# AUTOMATIC & MANUAL VACUUM CLEANING ROBOT

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**Abstract -** In this work we implemented a human friendly cleaning robot with the advancement of technology to make human life easy and comfortable. The conventional automatic cleaning robot already exists, but these robots do not work in sync with humans. This robot can work in any of two modes i.e. "Automatic and Manual''. The need of the project has come up because of a busy schedule of a working people. So this has resulted in coming up with an objective of making a automated vacuum cleaner. Vacuum cleaner robot which having components DC motors, wheels, roller brush, cleaning mop, the garbage container and obstacle avoidance sensor & 12V rechargeable battery is used as power supply. The study has been done keeping in mind economic cost of product. Manual work is done by robot technology. RF modules have been used for wireless communication between remote (manual mode) and robot and having range 50m. In this vacuum cleaning robot for obstacle detection IR sensor is used. Four motors are used, two for cleaning, one for water pump and one for wheels. Motor driver IC is used to drive the motors & MOSFET is used for water pump and another for cleaner as switching. In previous system, there was no automatic water sprayer used and works only in automatic mode. In the automatic mode robot control all the operations itself and change the lane in case of hurdle detection and moves back. In the manual mode, the remote is used to perform the expected task and to operate robot. In manual mode, RF module has been used to transmit and receive the information between remote and robot and display the information related to the hurdle detection on LCD. The whole circuitry is connected with 12V battery.

**Keywords -** Microcontroller, IR sensor, RF module, remote control, motor driver IC, power supply.

## I. INTRODUCTION

In present days, robotic cleaners have taken major attention in robotics research due to their effectiveness in assisting humans in floor cleaning applications at homes, hotels, restaurants, offices, hospitals, workshops, warehouses and universities etc. Basically, robotic cleaners are classified on their cleaning technique like floor mopping, dry vacuum cleaning, sweeping etc. Some products are based on simple obstacle avoidance using infrared sensors while some utilize laser mapping technique. All cleaning and operating mechanism of robotic floor cleaners has its own advantages and disadvantages. For example, robots utilizing mapping are relatively faster, and energy efficient but costly, while obstacle avoidance based robots are relatively less time consuming and less energy efficient due to random cleaning. The main objective of this work is to provide a substantial solution to the problem of manufacturing robotic cleaner utilizing local resources while keeping it low costs.

The "Automatic and manual vacuum cleaning robot" has been designed for consumer, office environments, hotels & restaurants. Proposed design is being operated in dual modes. In one of the modes, the robot is fully autonomous and making decisions on the basis of the outputs of infrared proximity sensors. In manual mode, the robot can also be used to clean a specific area of a room by operating it manually.

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 Autonomous robot. 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. Detachable clothes were attached for sweeping and mopping purposes. In this research work a floor cleaner robot based on Atmega18 have been developed. This cleaner robot is an electric home appliance, which operating in two modes as per the user requirement "Automatic and manual". Detachable mop is used for mopping and it works on 12V supply. In the automatic mode, robot performs all operations itself. Firstly robot starts it moves forward and reverse direction. For obstacle detection and to avoid hurdle IR sensors have been used. If any hurdle detected then robot change the lane automatically, does not stop and starts cleaning action. It follows zigzag path. RF modules have been used in automatic and manual with 50m range for the make a system wireless. For user convenience automatic water sprayer is attached which automatically spray water for mopping, therefore no need to attach wet cloth again and again for mopping. Motor driver IC has been used to drive the motors and four motors have been used to perform respected operations like to move the robot. MOSFET have been used to switching the water pump and cleaner motor. In the manual mode, user operates the robot itself. RF module has been used to transmit and receive the signal to operate the robot through remote. In the manual mode, if any hurdle detection in path, then signal of hurdle detection indicated by LED of the system. Movement of robot is controlled by user itself through remote therefore user can move the robot in the desired direction.

This paper is arranged in sections. Section II covers the mechanical design of robot including chassis design, vacuum cleaning mechanism. A detailed literature review of robotic vacuum cleaners is presented in Section III. Conclusions of the project are summarized in Section IV. Much type of machines is widely used for this purpose. But they are working under different principles and the cost is also compatible.

In "Automatic and manual vacuum cleaning robot" is very simple technique and easy to operate any persons. The size of the machine is also portable, so we can transfer from one place to other place very easily. The floor cleaner is simple, modern house holding device; even children can also operate it easily with safety. It is very important one for each and every houses and hospitals etc. Robots are utilized for many applications to assist Human Beings. The conventional vacuum cleaner system consists of large mechanical and electrical parts which are more costly and incur more losses. The autonomous cleaner robot consist of low power consuming electronic and mechanical parts and it can operate during power outage period and does not need any human guidance. This proposed "Automatic and manual vacuum cleaning robot" operating cost and initial cost of the machine will be reduced and the human effort and also time will be saved. That power comes in the form of electricity, which will originate from a battery a basic electrical circuit, plays a vital role here. The electrical condition of robot is used for movement through DC motors. Thus robots need some level of electrical energy supplied to their motors and sensors in order to activate and perform basic operations. Robots all have some kind of mechanical construction, a frame or shape designed to achieve a particular task. The mechanical aspect is mostly the creator's solution to completing the assigned task and dealing with the physics of the environment around it.

## II. WORK

All type of hardware and software are controlled by ATmega16 microcontroller. This floor cleaner robot can perform sweeping and mopping task. Subject robot operates in autonomous mode as well as in manual mode along with additional features like scheduling for specific time and bag less dirt container without-dirt disposal mechanism. This work can be very useful in improving life style of mankind.

## III. MECHANICAL DESIGN OF ROBOT

Mechanical body consists of four parts i.e. chassis, brushing mechanism, vacuum cleaning.

A. CHASSIS: Chassis frame is the basic frame work of the automobile its supports all the parts of automobile attached to it. In our system chassis work as to carry all the stationary loads attach to it. Also withstand torsional vibration cause by the movement of Robot. It is the back bone of the system. All the systems and parts are attached to it. The solidity of Robot is greatly affected by the chassis of the system and size is a square of side 30cm.

B. MOTOR-WHEEL SYSTEM: The complete product is a four wheel drive automation process. 4 wheels are independently connected to 4 different 12v DC motors. The purpose of the wheels is
1. To give the bot proper motion.
2. Provide traction in all sorts of surfaces.
3. Make the movement easier in all direction.
4. Not to slip of from its path.

C. VACUUME CLEANING: Dry vacuum pump is the process to clean the dust particles from the surface so that the load will be lessen for the purpose of other operation. This process is achieved by using a 12v DC vacuum pump. The inlet is divided into a number of holes so that dust all over the width can be sucked. In mechanical vacuum pumps the mechanism is so designed that air or liquid is sucked from closed area and being thrown to atmosphere.

## IV. LITERATURE SURVEY

- Uman Khalid & Muhammad faze baloch in had presented the design, development and fabrication of prototype smart floor cleaning robot (clear) using IEEE standard 1621. This ROBOT is specially made on the basis of modern technology. Clear has all the features which are required for a vacuum cleaner. It can work automatically and manually [4].

- Karthick.T, Ravikumar.A, Selvakumar.L, Viknesh.T, has discussed the idea to develop an autonomous ROBOT that can be move itself without continuous human guidance. The autonomous cleaner ROBOT system which can be consumes very less power on comparing with existing system. The existing system consumes very high power of 500W for suction whereas "Automatic and manual vacuum cleaning robot" required 10W for suction [3].

- Naman Aggrawal, Piyusha Chaudhari, Anshul Mishrain in 'Review paper based on cleaning ROBOT'. This paper a human friendly cleaning ROBOT system for the domestic over all environment through conventional automatic cleaning ROBOTs already exist. A prototype of the rotating brush device is made manually to ensure the cleaning effect of the proposed system. From this all research paper we conclude that the drawback of this research is the robot can be work automatically as well manually from that now us going to implement the robot which can be work without human effort [5].

- Manreet Kaur & Preeti Abrol[8]: Manual work is taken over the robot technology and many of the related robot appliances are being used extensively also. Here represents the technology that proposed the working of robot for Floor cleaning. This floor cleaner robot can work in any of two modes i.e. "Automatic and Manual".

- Prathmesh Joshi, Akshay Malviya & Priya Soni[9]: This project report is based on the "Manually Driven Platform Cleaning Machine" which provide the basic needs of cleaning ground floors.

## V.    CONCLUSION

This robot is specially made on the basis of modern technology. System has all the features which are required for a vacuum cleaner. It can work automatically and manually. It has the feature of the scheduling and it can auto drain itself. CLEAR has many competitors who are selling same product in high prices. This research clear the way for efficient floor cleaning with sweeping and mopping operations. An automatic water sprayer is used which sprays water for mopping purpose. User can also operate this robot manually with the help of remote. It reduces the labour cost and saves time also and provides efficient cleaning. In automatic mode, the robot operates autonomously. The operations such as sweeping, mopping and changing the path in case of hurdle are performed automatically. Nonetheless, there are still new ideas to improve the developed system and to add new functionality to it. Further, the robot can be made to move randomly in any direction and its speed can be controlled. It has a vacuum cleaning system which consume very less as comparing with other system. Power consumption will reduced greatly and hence the operating cost is very low.

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