



E – Toilet

Parth Narkhede¹, Abhishek Adhalkar², Lokesh Bapte³, Aditya Valvi⁴, Prof. Nilesh Madke⁵

Dept. of Computer Engineering, Sandip Institute of Engineering and Management, Nashik¹⁻⁵

Abstract: Our project, based on Arduino technology, aims to enhance cleanliness in India by providing smart toilets under the "Swachh Bharat Abhiyan" initiative. Unlike existing systems that focus on identifying dirt, our proposed system ensures ongoing cleanliness by monitoring sweeper activities. Using sensors like MQ-135, MQ-8, RFID, MQ-4, Arduino, and DHT-11, the E-Toilet system detects and cleans unhygienic conditions. It includes a hardware kit with location, ID, and cleaning staff details, maintaining cleanliness records in a database. Notifications are sent to municipal authorities via a web page, and an RFID reader ensures accountability by linking cleaning activities to unique IDs.

Keywords: MQ-135 Sensor, MQ-135 Sensor, Rfid Reader, Rfid Tag, MQ-4, Arduino, DHT-11 Temperature Humidity Sensor, MNC

I. 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. This happens because of improper use of given facilities, negligence by maintaining staff, unavailability of resources, etc. Also, the maintenance staff has to be there for maintaining the toilets whole day. This is a pity job to stay in the toilets for whole day even when not paid adequately nor provided safety equipment. Moving towards our glorious goal of vision 2020 as a developed and prosperous nation, cleanliness is one of the biggest need. 'Swachh Bharat Abhiyan' being our motto the invention 'E- Toilet' is the great leap towards the cleanliness of our public toilet. Unclean toilets cause contagious diseases which are hazardous for human life. It is a remedy for human health as well as our goal towards 'clean and smart India'.

The purpose of this system is to maintain hygienic level of Public toilets through automation with the help of arduino. At present, cleanliness system of Public toilet is worst and leads to health issues. To overcome all these problems, we came with a project names "E- Toilet". Hence we introduce the concept called "E-Toilet". It is introduce to use and maintain the toilets in the clean and hygienic way. The project is based on arduino concepts using different sensors like MQ-135 Sensor, MQ-8 Sensor, RFID Reader, RFID Tag, MQ-4, Arduino, DHT-11 Temperature and Humidity Sensor, Database. Using these materials we are trying to provide the clean toilets and create the awareness among the people. The model comprises of sensors controlled by Arduino controller. Arduino board collect the data from sensors and then it transfer through web application to municipal corporation.

The toilets conditions are continuously monitored by sensors. If bad odour detected, a notification will be sent to the municipal corporation. The main objective of this project is to provide a hygienic toilet and also to eliminate the duty of a worker to continuously present in the washrooms.

Arduino is getting very popular due to its vast application possibilities. A general idea behind Arduino is a network of various devices being connected together to perform a certain task. We will be designing an arduino based system for monitoring the hygiene of public toilets by various using various sensors. These sensors will be connected to a microcontroller which will send the data to the backend, where it will be stored and processed. This data can be fetched and monitored by using a website.

The objective of this system is to keep track of all cleaning activities so that the toilets are kept clean and hygienic at all times. The technical working of the system starts with parameters used to identify the hygiene of the toilet. Various sensors are available, like MQ135 Sensor, MQ-8 Sensor, RFID Reader, RFID Tag, MQ-4, Arduino, DHT-11 Temperature and Humidity Sensor, etc. can be used. Depending upon the complexity of the system, microcontrollers can be used. According to the tiers, the proposed system fall still tier 4 as our system will be able to store data that comes over a network.

This technology 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.



II. LITERATURE SURVEY

In recent times, many health monitoring systems have been developed to monitor the health condition of patients. We are reviewing some recent works developed in this field. Smart and automatic technologies developed Sarode in the paper designed and fabricated an automatic flush system for sanitation using microcontroller and IR sensor technology.

The system is designed to use pH sensor for identifying the change in the purity of water and activates the controllable flushing system. [1]. Designed and implemented an auto flushing device with ultralow standby power consumption. The system uses sensor, low-power chips and state control mechanism to save power when no user is using the toilet. The system consumes 10mW which is very low power while the other systems consume 0.5 to 1W of power when no user is present for 24 hours a day. [2]. In the paper proposed and developed a smart toilet using IoT. The authors proposed a microcontroller based system to keep the toilets clean by detecting dirt and to observe the sweeper's working activities using IoT and image [3]. Processing designed and implemented a smart toilet using IoT embedded sensor devices to detect dirt in the toilet, gas detection and the presence of sweeper.

The system also detects the depth of the septic tank and sends a message to a particular organization. [4] In the paper, Smart toilets using BLE beacon technology developed an application of smart toilets using Bluetooth low energy beacons and readers technology for the management of public toilets by government. The system counts the number of users using the toilet and the data is stored in cloud database for performing monthly analysis. [5] In the paper, investigated in one of the public toilets on how much clean water to be used for cleaning the toilet bowl. After investigation, the results were shown that duration of 3.8 seconds was sufficient for flushing water in the toilets. Smart toilet mechanism is very important especially in rural areas. [6] System proposed a technique for smart toilets using turbidity sensor to sense the bacteria in the toilet and identifying dirt in toilets and monitoring the sweeper's working activities.

If the bacteria is sensed or dirt is identified then the alert message is sent to the sweeper. [7] A system of smart sensible washrooms to optimize the manpower and real-time tracking of toilet condition in terms of odour level and user count, and turning on/off lights using different sensors like ammonia sensor, PIR sensor, buzzer, LCD display. [8] In the paper designed and fabricated the semi-automated pressurized flushing system in the toilets in Indian Railways. The system is designed and fabricated in such a way that the water is flushed only when the passenger opens and closes the door, which reduces the wastage of water and keeps the toilet clean. [9] In the paper Smart toilet proposed a toilet system to maintain hygienic level of Railway toilets through automation with the help of IoT. The proposed system automatically cleans the squat pan toilet with the help of robotic arm, by using sequential cleaning algorithm. [10]

III. MOTIVATION

Moving towards our glorious goal of vision 2020 as a developed and prosperous nation, cleanliness is one of the biggest needs. 'Swachh Bharat Abhiyan' being our motto the invention 'E-Toilet' is the great leap towards the cleanliness of our public toilet. Unclean toilets cause contagious diseases which are hazardous for human life. It is a remedy for human health as well as our goal towards 'clean and smart India'.

The purpose of this system is to maintain hygienic level of Public toilets through automation with the help of Arduino. At present, cleanliness system of Public toilet is worst and leads to health issues. The goal of the system is to monitor and evaluate Toilet Condition In Real-Time, enabling city governments to improve the toilet cleaning and upkeep through.

IV. OBJECTIVE

Provide solution with least hardware requirement. To develop an application that is cost efficient. To transmit these information to the concerned Doctor. To ensure data readability of the sensors where MNC can easily identify the status of the Public Toilet. The system is to monitor and evaluate Toilet Condition In Real-Time, enabling city governments to improve the toilet cleaning.

This project is aimed to contribute to the Central Government Scheme of "Swachh Bharat Abhiyan" where each and every citizen of the nation is entitled to have a cleaner and hygienic future. RFID tags can be used to monitor the cleaning done by staff of daily basis. MQ-135 and help to sensor installer for selection of best sensor based on best sensitivity. To create better and healthy stink-free male urinals and toilets for future life.

V. SYSTEM ARCHITECTURE

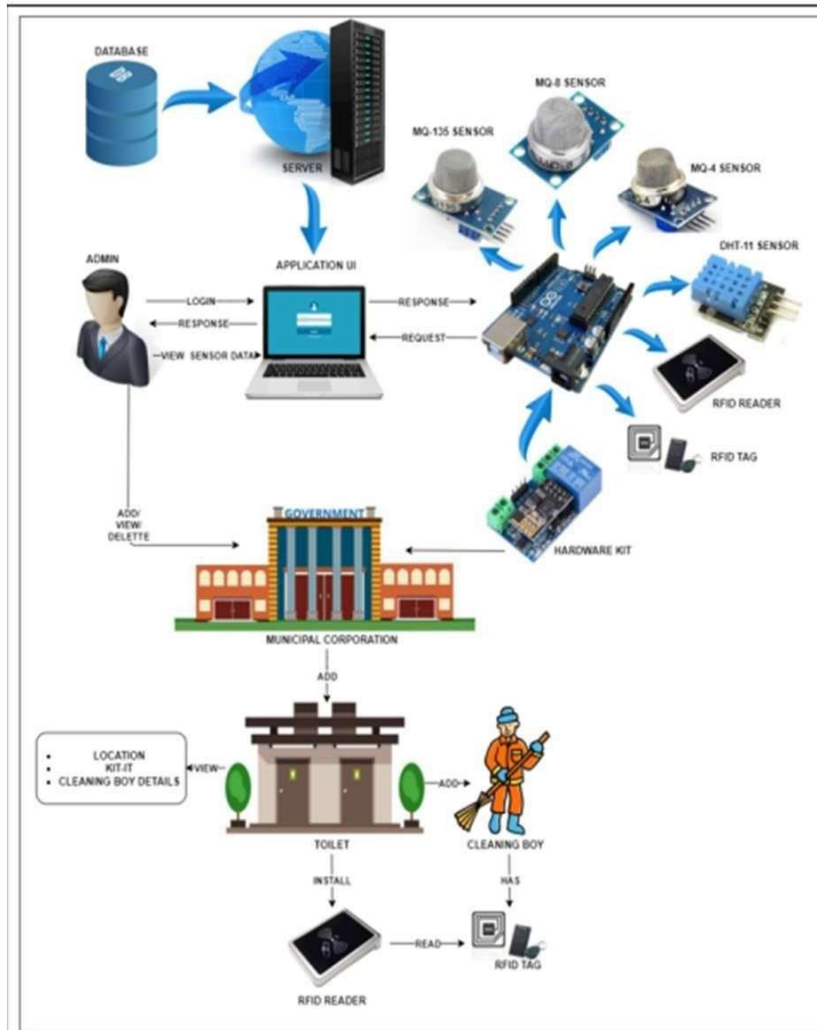


Figure 1: System Architecture

In an existing system, they concentrate more on organizing se-wages from the railway system. They are trying to taking all the medical tests through the usage of toilets. They are concentrated on reducing water wastage on toilets, by the implementation of automatic flusher. They are not focused on providing clean and hygienic toilets. The medical test can have chance to produce fault results. Some automatic flushing systems do exist in the market, but they are too expensive due to their complex construction. They generally use some optical or electrical sensors to detect the presence of a person using the toilet and accordingly they operate. They are found to be used in airports, shopping malls, multiplex etc. But their use in the public toilets is not possible due to the excessive cost and frequent maintenance.

VI. METHODOLOGY AND SCOPE

Moving towards our glorious goal of vision2020 as a developed and prosperous nation, cleanliness is one of the biggest need. 'Swachh Bharat Abhiyan' being our motto the invention 'E- Toilet' is the great leap towards the cleanliness of our public toilet. Unclean toilets cause contagious diseases which are hazardous for human life. It is a remedy for human health as well as our goal towards 'clean and smart India'. The purpose of this system is to maintain hygienic level of Public toilets through automation with the help of arduino. At present, cleanliness system of Public toilet is worst and leads to health issues. The Goal of the system is to monitor and evaluates Toilet Condition In Real- Time, enabling city governments to improve the toilet cleaning and upkeep through. The purpose of this system is to maintain hygiene level of toilets through cleaning the bowl in a semiautomatic way. At present, cleaning system of toilets is worst and leads to health issues.



Need-The proposed Arduino-based E-Toilet system, mainly deals with solving the problem of the unhygienic condition of public toilets. The automation of systems for everyone is turning very frequently in the present. Yet, common people are facing many issues in their daily routine. Sanitation is one of the largest problems faced by people in our country. Even though 6 percent of the urban people are relying on public toilets for their daily use, they are still not hygienic. This has become one of the most basic issues faced by people everywhere.

The mathematical concepts used in our system are System Description: $S = [I, O, F, DD, NDD, Failure, Success]$ Where, S =System I = Input O =Output F =Failure S =Success I is Input of system Input I = set of Inputs I = IMAGES F is Function of system F = set of Function Where, $F1$ = Input Dataset $F2$ = Conversion $F3$ =Pre- processing $F4$ =Cleaning $F5$ = Train test split $F6$ = Analysis $F7$ = Classifier $F8$ =sensor O is Output of system Output $O1$ = Results

VII. CONCLUSION

This system will be able to overcome the big problem of poorly maintained public toilets. Since most of them are cleaned by workers, their activities are not being detected, resulting in toilets being unclean most of the time. This system will be able to track their activities effectively and provide a great way for higher authorities to maintain them in real-time. This will result in increased efficiency of the labour and a decrease in extra cost and efforts. The common people will be able to use the regularly clean toilet than before, which will eventually increase the toilet usage. Thus by using technologies in the smarter way, we can maintain the cleanliness which is next to the godliness. Keep Clean, Be Safe. In future Smart Toilet provides hygienic, clean and smart management of public toilet. But the hard fact of today's society is that the condition of the public toilets have not changed from years. Although many of us are aware of using toilets that save water. This results in conservation of water by every individual. Various syndromes can be detected with the help of smart toilet by analyzing users waste. This will be done by sensors. The harmful content in the waste can be analyzed and a report will be generated that gives information like toxicity, blood-sugar level. Smart Toilet could provide a much better treatment options.

REFERENCES

- [1]. Anna Cinzia Squicciarini, Dan Lin, Smitha Sundareswaran "Privacy Policy Inference of User-Uploaded Images on Content Sharing Sites", in IEEE TRANSACTIONS ON KNOWLEDGE AND DATA ENGINEERING, VOL. 27, NO. 1, 2020, pp. 193-206.
- [2]. J. Zhuang and S. C. H. Hoi, "Non-parametric kernel ranking approach for social image retrieval," in Proc. ACM Int. Conf. Image Video Retrieval, 2018, pp. 26-33. [Online]. Available: <http://doi.acm.org/10.1145/1816041.1816047>
- [3]. S. Zerr, S. Siersdorfer, J. Hare, and E. Demidova, "Privacy-aware image classification and search," in Proc. 35th Int. ACM SIGIR Conf. Res. Develop. Inform. Retrieval, 2017, pp. 35-44.
- [4]. C.-H. Yeh, Y.-C. Ho, B. A. Barsky, and M. Ouhyoung, "Personalized photograph ranking and selection system," in Proc. Int. Conf. Multimedia, 2019, pp. 211-220. Available: <http://doi.acm.org/10.1145/1873951.1873963>
- [5]. K. Strater and H. Lipford, "Strategies and struggles with privacy in an online social networking community," in Proc. Brit. Comput. Soc. Conf. Human-Comput. Interact., 2018, pp. 111-119
- [6]. A. Acquisti and R. Gross, "Imagined communities: Awareness, information sharing, and privacy on the facebook," in Proc. 6th Int. Conf. Privacy Enhancing Technol. Workshop, 2017, pp. 36-58.
- [7]. R. Agrawal and R. Srikant, "Fast algorithms for mining association rules in large databases," in Proc. 20th Int. Conf. Very Large Data Bases, 2020, pp. 487-499.
- [8]. S. Ahern, D. Eckles, N. S. Good, S. King, M. Naaman, and R. Nair, "Over-exposed?: Privacy patterns and considerations in online and mobile photo sharing," in Proc. Conf. Human Factors Comput. Syst., 2017, pp. 357-366.
- [9]. S. Ahern, D. Eckles, N. S. Good, S. King, M. Naaman, and R. Nair, "Over-exposed?: Privacy patterns and considerations in online and mobile photo sharing," in Proc. Conf. Human Factors Comput. Syst., 2016, pp. 357-366.
- [10]. M. Ames and M. Naaman, "Why we tag: Motivations for annotation in mobile and online media," in Proc. Conf. Human Factors Comput. Syst., 2019, pp. 971-980.
- [11]. A. Besmer and H. Lipford, "Tagged photos: Concerns, perceptions, and protections," in Proc. 27th Int. Conf. Extended Abstracts Human Factors Comput. Syst., 2019, pp. 4585-4590.
- [12]. S. B. Barnes. A privacy paradox: Social networking in the united states. First Monday, 11(9), Sept. 2020.
- [13]. J. Bonneau, J. Anderson, and G. Danezis, "Prying data out of a social network," in Proc. Int. Conf. Adv. Soc. Netw. Anal. Mining., 2018, pp. 249-254.



- [14]. H.-M. Chen, M.-H. Chang, P.-C. Chang, M.-C. Tien, W. H. Hsu, and J.-L. Wu, "Sheepdog: Group and tag recommendation for flickr photos by automatic search based learning," in Proc. 16th ACM Int. Conf. Multimedia, 2017, pp. 737–740.
- [15]. M. D. Choudhury, H. Sundaram, Y.-R. Lin, A. John, and D. D. Seligmann, "Connecting content to community in socialmedia via image content, user tags and user communication," in Proc. IEEE Int. Conf. Multimedia Expo, 2016, pp.1238–1241.
- [16]. V. Schleswig-Holstein. In A study of the consumer organization in Schleswig-Holstein, Germany, March 2019.
- [17]. R. da Silva Torres and A. Falcão, "Content-based image retrieval: Theory and applications," Revista de Informatica Teorica e Aplicada, vol. 2, no. 13, pp. 161–185, 2018.
- [18]. J. Deng, A. C. Berg, K. Li, and L. Fei-Fei, "What does classifying more than 10,000 image categories tell us?" in Proc. 11th Eur. Conf. Comput. Vis.: Part V, 2017, pp. 71–84. [Online]. Available: <http://portal.acm.org/citation.cfm?id=1888150.1888157>
- [19]. A. Kapadia, F. Adu-Oppong, C. K. Gardiner, and P. P. Tsang, "Social circles: Tackling privacy in social networks," in Proc. Symp. Usable Privacy Security, 2016