International Journal of Research in Engineering and Science (IJRES)
ISSN (Online): 2320-9364, ISSN (Print): 2320-9356
www.ijres.org Volume 11 Issue 5 ǁ May 2023 ǁ PP. 663-667

Smart Lavatory with Automatic Cleansing System

Prof. Narayanaswamy G, Abhishek M, Dhanya, Meghana M, Mohammed Shakeeb

[a] *Professor, Vidya Vikas Institute of Engineering and Technology, Dept. of ECE, Mysore, India 570011,* [b]*Student Vidya Vikas Institute of Engineering and Technology, Dept. of ECE, Mysore, India 570011,* [c]*Student, Vidya Vikas Institute of Engineering and Technology, Dept. of ECE, Mysore, India 570011,* [d]*Student, Vidya Vikas Institute of Engineering and Technology, Dept. of ECE, Mysore, India 570011,* [e]*Student, Vidya Vikas Institute of Engineering and Technology,, Dept. of ECE, Mysore, India 570011.*

Abstract: *A comfort station may be a room or small building with one or more toilets (or urinals) available to be used by the overall public, or by customers or employees of a business. Mostly Public toilets are commonly female facilities although some are unisex, especially for little or single-occupancy public toilets. Increasingly, toilets are also for people with disabilities. Public toilets are known by many other names counting on the country. Some public toilets are freed from charge while others charge a fee. In the latter case they're also called pay toilets and sometimes have a coin-operated turnstile. Local authorities or commercial businesses may provide comfort station facilities. Some toilets are unattended while others are staffed by a janitor or an attendant. Public toilets are typically found in schools, offices, factories, and other places of labor. Similarly, museums, cinemas, bars, restaurants, entertainment venues and many other places usually provide public toilets. On implementing the smart lavatories, the cleanliness of the rest room is ensured every time, the user leaves the restroom after use. Even the cleanliness level is monitored keenly and rated so that the travelers who are new to the place can use the restrooms by knowing the cleanliness level.*

Date of Submission: 13-05-2023 Date of acceptance: 25-05-2023

I. INTRODUCTION

The traditional lavatory often poses challenges regarding cleanliness and maintenance, leading to unsanitary conditions and user dissatisfaction. This research proposes an innovative solution by integrating advanced technologies into the lavatory to automate the cleansing process and ensure optimal hygiene levels. Intelligent water management is a key feature of the system, which optimizes water usage and conserves resources. Water flow is controlled based on user interaction, reducing wastage and promoting eco-friendly practices. This system is designed to address the common challenges associated with traditional lavatories, such as unhygienic surfaces, manual cleaning requirements, and the inconvenience of maintaining cleanliness. By incorporating intelligent sensors, smart controls, and automated cleansing mechanisms, this smart lavatory significantly reduces the need for manual intervention and enhances user satisfaction. automatic cleaning and cleanliness monitoring systems have been contributed to the society. This proposed system is available for 24x7 to clean the lavatory whenever the toilet is unclean and the automated rating is done in order to overcome the false rating.

II. LITERATURE SURVEY

[1] **The authors are Kitisak Osathanunkul, Kittikorn Hantarkul, Park Pramokchon, Paween Khoenkaw, Nasi Tantitharanukul** has design an automatic urinal flushing system has been developed in the market for a long time. No information is collected from the traditional automatic urinal flushing system. With the smart system, a caretaker will be able to use the usage information to estimate or to analyse the number of users in each day, or each week. It is also possible to know which urinal has been used the most, so it should be taken care more than the other ones. The proposed system is tested under different scenarios.

[2] **The authors are Nafeesa Muntashar, KN Sahana, Saniya Shilledar** they designed and implemented an automatic urinal flushing system to provide water level information to the caretaker. With the smart system, a caretaker will be able to use the information to fill up the storage tank to avoid scarcity of water required for flushing. The proposed system is tested under different areas. The results show that in a normal condition. An effort is being made to raise public information of toilet cleanliness and maintenance. To enhance the toilet management solution, IOT-based sensors are used.

[3] **The authors are Seung-min Park, Daeyoun D Won, Brian J Lee, Diego Escobedo, Andre Esteva, Amin Aalipour, T Jessie Ge, Jung Ha Kim, Susie Suh, Elliot H Choi, Alexander X Lozano, Chengyang Yao, Sunil Bodapati, Friso B Achterberg, Jeesu Kim, Hwan Park, Youngjae Choi, Woo Jin Kim, Jung Ho Yu, Alexander M Bhatt, Jong Kyun Lee, Ryan Spitler, Shan X Wang, Sanjiv S Gambhir** initiate technologies for the longitudinal monitoring of a person's health are poorly integrated with clinical workflows, and have rarely Produced actionable biometricata for healthcare providers. The 'smart' toilet, which is self-contained and operates autonomously by leveraging pressure and motion sensors, analyses the user's urine using a standard-of-care colorimetric assay that traces red–green–blue values from images of urinalysis strips, calculates the flow rate and volume of urine using computer vision as a uroflowmeter, and classifies stool according to the Bristol stool form scale using deep learning, with performance that is comparable to the performance of trained medical personnel.

[4] **The authors J Jayachithra, M Madhu, K Elavarsi** they design Indian Government has introduced the theme referred to as "Swatch bharat" (Maintaining swampland is the main thing to provide a clean environment). This paper will facilitate the Bharat government to encourage the clean India project. Amidst, the technology always remains hyperbolic, when the cleansing public restrooms are completely manual. In this proposed system, the wiper box is employed to scrub the public lavatory. The wiper box is a gift within a box. The arm is provided with disinfectant and brushes. Before getting in the public lavatory the user will establish whether the public lavatory is clean or not. The scrubbing process is done by the user with simply wiping the liquid crystal display shown. Then the dirt is cleaned mechanically. Throughout the cleansing method, the disinfectant liquid is sprayed and cleansing is completed by the wiper box. The filling of the disinfectant is performed mechanically.

[5] **The authors Arun Kumar, Adithya Bharadwaj, R Balasubramanian, P Gowtham** they design 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, and thus, serves as a win-win situation; a revolting objective is accomplished with considerable ease.

III. Summary of the Literature survey

The outcome of a literature survey on smart lavatories with automatic cleansing systems reveals several key findings. Firstly, smart lavatories equipped with automatic cleansing systems offer numerous benefits such as improved hygiene, convenience, and water efficiency. They are designed to automatically clean the toilet bowl and other surfaces, reducing the need for manual cleaning and minimizing the spread of germs. The literature survey also highlights various technologies employed in these smart lavatories. Some models utilize sensors to detect user presence and initiate the cleaning process accordingly. Others incorporate self-cleaning mechanisms that use water jets, disinfectants, or UV light to sanitize the toilet bowl and surfaces. Furthermore, the survey identifies challenges associated with smart lavatories with automatic cleansing systems. One common concern is the reliability and effectiveness of the cleansing mechanisms. Ensuring thorough cleaning and disinfection without causing damage or inconvenience to users remains a significant research focus. Additionally, cost, maintenance requirements, and energy consumption are other factors that need to be considered when implementing such systems. Overall, the literature survey demonstrates a growing interest in smart lavatories with automatic cleansing systems and highlights the potential advantages and challenges associated with their implementation.

IV. METHODOLOGY

After studying literature survey we modified these papers works and trying to build a novel technique that will give us best result like notifications to the user that something bad might happen to their mobile phones as well as give future forecasting predictions to the users so the people move to safe places or at least they prepare before some damage happens.

Below figure shows the block diagram of the proposed model, we have used a coin acceptor microcontroller, dc motor, servo motor, led and relays.

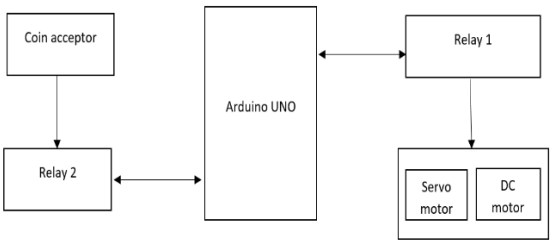


Figure 1: Block diagram

Working of the proposed model

Whenever the user wants to use the restroom, the user needs to insert a coin into the coin acceptor then the toilet seat/restroom will be flushed and the door will be opened to use the restroom. Once the door opens the coin acceptor gets deactivated it will not accept any coins. After using the restroom, the user needs to press the switch to open the door and then again the toilet will be flushed and the coin acceptor will be activated. So thereby it reduces the labor work and also maintains the cleanliness.

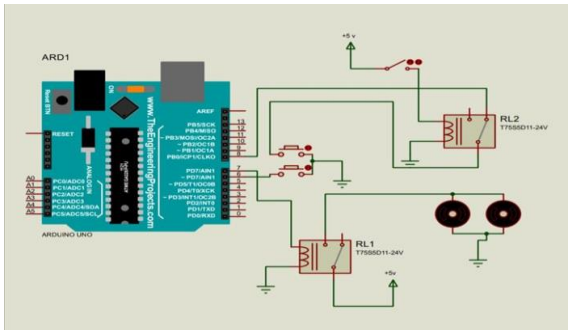
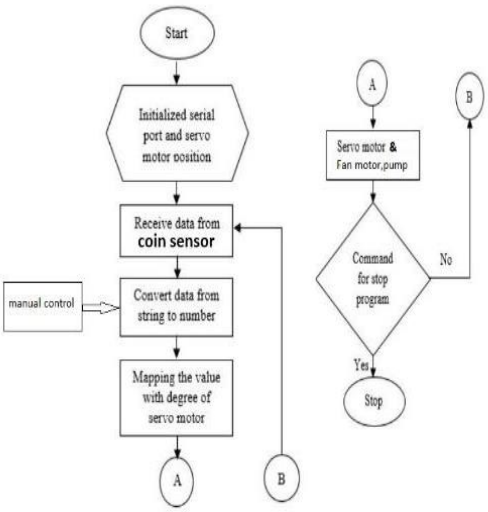


Figure 2: Circuit diagram

STEPS INVOLVED IN WORKING MODEL

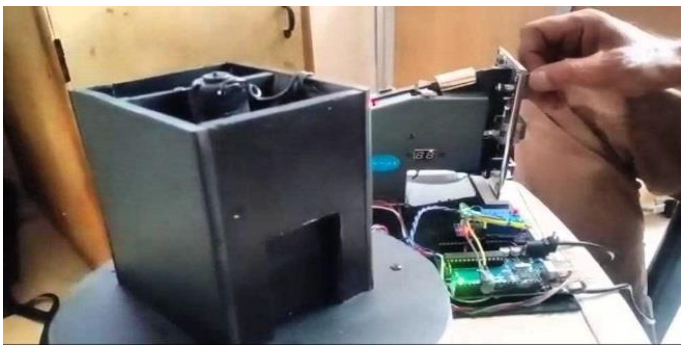
Step 1: Insert coin into the coin acceptor.
Step 2: Toilet is flushed & the door is opened.
Step 3: User enters the restroom the door gets closed.
Step 4: Coin acceptor gets deactivated & it will not accept any coins and also the led shows the red signal. (Which indicates, user is present inside restroom)
Step 5: After using press the switch presents inside the toilet/restroom.
Step 6: The door will be opened and the toilet will be flushed again.
Step 7: The coin acceptor gets activated and the led shows the green signal.

Flowchart:



V. RESULT AND DISCUSSION

A smart lavatory with an automatic cleansing system is equipped with various components requirements and technologies to provide a convenient and hygienic experience.



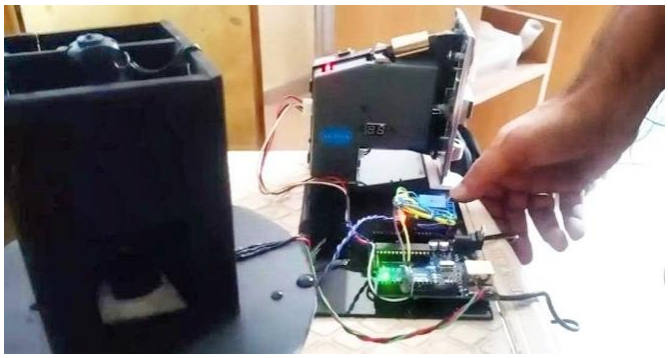


Figure 3: working model

The above figures show the working model of our project, where in the figure we are inserting a coin to a coin acceptor. After that the door opens and toilet flushed automatically.
After using the restroom, the user press the switch present inside the restroom and the door gets opened and toilet is flushed again as shown in the figure.

Acknowledgements

We express our gratitude to our respected guide Prof. Narayanaswamy G for his valuable guidance and feedback.

VI. CONCLUSION

Thus, the smart public lavatory has reduced the time of cleaning the toilet by using little amounts of water and also getting rid of infectious bacteria and viruses that cause diseases. The cleanliness achieved by an automatic cleaning system is good when compared to manual cleaning and also the human source is completely removed from the cleaning process. Overall, the smart lavatory with an automatic cleansing system provides numerous advantages, including improved hygiene, time-saving convenience, enhanced user experience, water conservation, and data-driven insights. This innovative technology represents a significant step towards modernizing and improving the functionality of bathroom facilities.

This work is further extended to include:

- Cloud: Where all the data that are used to monitor the cleanliness is updated in the cloud and the automatic rating is done.
- App development: An application can be developed where the long travelers can locate smart toilets in Google maps and also view the rating of the toilet.

REFERENCES

[1] Arun Kumar C, Adithya Bharadwaj A, Balasubramanian R and Gowtham P. 'Autonomous Lavatory Cleaning System', International Journal of Robotics and Automation (IJRA), vol6, issue.4, pp.65-71, 2015.

[2] D. Kokvin, G.Sziebig and 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.

[3] S. S. Bhatkande1, R. G. Hubballi2, “Weather Prediction Based on Decision Tree AlgorithmUsing Data Mining Techniques.” Belgaum India: International Journal of Advanced Research in Computer and Communication Engineering, vol. 5, no.5, pp. 483-48, 2016.

[4] E A Deulin, S S Mashurov and A A Gatsenko. "Sensor for the working surface cleanliness definition in vacuum", 23rd International Conference on Vacuum Technique and Technology, Journal of Physics: Conference Series, July 2016.

[5] Autonomous lavatory cleaning system Arun Kumar, Adithya Bharadwaj, R Balasubramanian, P Gowtham International Journal of Robotics and Automation (IJRA) 6 (4), 65, 2015.

[6] The Case for Self-Cleaning Technologies and Methodologies in Public Toilets Joshua Crawford, Neel Edupuganti, Mercy Espinoza Mendoza, Kristina Gandara, Prerana.