

Smell Detection Using - IoT

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Abstract: *In our proposed system, we have determined on keeping clean toilets, observing the sweeper's working activities. It can dodge many syndromes. It may create the consciousness amongst people about the toilet management. Therefore, our development is to use safe and hygienic toilets. This paper 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 & Humidity Sensor. By using these sensors, we can create the smart toilets. Proposed system cleans the public toilet with the help of arduino technology. The Arduino-based E-Toilet system, mainly deals with solving the problem of the unhygienic condition of public toilets. The hardware kit has attached in the toilet with location, Kit-Id and Cleaning Boy details. To maintain the periodicity of cleanliness level different kind of sensors are used. A database is maintained which gives all the notifications to authorities of cleaning department of municipal corporation on a web page. MNC views cleaning logs and Uncleaned toilets. System also provide RFID reader. When the sensor value crossed threshold values then smell sensor detect unclean toilet If toilet is unclean then cleaning boy read there RFID tag .Hardware kit has RFID tag that contains a unique ID scanned by the cleaning boy. Kit data save on server. When the RFID Tag is detected by the Cleaning boy, the system will get all sensors value. Cleaning boy Clean Toilet and After Toilet cleaning read RFID Tag to get all sensor values to view toilet conditions.*

Keywords: RFID

I. INTRODUCTION

In today's world, the technologies are being drastically developed, yet the cleanliness in our nation is under major risk. In our country, our Indian Government has introduced the Swachh Bharat (Clean India) Mission, a massive campaign to clean up the country's cities, towns and rural areas. One of the objectives of Clean India Mission is to keep the toilets contamination free. 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 & 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 MQ-135 Sensor, MQ-8 Sensor, RFID Reader, RFID Tag, MQ-4, Arduino, DHT-11 Temperature & Humidity Sensor, etc. can be used. Depending upon the complexity of the system, microcontrollers can be used. According to the tiers, the proposed system falls till 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. In this system sensor is used to discover the dirt present in the toilet. If the dirt present, it increases the notification. Then the cleaning boy wants to be clean the waste. Through this activity, MNC can get the awareness about the toilet management. The unwanted gases present in the toilet. The sensor, a particular range is to be Stable earlier manner. If the range gets extended, it can send the alert message to the sweeper. Then they cleaned it by using proper fragrant. RFID reader (Radio Frequency Identification) is used to observe the sweeper's activities (absence and presence in the toilet cleaning). Initially, the sweeper wants to show his/he individuality tag in front of RFID reader. It can be shown before and after cleaning the toilet. Then the first phase gets initiated and senses for the dirt presence in the toilet. If the dirt gets noticed, it raises the alarm. Through this monitoring activity, the sweeper can realize their roles and responsibilities.

II. LITERATURE REVIEW

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]

Tsai et al. 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]

Elavarasi et al. 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. Elakiya et al. 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 by N. Mishra et al. 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]

Boonyakan et al. 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]

Mithya et al. 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 send to the sweeper. [7]

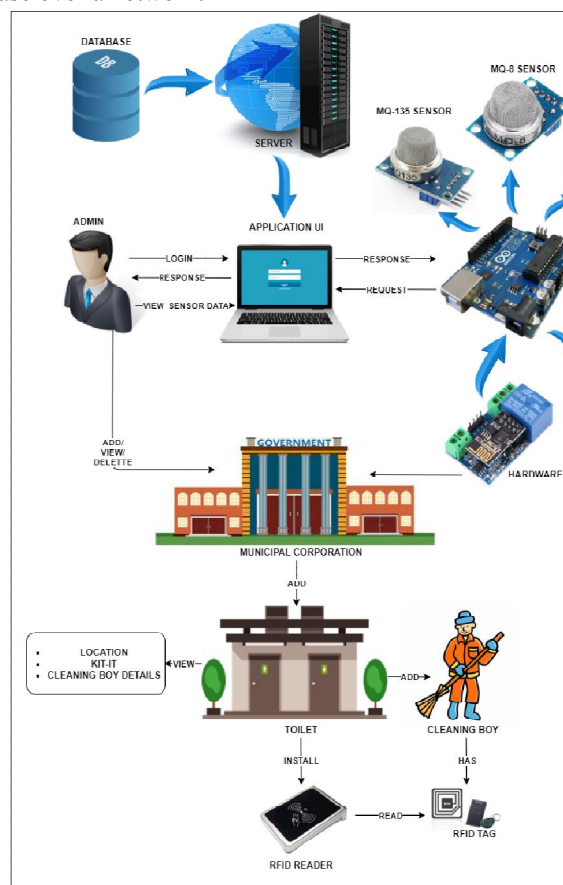
Sonekar et al. proposed a system of smart sensible washrooms to optimize the manpower and real-time tracking of toilet condition in term of odour level and user count, and turning on/off lights using different sensors like ammonia sensor, PIR sensor, buzzer, LCD display. [8]

Ashiq et al. 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]

Katariya et al. 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. PROPOSED SYSTEM ARCHITECTURE

Our proposed system is a smart monitoring system designed to monitor the hygiene of public toilets. Unhygienic toilets can be detected by different parameters such as various gases evolved, humidity, temperature etc. We will be using the gases present in this toilet as our primary parameter. Ammonia gas is the most dominant gas that can be sensed in an unhygienic toilet. Also, we will be keeping track of the number of persons using the toilet and also the track records of the workers who clean the toilet. All these sensors will be connected to the Arduino, which will handle these sensors and will transmit the sensor data to the system. We will be using the MQ-135 gas sensor to determine the amount of ammonia present in the room. A threshold value will be set, and if the value of ammonia present exceeds that value, then the toilet will be marked for cleaning. The notification will be the indication for the cleaning boy. MNC views cleaning logs and Uncleaned toilets. System also provide RFID reader. The RFID Reader will be installed at the entrance, and the value will change if a person enters or leaves the toilet. When the sensor value crossed threshold values then smell sensor detect unclean toilet. If toilet is unclean then cleaning boy read there RFID tag. Hardware kit has RFID tag that contains a unique ID scanned by the cleaning boy. Kit data save on server. When the RFID Tag is detected by the Cleaning boy, the system will get all sensors value. Cleaning boy Clean Toilet and After Toilet cleaning read RFID Tag to get all sensor values to view toilet conditions. Once the system receives the sensor data, it will broadcast it to the database over a network.



A user-friendly GUI or website will be provided for higher authorities for managing the system. The programming of system is done in the Arduino software and downloaded in the Arduino-UNO. The odor in the train toilet is detected by the odor sensors namely MQ4 for methane and MQ135 for ammonia. When the odor reaches its set level then the smell sensor is used to detect any unwanted gases present in the toilet. If any foul smell goes into the sensor, it creates a signal. All the signals are passed through the microcontroller where the constraints of foul smell are checked. All of the data is stored inside database, which stores all the information about the results. It is an application development software. The data is accessed through a web application where the municipal corporation receives the output message which informs that the toilet must be cleaned. The MNC must install this application to access the alerts and view the data which has been received. Then a sweeper is sent to clean the toilet. GUI will be provided to the MNC where they can get notifications and messages directly from the office.

IV. CONCLUSION

We found some advantages over existing system, with the help of sensors and Arduino controller we have implemented an automatic toilet monitoring system.

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 labor 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.

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