

Review on Automatic Floor Cleaning Robot by Using e-Yantra and IOT

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Abstract- This paper presents floor cleaning robot used for cleaning the surface. It can be used for domestic and industrial purpose. The main feature of this robot is e-Yantra robot and the main component here is the AVR Atmega 2560 microcontroller, which controls and supervises all process. The robot can perform its work using IoT. It avoid obstacles while cleaning. This new structure using e-Yantra is efficient and manageable according to our needs. It will be useful in improving the lifestyle of human being.

Index Terms- e-Yantra, IoT, Atmega 2560.

I. INTRODUCTION

For the last few decades, automatic robots-vehicles are becoming very famous and common in R&D, Industries and home. The research paper details the development of E-Yantra floor cleaner also the generalise study of e-yantra robot, its specification and interfacing programming which required to complete this project. E-Yantra is the advanced robotic platform having number of functionality. There is direct provision in the e Yantra robot to interface the servo motor along with the serial communication through RS232 so there is no need to use two controllers for operation of system. In today's era, the cost of cleaning a floor from labour is high. Naturally, the high cost of this simple task has inspired alternative solutions. No man power required and we also monitor it on remote place.

The project is used for domestic and industrial purpose to clean the surface automatically. When it is turned ON, it clean the dust by moving all around the surface (floor or any other area) as it passes over it. The controller is used to drive the motors and sensors are used to avoid the obstacles. This can be useful in improving the lifestyle of mankind.

In the modern world, the Automatic Floor Cleaner is required. Thus, the cleaner is designed in such a way that it is capable of cleaning the area reducing the human effort just by starting the cleaning unit. In the paper, main focus is to build and program it in such a way, that it can move around freely and clean a specific area. It uses IR sensors to detect the obstacles and hence change its direction while moving and also preventing the cleaner to fall from height. Using a cleaner mobile robot for house cleaning is more and more popular in household work recently. There are many brands of cleaner robots in the market for to help people to do a tedious cleaning job. From the viewpoint of the user, a cleaner robot need design useful functions which consist of automatic cleaning whole area, automatic home returning and automatic service at time schedule user had determined.

The home return function of cleaner robot is also one of the factor for automatic completely in customer using. The cleaner robots are worked on each different house that means cleaner robots are serviced in unknown environment. That reason makes cleaner robots home return become more and more complication. The presented method can easily figure out the home and the orientation under unknown environment. This robot is small in size, light in weight and can clear an area in a domestic environment. Robotic cleaning systems have the characteristics of being driven differentially. The floor cleaning robot is an integration of moving mechanism, cleaning mechanism, control system.

Robot is an electromechanical machine and used for various roles in industrial and domestic applications. Many related appliances from different 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.

- E-YANTRA Module

E-Yantra is the robotic platform which is designed and developed by the IIT, Bombay for learning and education purpose. It is the advanced robotic platform having number of functionality already built in it. Along with that there is provision in the system that one can interface the external hardware on it for different application.

- The Major Components needed for Designing a Robot

Sensors: For Sensing the environments.

Actuators: For Movement of robots and its parts.

Control: Controller/Processor as brain of Robot.

Intelligence: User Written Command to perform desired set of action.

Power: A necessity for making a system work.

Communication: Robot can talk to another robot/PC.

- Flavors of E-yantra robot

1. Master: P89v51RD2 Slave: ATmega2560

2. Master: ATmega 2560 Slave: ATmega 8

3. Master: LPC 2148 Slave: 2 x ATmega 8

II. LITERATURE REVIEW

In paper[1], a floor cleaning robot equipped with Swedish wheels. It can be used in crowded places such as houses, train station, airport etc. the robot can perform its work in autonomous and teleoperated mode. Moreover the robot can pivot around without turning, can avoid obstacles and is provided with automatic power management ability. And meanwhile, the kinematics for its control and controlling methods are studied and demonstrated. This new structure, smooth locomotion capability and high working efficiency are verified by experimentation. In the early 90s, Denning Company and Windsor Industry Company of America developed a kind of cleaning robot called RoboScrub. The robot use ultrasonic range finders for obstacle detection and feature extraction. In addition they are provided with high precision laser based navigation system. This paper presents a new floor cleaning robot, which can move along all direction by its Swedish wheels and has four cleaners with automatic

switching capability. The robot can move longitudinally and laterally, pivot around and move toward arbitrary direction.

In paper[2], a small bot for home floor cleaning, and make simple algorithm for the robot to any out the cleaning. Robots are increasingly desired for various tasks in many fields. Recently, a cleaning bot is developed and is noticed in the station or office building. However it is very difficult to manufacture a small cleaning bot available in the house floor. Because a complex structure is required to collect the refuse and to control the robot based on various sensors. The target of this study is the small robot, and then the bot should be loaded with light parts or sensors. Although general navigation for autonomous mobile bot is based on ultrasonic sensor vision. However, in this study it is attempted to navigate based on only a simple switch sensor.

In paper[3], 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.

In paper[4], a dynamic coordinate method for home return of cleaner mobile robot when the work of cleaner robot is finished or the battery charging is necessary. The salient features of the dynamic coordinate calculating for cleaner robot home return are which provides with easy implement, high reliability, efficiency and cost cheap. The orientation and position coordinate of the cleaner robot will be easily calculated by the proposed method whatever cleaner robot which moving in any location under unknown environment area. That means we can figure out the position coordinate and direction angle of the cleaner robot in real time condition. Based on the dynamic coordinate method, the cleaner robot can easily find an efficient and the shortest way for home returning. The numerical results demonstrate the proposed method which is useful for home returning of cleaner robot.

In paper[6], the people lead a very busy life. People in cities have irregular and long working times. In such a situation a person will always find ways of

saving time. Thus 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.

III. APPLICATIONS

e-Yantra robot used in industry, at home, at company for cleaning purpose.

IV. CONCLUSION

This research will facilitate efficient floor cleaning operations and detail study of the e-yantra bot. Also the interfacing will be done with the help programming language. This robot will work in automatic modes for user convenience. And the proposed work will gives the result of obstacle detection in case of any obstacle that will come in its way. IOT will provide wireless communication between user and e-yantra floor cleaning robot. If there will be obstacle in the way of robot, it sends the information to the user which gets displayed on the LCD. An automatic water sprayer also attach which sprays water for mopping purpose for the convenience of user. It will reduce the labour cost and saves time also and provide efficient cleaning.

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