www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 6 Issue 1 Jan. 2017, Page No. 20170-20172
Index Copernicus Value (2015): 58.10, DOI: 10.18535/ijecs/v6i1.59

ADFC Robot: Ashirwad

A Low cost much efficient ADFC(Autonomous Dry Floor Clean-up) Robot

Rupinder Kaur[1], Kamalpreet Kaur[2], Harpreet Kaur[3]
[1] Bahra Faculty of Engineering and Technology
Bhedpura, Distt. Patiala, Punjab-147001
Email: errupinder23@gmail.com
[2] Bahra Faculty of Engineering and Technology
Bhedpura, Distt. Patiala, Punjab-147001
Email: kamal02.kaur@gmail.com
[3] Bahra Faculty of Engineering and Technology
Bhedpura, Distt. Patiala, Punjab-147001
Email: preet.harry11@gmail.com

***Abstract*—Artificial intelligence is reaching local areas like homes, offices, hospitals and other public places at a rapid pace. Robots are stepping forward to do the task of their creators-Human beings. Many organizations are exploring this field of exploration where design, construction, operation and application are equally important. These mechanical beings are programmed to perform various tasks with 100% approximate of efficiency. The paper focuses on the simplified approach to reduce the cost and improved efficiency of the robot so to serve the community to higher extent. Rotation in the brushes and simultaneous mapping of path facilitate for better clean up as compared to the previous cleaners that are associated with high cost but uses static brushes and random path. It eliminates the use of vacuum cleaners as they are expensive. The rotation brushes projected in the front do the needful to collect the mess in the dustbin attached at the bottom of the robot. Steeper motors are used for the mobility of wheels and brushes. Ultrasonic sensor is used to for obstacle detection. Ultrasonic sensor gathers information from the surrounding to assist the robot to react upon. This robot is programmed to reach each and every part of the floor. Its wiping brush rotates to give better results as compares to the static one. Graphical user interface is provided to switch between different speeds modes.**

Keywords—Microcontroller, Mechanical beings, sensor, graphical user interface.

I. INTRODUCTION

Cleanliness is a major concern in modern standards of living. Floor cleaning is one of the major issue to look upon. Presently, there are many vacuum cleaners and other floor cleaning machines available in the market but are unable to chuck out the demand of mopping the floor. The foremost sticking point for these autonomous machines that raise difficulty to reach the Indian market is cost. No doubt that work is being done to reduce the cost to make suitable for the budget of the common man for domestic use. In this period of modernization, people started to rely much upon automatic devices for the execution of their household activities.

This paper delves with a proposal of such a superior design and reduced cost robot that was not provided by the earlier designs. This robot is a combination of hardware and software that work together as programmed to give exceptional outcomes. The same design can would be developed or modified for applications in future. Its slim design avail it to clean under the furniture and other things. Vacuum cleaning technique is not implemented as it raises the cost of the robot. Simple but efficient working design would make this robot in scope for domestic activities. Assembly of sensor and motors formulated unmatched results through programming. This proposed design would fully eliminate the requirement for additional mopping. Modifications in this design can be easily made for further exploration.

II. PROBLEM DESCRIPTION

The development of task in this field of cleaning is worked upon long before. Modifications made it much easier and reliable. Concept of mapping was also introduced to cover maximum area but the cost associated can never met the budget that these machines could reach the Indian market to common use. The suggested algorithms suits for the structured area only [1]. Raster scanning technique was proposed in proposed and used in lawn mower. It suited in an unknown boundary that have unknown obstacles. Also when obstacles were detected it follows planned path as automatically done in system, so did not found much suitable [2]. An algorithm was proposed in which a 2D map was projected for the path planning and was restricted according to the tackled hurdles [3]. Hierarchical control structure and sonar and dead reconing technique were used to control the robot [4]. Localization practice used was same as of hofner [3].system of area division into subparts us used [5]. Magnetic field based immediate localization and mapping was introduced. Magnetic sensors were fitted for this purpose. Map generation was used for area filling [6]. A logic based model was proposed called fuzzy logic for controlling the behavior of the robots [7]. Ultrasonic sensors were used for mapping. Microcontroller and motors were planted to control the working of the robot [8]. A multi-function floor cleaning was introduced that includes 2 different modes for vacuum cleaning and mopping. The technique uses water collection was cheap and the most effective one [9]. A small cleaning boat was introduced and

the major disadvantage of this robot was that it followed a random area for cleaning and no technique for area filling was projected [10]. A model was developed to fully eliminate the demand of mopping of floor but as the previous devices it was unable to decline the cost associated with it to reach the local area such as homes.

III. PROPOSED WORK

This robot is very compact in size with mobility. Separate rotating brushes are used for unmatched cleaning. Its development cost is 66% (approx.) lesser than the previous design. It would cost for 3000-3500 INR. Simple design and easy to use robot provide you with three modes moderate, speedy, ultra speedy. Also it can be operated automatically as well as manually through mobile phone as well as computer system. Rotating sensor provides you with better obstacle avoidance. Dust pan collects the dirt and can be thrown out later on. Dual dry wiping is provided through this proposed model only. This reduced cost would boom the field of implementation of Robots through artificial intelligence.

IV. HARDWARE DESIGN

This cleaning robot is very compact in size with mobility. Two small wheels are used for this operation. Ultrasonic sensor is implemented in the front side so to catch the clear and fine view for obstacle avoidance. Two brushes are used at the front side of the robot which are made to rotate in the opposite direction to each other that is toward the inner side of the robot. Front and rear brush gives you a better cleaning experience. Dust pan is projected at the bottom of the robot in which the front brushes collect the dust and dust particles. The dust pan is removable. At the lower side, a cotton sponge wiper is used for dual cleaning. Motors are used in the design for rotating the front side brushes that directs the dirt towards the dustpan, for the 180^{o} movement of the ultrasonic sensor and the steering based mobility of the robot. Cables are used for the transfer of data from one place to another. Microcontroller is used to program the task instructions to work upon in various situations.

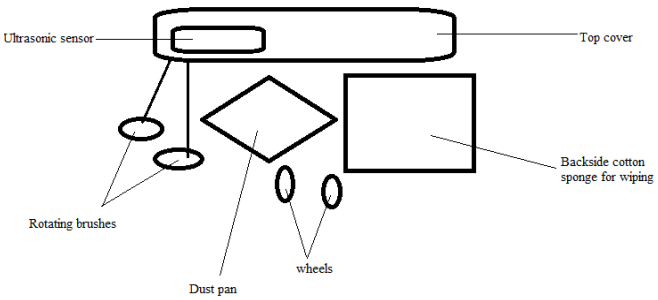

Figure1. Hardware design of ADFC Robot: Ashirwad

V. SOFTWARE DESIGN

When the robot is switch ON, the robot starts to move. At the same time the ultrasonic sensor come into play and gather the information from the surroundings. If no obstacles found in the particular area of localized distance, then the brushes stars rotation and initiate with the work. It starts moving in straight line path while cleaning with the rotating brushes. As it is mapped it will follow a particular path instead of the random path elimination shortcoming of the previous designs. It the machine found any kind of obstacle then it stops for a while the ultrasonic sensor start scanning proceeding left to right. After finding favorable path it resume with task. Otherwise it will turn the steering to the left. The main program consists of a few sub-programs to provide more flexibility.

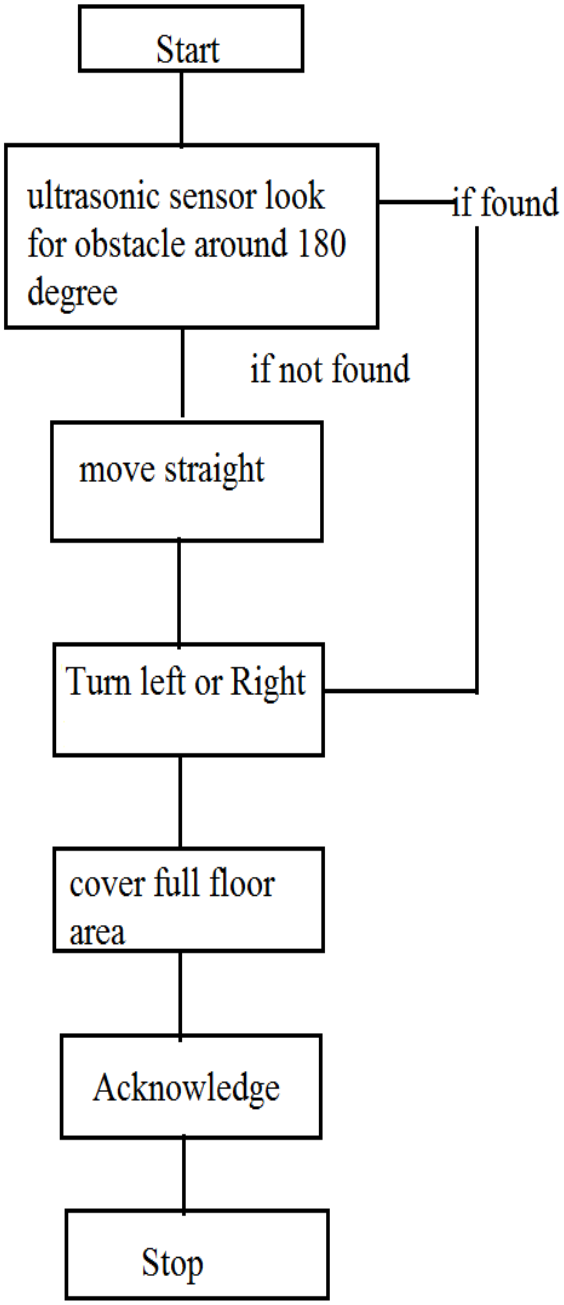

Figure 2. Sofware design of ADFC Robot: Ashirwad

VI. RESULT

The proposed design eases you with the simplified approach and reduced cost of the efficient robot. It can easily be used in a homely environment. It will easily suit the budgets of common people. The design provides you with manual and automatic modes at three different speed levels. It can actually fulfill its task by reaching every area for operation.

VII. CONCLUSION AND FUTURE SCOPE

In this paper, we have proposed a dynamic and very cost effective model. This mechanical equipment is basically designed for household to clean the floor, includes sweeping and mopping. Microcontroller is used to instruct the working, steeper motor controls the mobility of parts and sensor. An ultrasonic sensor is used for obstacle avoidance. The cotton sponge is used because can absorb even minute particles of dust. It completely eliminates the additional floor mopping. Its precise size makes it reach every area even under the furniture. This proposed model can be modified and used in many other ways. It can also be developed with additional features keeping cost in mind.

VIII. ACKNOWLEDGEMENT

The completion of this paper on "ADFC Robot: Ashirwad" has given immense pleasure and knowledge. We are sincerely thankful to guide Astt. Prof. Harpreet Kaur at bahra faculty of engineering who have cooperated with us at different stages during the development of this paper. Special thanks to my mother Jaswinder Kaur for her support and cooperation.

REFERNCES

[1]. F. Yasutomi, D. Takaoka, M. Yamada, and K. Tsukamoto. Cleaning robot control. Proc. of IEEE Intemational Conference on Robotics and Automation, 3: 1839-1 84 1 , 1988.

[2]. Cao, Zuo Liang, Yuyu Huang and Ernest L. Hall. "Region Filling Operations with Random Obstacle Avoidance for Mobile Robots", Journal of Robotic Systems, Vol. 5, No. 2, April 1988, p 87- 102.

[3]. Hofher, Christian; Schmidt, Guenther "Path planning and guidance techniques for an autonomous mobile cleaning robot", Robotics and Autonomous Systems v 14 n 2-3 May 1995. p 199-212.

[4]. Gonzalez, E.; Suarez, A.; Moreno, C.; Artigue, F. "Complementary regions: a surface filling algorithm",1996 13th IEEE Intemational Conference on Robotics and Automation. Part 1 (of 4), Minneapolis, MN, USA, 22-28, June 1996, p 909- 914.

[5].Chang, C. L. and J. M. Shyu. A region-filling mobile robot. Proc. of International Conference on CAD/CAM, Robotics and Factories of the Future, pages 1128-11 41, 1993.

[6]. Ilari Vallivaara, Janne Haverinen, Anssi Kemppainen, Juha R¨oning ."MagneticfieldbasedSLAMmethodforsolvingthelocalizationproblemin mobile robotfloor-cleaningtask", The 15th International Conference on Advanced Robotics Tallinn University of Technology Tallinn, Estonia, June 20-23, 2011.

[7]. Sherman Y.T. Lang and Bing-Yung Chee. "Coordination of behaviours for Mobile Robot Floor Cleaning",1998 IEEE/RSJ Intl.Conference on intelligent Robots and Systems Victoria, B.C., Canada, October 1998.

[8]. J. Palacin, J.A. Salse, I. Valganon, X.Clua. "Building a Mobile Robot for a Floor-Cleaning Operation in Domestic Environments", IMTC 2003- Instrumentation and Measurement Technology Conference, Vail, CO, USA,20-22 May 2003.

[9]. Yunbo Hong, Rongchuan Sun, Rui Lin, Shumei Yu, Lining Sun. "Mopping module design and experiments of a multifunction floor cleaning robot", proceeding of 11th World Congress on Intelligent Control and Automation Shenyang, China, June 29- July 4 2014.

[10]. Ynng-.loo Oh' and Yoshio Watanabe', "Development of Small Robot for Home Floor Cleaning", Proceedings of the 41st SICE Annual Conferenc.

[11]. Sayali P Chavan , M R Dhanvijay, M.D.Jaybhaye," A Low Cost Aurdino Controlled Floor Mopping Robot"