AUTOMATIC AND MANUAL FLOOR CLEANING ROBOT

Meghana K V[1], Harshitha V [2], Mahima Padmanabha B[3], Naresh N Dikshit[4], B R Santosh Kumar[5]

[1]UG scholar, [2] UG scholar, [3] UG scholar, [4] UG scholar, [5]Asst. Professor

[1]Electronics and Communication Engineering,
[1]K.S.Institute of Technology, Bangalore, India

Abstract: Households of today are becoming smarter and more automated. Home automation delivers convenience and creates more time for people. Domestic robots are entering the homes and people's daily lives, but it is yet a relatively new and immature market. However, a growth is predicted and the adoption of domestic robots is evolving. Several robotic vacuum cleaners are available on the market but only few ones implement wet cleaning of floors. The purpose of this project is to design and implement a Vacuum Robot which has two cleaning modes Autonomous and Manual mode and manual mode is via phone application. Vacuum Cleaner Robot is designed to make cleaning process become easier rather than by using manual vacuum. The main objective of this project is to design and implement a vacuum robot prototype by using Arduino Uno, Sensors, DC motor, motor driver L298N, Ultrasonic Sensor, and Vacuum suction unit and to achieve the goal of this project. Vacuum Robot will have several criteria that are user-friendly. With the advancement of technology, robots are getting more attention of researches to make life of mankind comfortable. This projects presents the design, development and fabrication of prototype automatic floor cleaner. This robot operates autonomous mode with additional features like dirt container with air vacuum mechanism and pick and place mechanism. This work is very useful in improving life style of mankind

Index Terms – **Ultrasonic sensor, Motor driver, vacuum unit, dustbin unit**

I. INTRODUCTION

From the very beginning of human era, cleaning was one of the tedious tasks. There were many methods for cleaning the premises. But those methods were tedious and needed high effort. It became difficult for the working population to find time for room cleaning. Because of the difficulties, the existed system was not considered as an efficient method. As the technology has advanced, with the help of automation this task was made much more efficient. This paper presents about how the burden of cleaning can drastically be reduced by means of using an automatic floor cleaner capable of accepting user commands via mobile. Main objective of this project is to design and implement a robot by using Arduino Uno, Motor driver L293D, Ultrasonic Sensor, LCD display and thereby controlling the robot through user commands by means of GSM and Wi-Fi technology.

Robot is an intelligent device having its own brain fed with computer logic so that it can do the work according to the algorithm designed. Autonomous movement of vehicle is guided by the logic controller designed. Robots plays an important role in each every field of life. It is used in industries, in households and in institutes. The robots are just becoming as intelligent as Human now a days. Mostly an average human uses 2-3 robots per day in his day to day life.

Sensors are the sensing devices which transmit a signal and receives the signal and accordingly used to accumulate the various environment information which is ultimately fed to microcontroller for deciding the working of machines. Microcontroller is the brain of robot where program is written and sensors are connected as input and actuators as output.

II. IMPLEMENTATION METHODOLOGY

A floor cleaner robot based on ATMEGA328 have been developed. This cleaner robot is an electric home appliance, which works in both Automatic and Manual mode.

In this project mainly four applications are there,

- Cleaning.
- Mopping.
- Robot control with Wi-Fi in Manual mode.
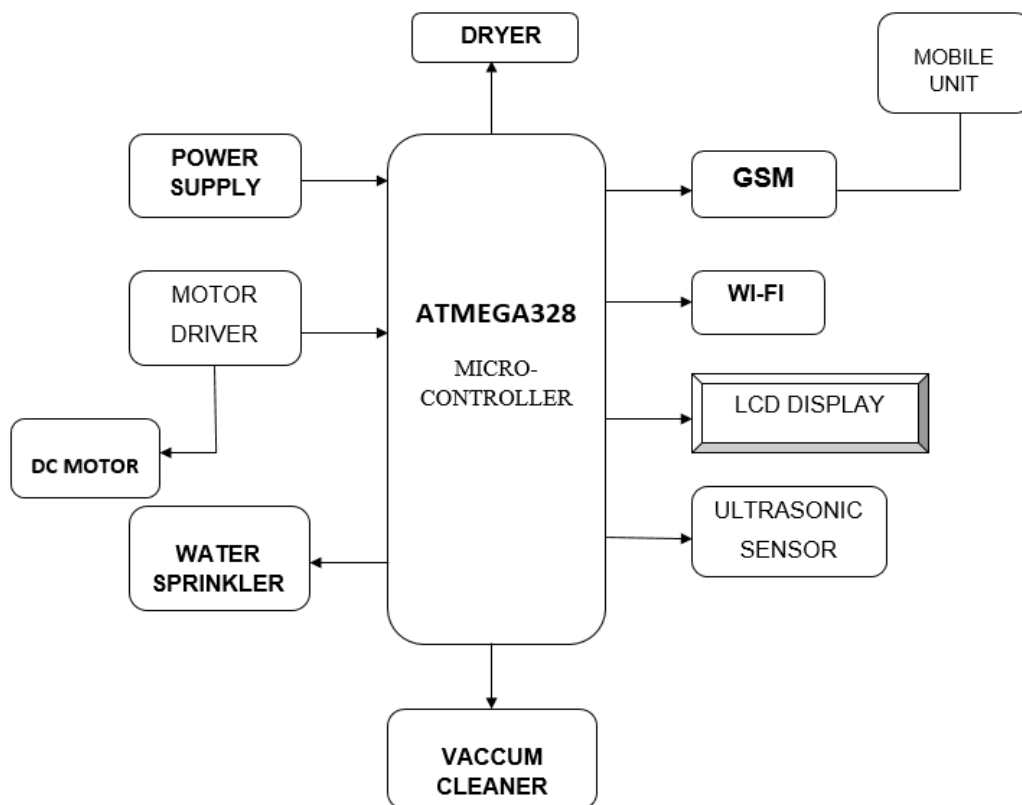- Ultrasonic for obstacle avoidance ,especially in Automatic mode.
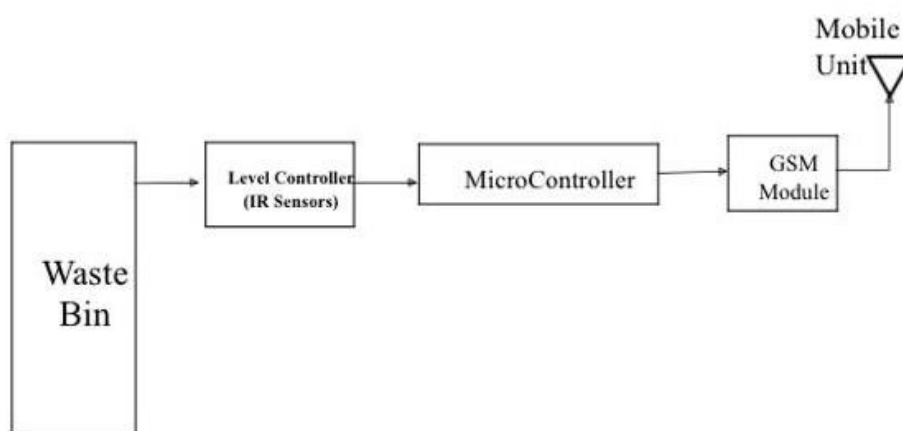
Fig. 2.1. Block Diagram of Automatic and Manual

Fig 2.2 Dustbin Unit

2.1 Working of Floor Cleaning Robot

The proposed system is shown in the block diagram Fig 4.1. In this system an Arduino Uno is used as the microcontroller. It can work automatically and manually .Circuit consist of a GSM module, an ultrasonic Sensor, L293D driver ICs, two motors, a cleaner and an LCD Display, Water Sprinkler, Wi-Fi, Dryer, Vacuum Cleaner. Ultrasonic sensor is used for obstacle detection and IR sensor is used for level detection in dustbin unit. Robot controls all operations itself and changes the lane in case of hurdle detection. Motor driver IC (L293D) for driving the two motors.

In this research work a floor cleaner robot based on ATMEGA328 have been developed. This cleaner robot is an electric home appliance, which works in two modes as per the user convenience "Automatic and manual". This floor cleaner robots is a vacuum cleaner robot; it also performs mopping operation. Roller is used for mopping. It works on 12V supply. In the automatic mode, robot performs all operations itself. Firstly robot starts it moves forward and perform cleaning action. For obstacle detection and to avoid hurdle

Ultrasonic sensors have been used. If any hurdle detected then robot change the lane automatically, does not stop and starts cleaning action. It follows straight path. To make whole system wireless, GSM and Wi-Fi modules have been used in automatic and manual with 50m range. For user convenience automatic water sprayer is attached which automatically spray water for mopping and therefore no need to attach wet cloth again and again for mopping. Followed by mopping dryer is used to dry the surface.

Motor driver circuit have been used to drive the motors. Four motors have been used to perform respected operations like to move the robot, for water sprinkler, for cleaner. LM293D IC has been used to drive wheel motor. All the information displayed on LCD. In the manual mode, user itself operates the robot and direction can controlled by user. GSM module have been used to transmit and receive the signal to operate the robot through mobile. In the manual and automatic modes, if any hurdle detected, then signal of hurdle detection displayed on the LCD of remote via GSM module.

2.2 Flow Chart of Automatic and Manual Floor Cleaning Robot

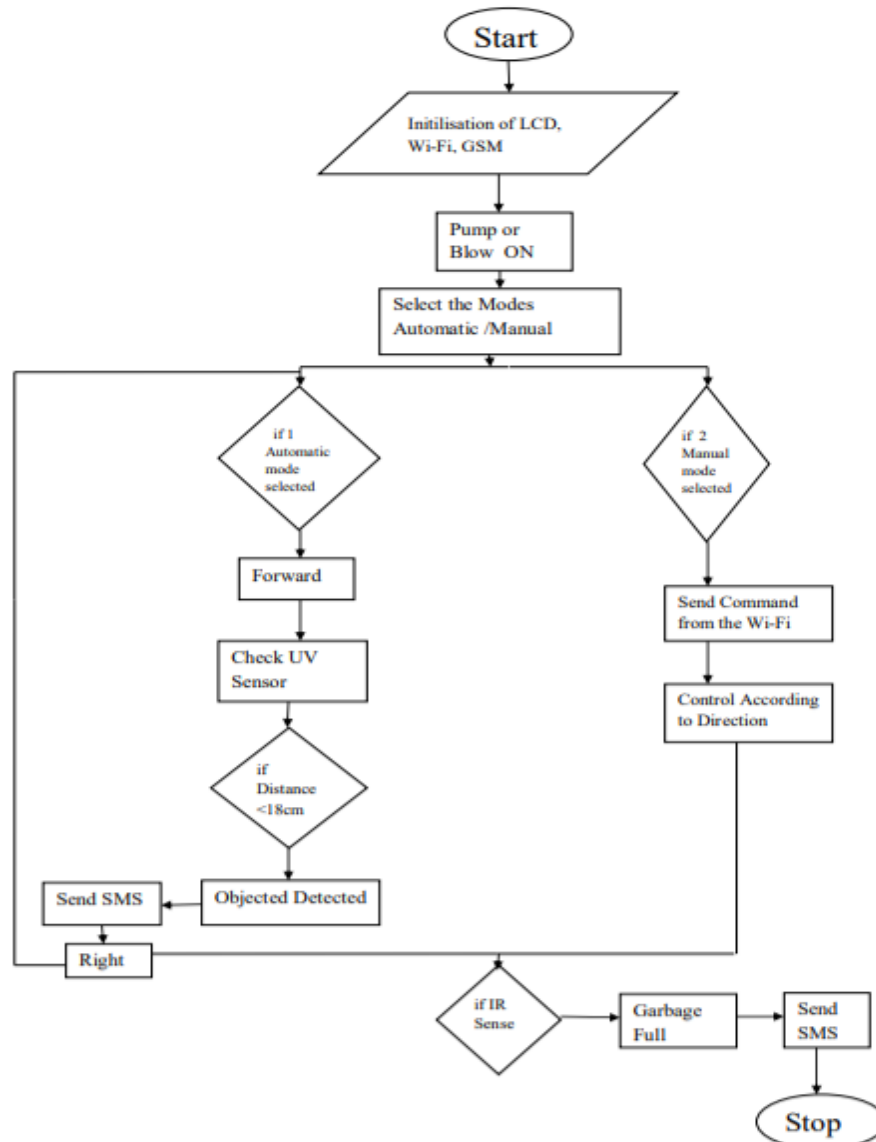The below flowchart shows the working of the automatic and Manual floor cleaning robot.

Fig 2.3 Working flow of the system

Once the operation is started the LCD, Wi-Fi and GSM is initialized after this the mode selection will be shown. If automatic mode is selected the robot moves forward the ultrasonic sensor will sense the object, if the distance between the sensor and the object is less than 18cm the robot changes the direction once the message is sent. If manual mode is selected the command is sent from Wi-Fi to control the direction accordingly. Once the garbage is full the IR senses the same and sends the message via GSM.

III. ADVANTAGES

1. It reduces human labor.
2. Better maintenance of sterility in operating room.
3. It can be used anytime and anywhere, it does not get tired and is never busy.
4. Saves on labor costs and time, as a single machine can do the work of multiple laborers in lesser time.
5. It can clean areas of hazardous environment and biomedical wastes.
6. Cleaning surfaces at any height.
7. Any path can be fed into its memory thus eliminating human involvement during operation.

IV. APPLICATIONS

1. Hospitals – floor cleaning machines are used in hospitals for both wet and dry cleaning. In order to obtain hygienic surface.
2. Computer centers – To maintain the desired cleaning surface finish.
3. Colleges – it is mainly used to clean the dust which is collected on the surface.
4. Railway station– On the platform of the railway station it can be used in any seasons.
5. Auditoriums & Malls
6. Cinema Halls

V. CONCLUSION

The Product developed is definitely a very significant product in robotics and floor cleaning field. This research assist efficient floor cleaning with sweeping and mopping operations. This robot works in two modes automatic and manual for user expediency.This proposed work provides the obstacle detection in case of any obstacle that comes in its way. An automatic water sprayer is fixed which sprays water for mopping purpose for the expediency of user. User can also operate this robot manually with the help of smartphone. It decreases 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 nevertheless, there are still new ideas to improve the developed system and to add new functionality to it.

REFERENCES

[[1]Manya Jain, Pankaj Singh Rawat, Assist.Prof. Jyoti Morbale "AutomaticFloor Cleaner"International Research Journal of Engineering and Technology Volume: 04 Apr -2017.

[2]Uman Khalid , Muhammad Faizan Baloch , Haseeb Haider , Muhammad Usman Sardar Muhammad Faisal Khan, Abdul Basit Zia1 and Tahseen Amin Khan Qasuria Faculty ofElectronic Engineering, Ghulam Ishaq Khan "Smart Floor Cleaning Robot (CLEAR)" Institute of Engineering Sciences and Technology, Pakistan Hamdard Institute of Engineering & Technology, Hamdard University, Karachi, Pakistan 2015.

[3]Manreet Kaur, Preeti Abrol "Design and Development of Floor Cleaner Robot(Automatic and Manual) "International Journal of Computer Applications (0975 – 8887)Volume 97– No.19, July 2014.

[4] Jens-Steffen Gutmann, Kristen Culp, Mario E. Munich and Paolo Pirjanian. The SocialImpact of a Systematic Floor Cleaner. In IEEE international workshop on advance robotics and its social impacts, Technische University munchen, Germany May 21-23, 2012.

[5]Mr.Chavan Swaroop Chandrakant, Mr.Parulekar Sharvarish Shashikan, Mr. Gavali Omkar Raju, Mr. Gokhale Shantanu Bhalchandra, Mr. Shinde Vaibhav Tanaji " Semi-Automatic Floor Cleaner with Obstacle Avoidance for Indoor Applications" International Research Journal of Engineering and Technology Volume: 05 Feb-2018.

[6]Vaibhavi Rewatkar, Sachin T. Bagde," Design of Automated Floor Cleaning System" International Journal on Recent and Innovation Trends in Computing and Communication ISSN: 23218169 Volume: 3 Issue: 2

[7]Ajaykumar,Madhura,Mahamunkar,Rose Merlin Jose Sahima Khan "Automated Operating Room Cleaning Robot".International Journal of Advanced Research in Electrical Electronics and Instrumentation Engineering. Vol-5,Issue 04,April 2016.

[8]Aishwarya Pardeshi, Shraddha More, Dhanashri Kadam, V.A.Patil " Automatic Floor Cleaner" IJECT Vol. 8, Issue 1, Jan - March 2017.

[9]Abhishek Pandey, Anirudh Kaushik, Amit Kumar Jha, Girish Kapse " A Technological Survey on Autonomous Home Cleaning Robot" International Journal of Scientific and Research Publications,Volume 4,Issue 4,April 2014.