International Journal of Advance Research in Science and Engineering
Vol. No.10, Issue No. 04, April 2021
www.ijarse.com
IJARSE
ISSN 2319 - 8354

DESIGN AND ANALYSIS OF ROBOT TOILET CLEANER

A.Mohanraj[1], M.Chandru[2],B.Gokulraj[3],T.Karthikeyan[4], C.Kavinkumar[5]

[1] *Associate Professor, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.*

[2,3,4,5] *UG Student, Department of Mechanical Engineering, K S R Institute for Engineering and Technology, Tiruchengode, Tamilnadu, India.*

I. ABSTRACT

Moving towards our glorious goal of developed and prosperous nation, cleanliness is one of the biggest need. 'Swachh Bharat Abhiyan' is our motto behind the research of 'Robot Toilet Cleaner' and it is the great leap towards the cleanliness of private as well as Public Lavatories. Dirty toilets cause contagious diseases which are hazardous for human life. This system is a remedy for human health as well as our goal towards 'clean and smart India'. The purpose of this system is to maintain hygiene level of toilets through cleaning the bowl in a semi automatic way. At present, cleaning system of toilets is worst and leads to health issues. This system automatically cleans the western toilet with the help of robotic arms. There is a sequential cleaning algorithm for the same. The robotic arm has a brush attached to its end that is used for the cleaning purpose. Water jets are provided. In this system there is minimum usage of water & electricity.To maintain the periodicity of cleanliness level servo motor and DC motors are used.

Keywords- Cleanliness, Toilet, Sequential cleaning algorithm, Robotic Arm.

II. INTRODUCTION

In our country, people do not have enough knowledge of using toilets. This leads to several diseases, such as Malaria, Hepatitis, Flu, Cholera, Streptococcus, Typhoid, etc. Hence we introduce the concept in the IOT called "Swachh Shithouse" The term Swachh means 'Clean'. Then the term Shithouse means 'Toilet'. It is introduce to use and maintain the toilets in the clean and hygienic way. The project is based on IOT concepts using different sensors like smell sensor, dirt sensor, sonic sensor, RFID reader, Database. Using these materials we are trying to provide the clean toilets and create the awareness among the people.

III. LITERATURE SURVEY

Kumar C.Adithya Arun Bharadwaj A Balasubramanian R Gowtham P

Autonomous Lavatory Cleaning System

The application of integrated robotics is becoming increasingly commonplace in day to day applications. The idea presented in this paper seeks to provide a convenient and a hassle-free means of cleaning public toilets whilst maintaining hygienic and sanitary standards. By using a counter to record the number of times of usage, a line follower mechanism to guide the robot and an RFID

module to initiate the auto- flushing, the cleaning operation is fully automated and requires low operational power. Furthermore, a robotic arm is part of the module, so as to thoroughly clean the toilet bowl. Such a provision will curtail the role of manpower in maintenance of public toilets to a great degree.

IV. MAJOR COMPONENTS

1. D C MOTOR
2. FRAME
3. SHAFT
4. WORM AND WORM GEAR ARRANGMENT
5. LIMIT SWITCH
6. BEARING
7. METAL STRIP
8. TOILET CLEANING BRUSH
9. CIRCUIT;

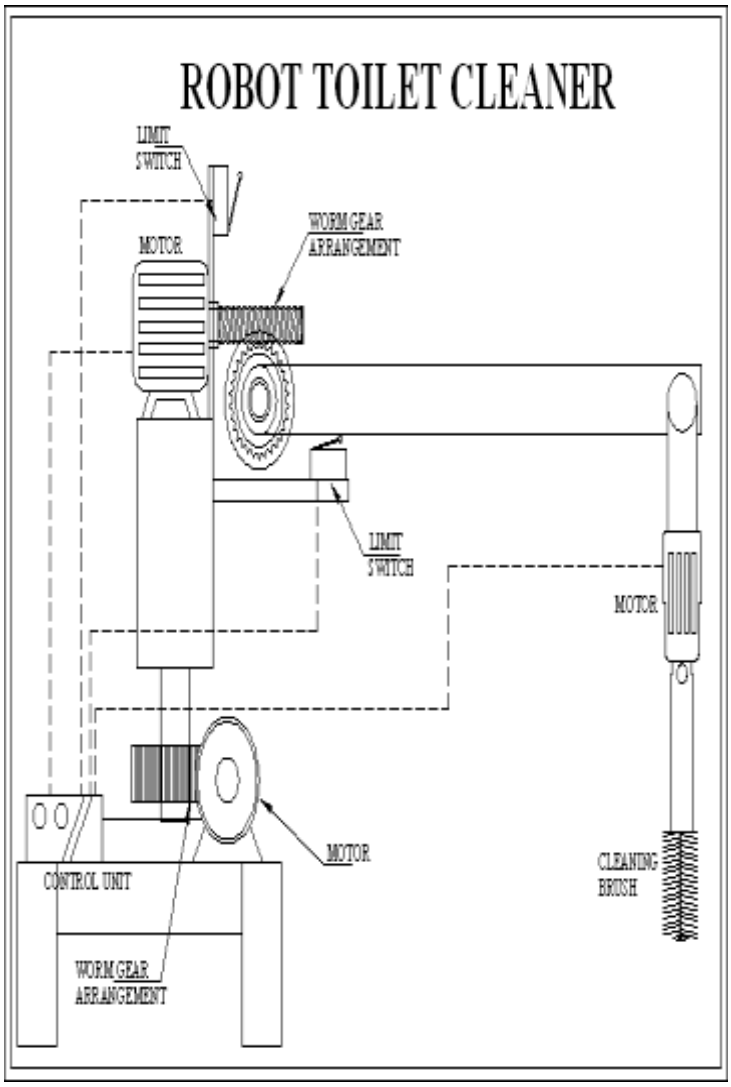
RELAY
MOTHER BOARD

V. MATERIALS AND METHODS

Good science project does not stop with building a motor. It is very important to measure different electrical and mechanical parameters of your motor and calculate unknown values using the following helpful formulas. This formula could be used in many cases. You may calculate the resistance of your motor by measuring the consumed current and applied voltage. For any given resistance (in the motors it is basically the resistance of the coil) this formula explains that the current can be controlled by applied voltage. Torque of the motor is 4.2 kgcm. A **worm drive** is a gear arrangement in which a **worm** meshes with a **worm gear**. The two elements are also called the **worm screw** and **worm wheel**. Limit switches are used for controlling machinery as part of a control system, as a safety interlocks, or to count objects passing a point. A relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. Arduino is an open source electronics platform accompanied with a hardware and software to design, develop and test complex electronics prototypes and products. Shaft is a common and important machine element. It is a rotating member, in general, has a circular cross-section and is used to transmit power. A ball bearing is a type of rolling- element bearing that uses balls to maintain the separation between the bearing- races.

International Journal of Advance Research in Science and Engineering
Vol. No.10, Issue No. 04, April 2021
www.ijarse.com
IJARSE
ISSN 2319 - 8354

FIG



VI. WORKING PROCESS

Here the four motors are there to make the robot move horizontally, vertically and then for the cleaning purpose. Basically the whole setup is rotated by means of a motor. Then the horizontal movement is takes place by a motor which is limited at both ends by a limit switch. Then the brush with the mob is moved by means of a motor horizontally. Several welding processes are based on heating with an electric arc, only a few are considered here, starting with the oldest, simple arc welding, also known as shielded metal arc welding (SMAW) or stick welding.

In this process an electrical machine (which may be DC or AC, but nowadays is usually AC) supplies current to an electrode holder which carries an electrode which is normally coated with a

mixture of chemicals or flux. The high temperature generated (about 6000^{o}C) almost instantly produces a molten pool and the end of the electrode continuously melts into this pool and forms the joint. Welding is a process for joining similar metals. Welding joins metals by melting and fusing 1, the base metals being joined and 2, the filler metal applied. Welding employs pinpointed, localized heat input. Most welding involves ferrous-based metals such as steel and stainless steel. Weld joints are usually stronger than or as strong as the base metals being joined. An earth cable connects the work piece to the welding machine to provide a return path for the current. The weld is initiated by tapping ('striking') the tip of the electrode against the work piece which initiates an electric arc.

VII. MANUFACTURING PROCESS

. Manufacturing processes are the steps through which raw materials are transformed into a final product. The manufacturing process begins with the creation of the materials from which the design is made. These materials are then modified through manufacturing processes to become the required part. Manufacturing processes can include treating (such as heat treating or coating), machining, or reshaping the material. The manufacturing process also includes tests and checks for quality assurance during or after the manufacturing, and planning the production process prior to manufacturing.

VIII. INDUSTRIAL APPLICATION

This technology offers a ‘clean on demand’ model, allowing housekeeping department to deploy their manpower resources more efficiently. It can also be used for domestic purposes also. It can reduce the human efforts by semi automatic cleaning. It allows better maintenance and hygiene level of toilets and set a higher standard of cleanliness of the toilets. It is also a convenient way of obtaining relevant real time information on usage and odour levels in toilets. This system is economical and easy to implement in the existing toilets.

IX. CONCLUSION

Our proposed project will create awareness among the people about the proper sanitation. It makes use of Internet of things, which is a rapidly growing technology. Our proposed system will make everyone to strictly follow the cleanliness and proper sanitation in the toilets. It prevents the many new contagious diseases that spread due to improper sanitation of the toilets. Thus by using technologies in the smarter way, we can maintain the cleanliness which is next to the godliness. Keep Clean, Be Safe.

X. REFERENCE

1. J.H.Davies.MSP430 Microcontroller Basics. Newnes: Butterworth- Heinemann Ltd, 2008, pp. 146-382.
2. P.D. Gasper, A.E. Santo, B. Ribeiro. “MSP430 microcontrollers essentials - A new approach for embedded systems courses: Part 1 – Overview and tools,” in Proc. Education and Research Conference (EDERC), 2010, pp. 66-70.
3. M.E.Islam. Design and Fabrication of a Line Follower Robot.LAP LAMBERT Academic

Publishing, 2011, pp. 25-65.

4. S.M. Ashiq. K. Karthikeyan, S. Karthikeyan (2013, Feb.). "Electrical Fabrication of Semi Automated Pressurized Flushing System in Indian Railway Toilet."International Journal of Engineering and Advanced Technology (IJEAT). [On-line]. 2(3), pp. 778-998. Available: http://www.ijeat.org/attachments/File/v2i 3/C1077022313.pdf [Aug. 15, 2015]
5. . D. Kokvin, G.Sziebig, W.D. Solvang. "Design of a Robotic Arm for Automatic cleaning of cargo containers", presented at the 4th International Conference on Cognitive Infocommunications (CogInfoCom),Budapest, Hungary, 2013.
6. Matijevics. "Infrared Sensors Microcontroller Interface system for Mobile Robots", presented at the5th International Symposium on Intelligent Systems and Informatics, Subotica, Hungary, 2007.
7. J.H.Davies.MSP430 Microcontroller Basics. Newnes: Butterworth- Heinemann Ltd, 2008, pp. 146-382.
8. P.D. Gasper, A.E. Santo, B. Ribeiro. "MSP430 microcontrollers essentials - A new approach for embedded systems courses: Part 1 – Overview and tools," in Proc.
9. Education and Research Conference (EDERC), 2010, pp. 66-70.
10. M.E Islam. Design and Fabrication of a Line Follower Robot.LAP LAMBERT Academic Publishing, 2011, pp. 25-65.
11. S.M. Ashiq. K. Karthikeyan, S. Karthikeyan (2013, Feb.). "Electrical Fabrication of Semi-Automated Pressurized Flushing System in Indian Railway Toilet." International Journal of Engineering and Advanced Technology (IJEAT). [On-line]. 2(3), pp. 778-998. Available:http://www.ijeat.org/attachme nts/File/v2i3/C 1077022313.pdf [Aug. 15, 2015].
12. D. Kokvin, G.Sziebig, W.D. Solvang. "Design of a Robotic Arm for automatic cleaning of cargo containers", presented at the 4th International Conference on Cognitive Info communications (CogInfoCom), Budapest, Hungary, 2013.

.