortable.
Keywords : Smart Floor Cleaner , Android Device, PMDC Motor, Bluetooth Module, Battery, Vacuum Cleaner.

I. INTRODUCTION

In the cutting edge time, the Smart Floor Cleaner is required. Therefore, the cleaner is outlined such that it is equipped for cleaning the zone decreasing the human exertion just by beginning the cleaning unit. In the paper, fundamental core interest is to assemble and program it in such a way, that it can move around uninhibitedly and clean a particular region by the vacuuming process.

In early, 2010 a new automatic floor cleaner robot “Mint” was developed by Jen Steffen. Detachable clothes were attached for sweeping and mopping purposes. For tracking mint used the GPS-like indoor localization system. Sawdust is utilized on around floor materials to spellbind at all arrangements that diminishment generally than chafing to stay away from them reality dropped. The sawdust leaked up and supplanted separately sunshine. This was common in the before in hostelries is as yet utilized as a part of a few executioners and fishmongers. It used to be common to utilize tea leaves to amass mud from floor materials and take out scents. Right now it is still very common to utilize diatomaceous earth, or in reality any little cat issue write strong, to dispense with convergences from floor materials. There is comparatively a broad changeability of base washing mechanical assemblies possible today, for example, floor supports, programmed floor scrubbers and sweepers, and cover extractors that can unlimited sterile about fairly sort of inflexible ground surface or covered sections of flooring surface in rich not as quite a bit of period than it would salary expending an outdated washing system.

Robot is an electromechanical machine and used for various purposes in industrial and domestic applications. Robot appliances are entering in the consumer market, since the introduction of Robots. Many related appliances from various companies have been followed. Initially the main focus was on having a cleaning device. As the time pass on many improvements were made and more efficient appliances were developed. In early, 2010 a new automatic floor cleaner robot “Mint” was developed by Jen Steffen. Detachable clothes were attached for

sweeping and mopping purposes. For tracking mint used the GPS-like indoor localization system.

There is not at all unique solo washing technique that is appropriate for altogether positions and instances and operative washing be subject to upon category of cleaning expedient, housework technique and likewise the apparatus should be operator responsive. Cleaning effort can be materially challenging and an essential has been recognized to advanced approaches for efficient ergonomics estimation of original products. In current years, floor washing machines are receiving supplementary general for eventful and elderly residents due to absence of workers. However, in India, being without a job is additional and hence there is an essential to progress a smaller amount labour focused on cleaning machine. Hence, the present-day task is designed to proposal, expansion and assessment of a physically in this proposed navigation system, the cleaning robot is not an independent device. It can be likewise associated to processors or smart phones.

Under overall environments, the duplicate and of the cleaning location evidence machine will be communicated to processor. The duplicate handing out and course preparation are carried out on the processor. Operators can regulator the housework automaton via human-robot communication afterward that, the knowledge of the computer will be sent towards cleaning automaton via wireless statement. Under the manual regulator manner, the processor wills stopover distribution knowledge to the cleaning robot, however component. In our original, operators can governor the cleaning robot by smart receivers. How to sponsor the housework presentation lowers than the overall situation, specifically, the programmed method is the essential of this paper.

II. EXISTING CLEANING DEVICES

In this paper, the mint cleaning robot which is an automatic cleaning robot that sweeps and mops hard–surface floors using dusting and mopping clothes was developed. It investigates the product's social impact with respect to the attitude of the customers towards a systematic floor cleaner and how such a robot influences their lifestyle. Systematic cleaning was an important feature, and modifications to the environment to support the navigation of robot. The robot employs a systematic cleaning strategy that maps the environment using a GPS-like indoor localization. [16]

Paper described about some essential characteristics that a robot must have and this might help you to decide what is and what not a robot is. It will also help you to decide what features you will need to build into a machine before it can count as a robot. Robo Cleaner is a machine that cleans room automatically. Once it starts then Robo cleaner cleaned whole room. Robo Cleaner which use two motors control rear wheels and the single front wheel is free. It has 8-infrared sensors, 6-infrared sensors (3 pair) in left, right and front side for detect wall or a obstructs, when the sensors detected any obstructs, output of comparator, LM324 is high logic and the other the output is low. Microcontroller AT89S51 and H-Bridge driver L293 were used to control direction and speed of motor. Sensing a obstructs and manoeuvring the robot to stay on course, while constantly correcting wrong moves using feedback mechanism forms a simple yet effective closed loop system. As a programmer you get an opportunity to "teach" the robot how to move when obstructs is come. [15]

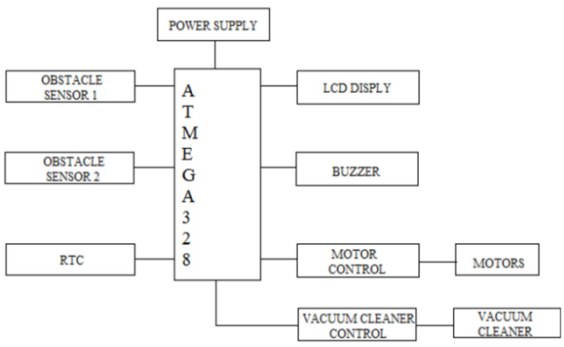

Figure 1. Block Diagram of an Advanced Mobile Robot for Floor Cleaning

The study concluded that, manual work is taken over by robotics nowadays. In this paper, an autonomous robot for floor cleaning application is proposed. It is capable of performing sucking and mopping tasks, obstacle detection, and automatic water spray. Moreover it is also able to work in manual mode. All hardware and software operations are controlled by Atmega 328 microcontroller. [5]

This paper presents the design & development of Floor Cleaning Robot which can clean and sweep the floor. Proposed model of operated in autonomous mode as well as in manual mode . This project deals with the designing and development of Floor cleaning Machine. The aim of this project work is to develop and modernized process for cleaning the floor with wet and dry. It is very useful for cleaning the floors. It can be used wet and dry; hence it is widely used in houses, hospitals, auditorium, shops, computer centres, etc. In modern days interior decorations are becoming an important role in our life. The motion of robot will be controlled by using two wheels coupled with centre and side shaft motors. The cost of this floor cleaning Robot is very cheap and it is advantageous for mobility issues.[1]

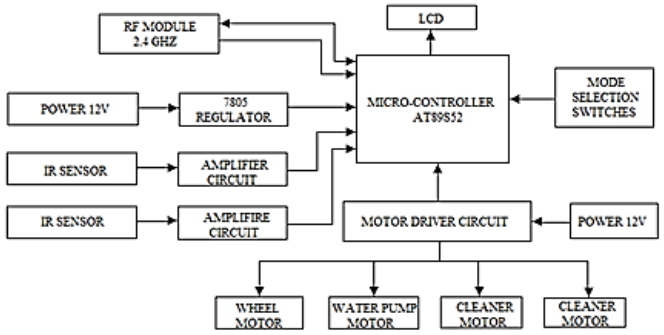

Figure 2. Block Diagram of Wireless Floor Cleaning Robot

III. COMBINATION OF VACUUME CLEANER, FLOOR CLEANER AND DRYER SYSTEM

The mind of the robot is microcontroller. Microcontroller peruses information from sensors and PC through RF handset and decoder/encoder. It is given dc supply as an information; an IC is utilized to smooth dc contribution to the microcontroller. As per the information sources got from sensors, microcontroller drives dc engine and consequently cleaner works better at the point when the sack is simply swapped than amid vacuuming for some time. The extent of the opening toward the end of the admission port: Since the speed of the vacuum fan is steady, the measure of air going through the vacuum cleaner per unit of time is likewise consistent.

IV. BLOCK DIAGRAM OF SMART FLOOR CLEANER

The block diagram is a pictorial portrayal of proposed robot which is appeared in fig.3. It indicates how the different fundamental parts must be associated with satisfy the coveted assignment. It portrays the hardware of robot undercarriage. It demonstrates the principle structure of investigation and cleaning robot which comprises of energy sources, dc engines, RF transmitter and recipient. The cerebrum of the robot is microcontroller. Microcontroller peruses information from sensors and PC through RF handset and decoder/encoder.

It is given dc supply as an information; an IC is utilized to smooth dc contribution to the microcontroller. As indicated by the sources of info got from sensors, microcontroller drives dc engine and consequently cleaner works better when the sack is simply swapped than amid vacuuming for a while.

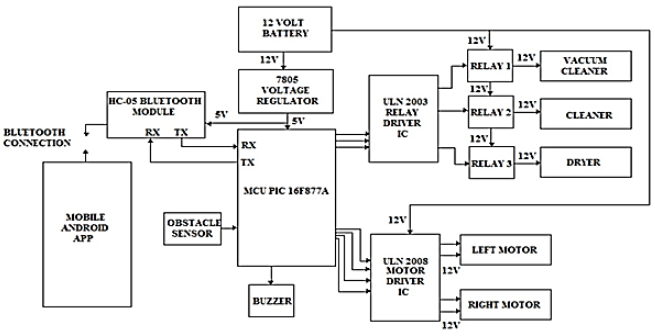

Figure 3. Block Diagram of Smart Floor Cleaner

The size of the opening toward the finish of the admission port: Since the speed of the vacuum fan is steady, the measure of air going through the vacuum cleaner per unit of time is likewise consistent.

Regardless of what measure the admission port has, a similar number of air particles should go into the vacuum cleaner consistently. In the event that the port is made littler, the individual air particles should move substantially more rapidly all together for them all to overcome in that measure of time. At the point where the velocity builds, weight diminishes, as indicated by Bernoulli's guideline, the drop-in weight means a more prominent suction constrain at the admission port.

A. Bluetooth Module

The Bluetooth is allowed to use in the remote correspondence convention as the scope of the Bluetooth is not as much as alternate remote correspondence conventions like Wi-Fi and ZigBee. HC 05 Bluetooth is a remote correspondence convention; it is utilized as a part of two gadgets as a sending and getting the data. The Bluetooth is allowed to use in the remote correspondence convention as the scope of the Bluetooth is not as much as alternate remote correspondence little. HC 05 Bluetooth is a remote communication protocol; it is utilized as a part of two gadgets as a sending and accepting the data.

Figure 4. HC-05 Bluetooth Module

HC 05 Bluetooth module interfacing with the microcontroller. These days, requests of portable telephones and individual correspondence the transfer speed is simple and helpful to utilize. The Bluetooth innovation deals with the correspondence channel of the remote part. The Bluetooth modules can transmit and gets the information remotely by utilizing two gadgets. The Bluetooth module can get and transmits the information from a host framework with the assistance of the host controller interface (HCI). The UART and USB are the most mainstream have controller interfaces and in this article, we have examined the UART.

B. RN-42 Module Interfacing with PIC-Microcontroller

RN-42 is class 2 Bluetooth module. It have UART and USB correspondence interface. It can both send and get information i.e. it can work both as Master and slave. It can likewise be used for sound application.
To interface RN-42 module with PIC microcontroller or any microcontroller, you need of voltage level moving circuit with RN-42. However, Microchip likewise give it arrangement by giving complete good board to interface it with microcontroller. RN-42 EK board would interface be able to with PIC microcontroller specifically by associating UART_RX stick of RN-42 Bluetooth module to Tx stick of pic microcontroller and UART_TX stick of RN-42 Bluetooth module to Rx stick of pic microcontroller. RN-42-EK board can likewise be associated with PC through USB Cable.

C. How to send/receive commands or data from microcontroller to/from RN-42 EK kit

RN-42 have two modes commands mode and data mode. Command mode is used to set configuration of Bluetooth module like its mode either master or slave, baud rate, serial port flow control. Bluetooth module should be configured before using data mode. Otherwise it will use default values of configuration bits and commands. Command mode is used to set device name, pin code and baud rate. One thing you should keep in mind there is a specific time for command mode, you should use command with in this time otherwise. Bluetooth module will reach into data mode after this time.

The RN-40 EK board is interfaced with the pic microcontroller by connecting directly, i.e. UARTRX

pin of the RN-40 Bluetooth module to the pic microcontroller of TX pin and UART-TX pin is connected to the Rx pin of pic microcontroller which is shown in fig.4. By using the USB cable, the RN-40 EK board is connected to the computer.

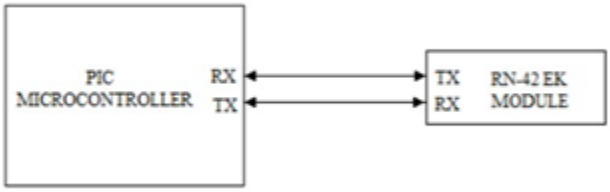

Figure 5. RN-42 Module Interfacing with PIC-Microcontroller

In this, android application is utilized and this application send and microcontroller move the robot in like manner by controlling the equip engines. Ultrasonic sensor used to distinguish the obstruction in the way of robot .Sensor recognizes the impediment separation and demonstrate the value in the android application.

V. Working of hardware model

The Smart floor cleaner robot works on automatic mode. It is operated through command given by the mobile android appllication. This command is transmitted to the microcontroller with the help of pairing of mobile bluetooth and bluetooth module. Microcontroller matchs the data of operator and programming and start working. For example if we give command of forward motoring, suppose the character 'a' is set for forward motoring in microcontroller. The microcontroller match the data, if data equals to 'a' the robot moves in forward direction. Similarly all operations are performes in this way. The obstacle sensor is use for obstacle detection. If it detect the obstacle, then obstacle sensor become 1 and buzzer will operate and robot will stop working.

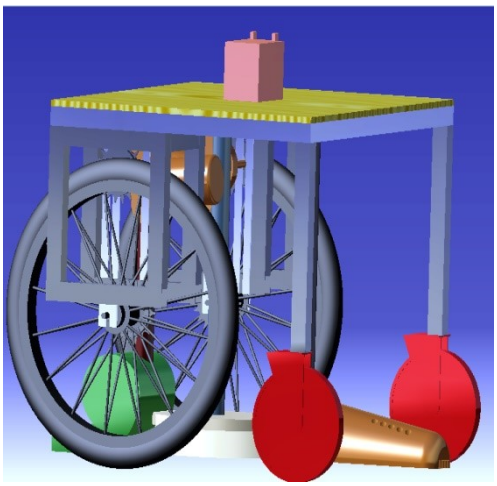

Figure 5. 3D diagram of Smart Floor Cleaner

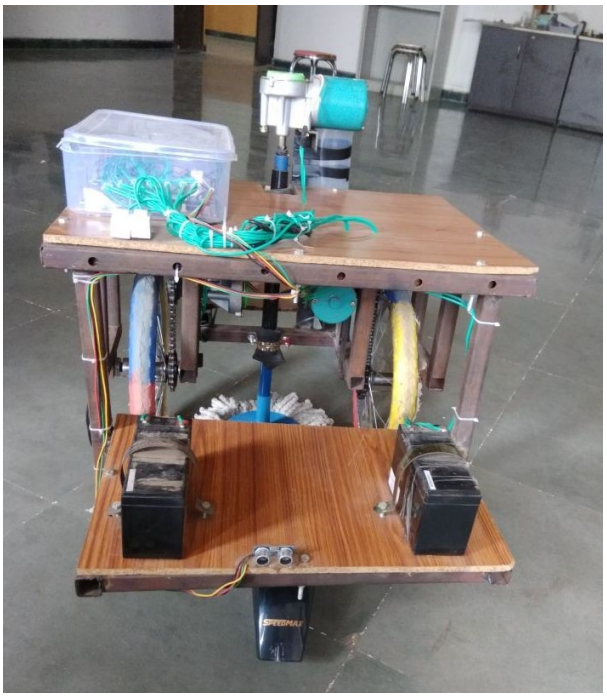

Figure 6. Hardware Model of Smart Floor Cleaner

VI. Conclusion

The different kinds of floor cleaning are used in various places such as ordinary floor cleaning machine or programmed floor cleaning. In this paper, we are utilized the savvy floor cleaning machine. The ordinary floor cleaning machine is less proficient than the advanced instrument. Along these lines, we are centered around savvy, which is worked on battery, which has smaller size consequently we can work this gadget in business regions, yet extremely valuable in

montages, railroad stage, clinics. This innovation is a mix of mechanical, electrical and hardware and gadgets. In this gadget planning and examination of the brilliant floor cleaning machine finished. In this paper, used comprise of multitasking part in gadget. In which we utilized portable we can achieve our objective by utilizing this hardware. Restriction, minute vision, remote system and in addition human-machine communication are done in our framework.

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