

TOILET MANAGEMENT SYSTEM USING IOT

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Abstract - In the cutting edge world, the advances are definitely grown, yet at the same time the cleanliness in our nation is under risk. The abstract of this paper is to deliver clean and hygiene toilets. All the public toilets should be clean and hygiene. In our country, our government has introduced the scheme called “Swachh Bharat” (Clean India). Keeping the toilets uncontaminated is the one of the objective of Clean India scheme. This paper can be helpful to encourage the clean India project. In future, it can show the major part in clean India scheme. In an Existing system, they are focused only on identifying the dirt in the toilets. 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 IOT and image-processing concepts using different sensors like smell sensor, IR sensor, sonic sensor, RFID reader. By using these sensors, we can create the smart toilets.

Key Words: Smell sensor, IR sensor, sonic sensor, RFID reader, IOT

1. INTRODUCTION

India ranks low on sanitation index [1], one of the reason is the lack of awareness about how to use toilets in a healthy and hygienic way and other is the number of availability of toilets and their improper management [10]. In order to overcome these issues we have come up with the idea of Smart Toilet which is based on IoT [9]. This will create awareness in people on how to smartly use the toilets which will thereby improve the hygiene condition. Management of public toilets smartly will encourage the people to make use of available number of public toilets efficiently. Smart Toilet is an IoT based concept. Different sensors such as IR sensor, smell sensor, sonic sensor, RFID sensor are used.

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 introduced 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.

2. SCOPE OF THE PROJECT

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 saves 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

3. LITERATURE REVIEW

Kitisak Osathanunkul, Kittikorn Hantrakul, Part Pramokcho (2017) has proposed "Configurable Automatic Smart Urinal Flusher based on MQTT Protocol", This paper examines one probable way to cut the wastage of clean water used in a public toilet.

[1]. The system uses MQTT as an underlying communication protocol. The protocol is used in gathering, governing, powerful and correcting the system. The results in the testing environment show that using a flushing duration for 2.5 seconds is enough to satisfy most users while wasting clean water as less as possible. There are two part are involved here. They are,

1. Automatic Flusher Part (AFP)
2. Server part

The AFP detects if there is an object in front of its infrared sensor. When a user stands in front of the urinal, an infrared sensor can detect the user. If the user keeps staying in front of the sensor for 3 seconds continuously, it is considered that a user is currently using a urinal. After the urinal has been flushed AFP

International Journal of Pure and Applied Mathematics unit also sends a MQTT message about its usage data to the server part. In server part, it receives the usage data from AFP unit. The usage data will be stored into a database for a future use. A. D. Kadge, A.

K. Varute, P. G. Patil, P. R. Belukhi (2016) has proposed "Automatic Sewage Disposal System for Train", Indian railways have 114,500 km of total track over a route of 65,000 km and 7,500 stations. While travelling by the train everyone expects healthy and hygienic surroundings. Feel uncomfortable due to the waste on the platform and the allied foul smell. [2] Creates bad impression on foreign tourists. Sanitation problem caused due to system in which train toilets dispose human waste openly on to tracks. In this system, they are using two mechanisms. They are sewage disposal mechanisms and track changing mechanisms. In the sewage disposal mechanisms, the ultrasonic sensor and position sensor is used. The ultrasonic sensor can detect the depth of the sewage tank and the position sensor detects the proper place to dispose the sewage. After the proper detection of particular place, the solenoid valve on. Then the sewage disposal is done. Pandya Chintan, Yadav Jatin, Kareliya Sanket 2015 has proposed "Automatic working bio-toilet tank for railway coaches", Bio toilet tank is human waste disposal mechanism in area with no infrastructure facilities. That is easy to operate alternative to the

tradition waste disposal system. In that project are two doors in tank, the one input door and second exit door. [3] The input door is on top of the tank and exit door is assembling inside the tank. The doors are open

and close by using pneumatic cylinder. RPM controller is used to measure the speed of the train and transfer those details to proximity sensor, which can send control over the train. Pneumatic cylinder is controlled by using RPM controller, Proximity sensor, and Compressed air tank. So, whole system is controlled with train speed. If the train speed exceeds 30 km/h then exit door will open and total waste depositor drops in tracks and input door is close. Input door is open when train is under 30 km/h speed. In an

Morsia, Mohamed Mansour, Mohamed Mostafa 2013 has proposed "Wireless Gas Detector System Using Microcontrollers, PLC and SCADA System for Monitoring Environmental Pollution", Gas identification represents a big challenge for improving detection and pattern recognition of each gas by using inexpensive gas sensor. This paper presents a gas detector system which is built to monitor, and measure gas pollutant emissions in the air and also used to detect different gases. The pollutants are ethane (C₂H₆) and methane (CH₄) which are located beside the fertilizer factories in Alexandria Egypt and some other gases as hydrogen (H₂), propane (C₃H₈) and isobutane (C₄H₁₀). The gas sensors [4]. The system is controlled and monitored by using programmable logic controller PLC Step 7-200 from Siemens and Supervisory Control and Data Acquisition SCADA systems respectively. The principal component analysis PCA method is applied for clustering and distinguishing among different gases. Thomas Schlebusch, Steffen Leonhardt 2011 has proposed "Intelligent Toilet System for Health Screening", Home monitoring is a promising technology to deal with the increasing amount of chronically ill patients while ensuring quality of medical care. [5]

4. EXISTING SYSTEM

In an existing system, they concentrate more on organizing sewages from the railway system. They are trying to take all the medical tests through the usage of toilets. They are concentrated on reducing water wastage on toilets, by the implementation of automatic flusher.

5. ARCHITECTURE OF THE PROPOSED SYSTEM

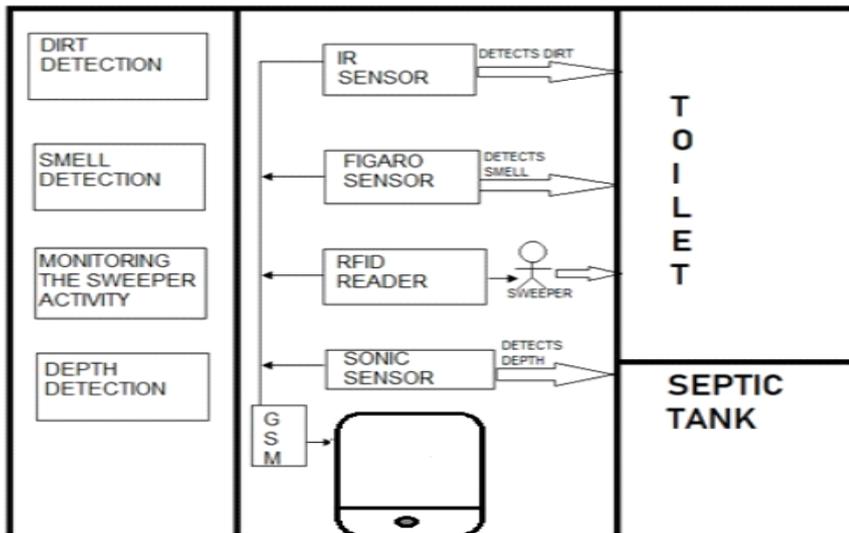


Figure 1: Architecture of the proposed system

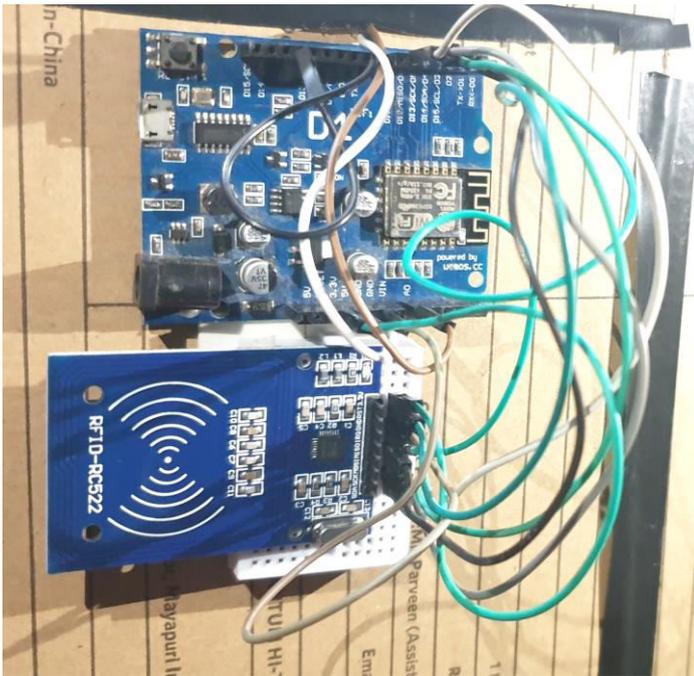
5.1 DESCRIPTION OF ARCHITECTURE

HARDWARE REQUIREMENTS:

- Microcontroller
- Power supply
- LCD display
- Buzzer
- Infrared sensor
- Sonicsensor
- Gassensor
- RFID
- GSMmodem
- SOFTWARE REQUIREMENTS
- Embedded C
-

MICROCONTROLLER:

A microcontroller is a small computer on a single combined circuit holding a processor core, memory and programmable input/output peripherals. Programmable memory in the form of Ferroelectric RAM, NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general-purpose applications.



SMELL SENSOR:

The Smell Sensor is used to detect the unwanted smell and gases in the toilet. For this purpose, we are going to use the sensor called Figaro sensor.



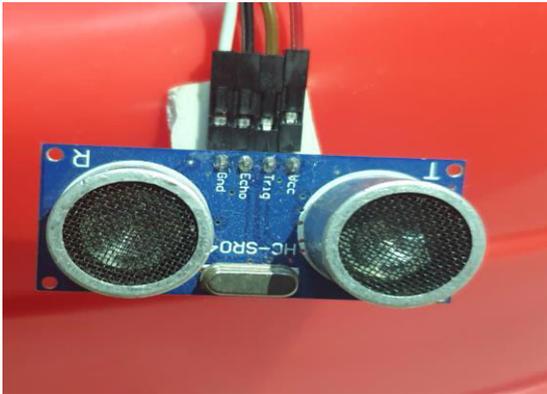
It can sense the dry gases present in the toilets such as NH_3 , CO_2 , CH_4 , H_2S , etc. By taking those gases leads to Nausea, Drowsiness, instant loss of awareness, etc. After sensing the unwanted gases, it can blink the red light. Then the sweeper can clean it by using particular Cleaning Agents.

RFID READER:

The RFID stands for Radio Frequency Identification. It can be used for monitoring the Sweeper. The Organization wishes to provide the identity tag for the Sweeper. The Sweeper desires to show the tag before the cleaning process is going to start and after it is finished.

Then the CR4 sensor can spot the presence of dirt. If it is present, it can blink the red light. If it is clean, it can blink the blue light. It assists to understand the responsibilities of sweeper by his/her own. If Sweeper is not clean the toilets for period of time, his/her absence in cleaning the toilet also reported to the dependable organization. These all the details are stored in the database.

SONIC SENSOR:



The Sonic Sensor is used for computing the depth. Here it is used to measure the depth of the septic tank. The Sonic Sensor is fixed into the Septic tank. Then the Septic tank get filled means, it can sends the communications to particular organization. Then they will allot persons to clean the septic tank. Then septic tank cleaners will clean the tank. After cleaning it, the sensor can detect the level, and send messages to consistent organization.

This ultrasonic sensor can be used for measuring distance, object sensor, motion sensors etc. High sensitive module can be used with microcontroller to integrate with motion circuits to measure the distance, position & motion sensitive products.

In a nutshell, water depth sensing is using a sensor to measure the depth of water in a tank or container. Although various sensors can be used for this application, we will talk about ultrasonic sensor

application. With ultrasonic sensors, we can find the water depth calculation by finding the distance between the transceiver and the surface of the water. The sensor will transmit a short ultrasonic pulse, and we can measure the travel time of that pulse to the liquid and back. We can then subtract that distance from the total depth of the tank to determine the water depth.

6. WORKING PRINCIPLE

In the first phase, IR sensor is used to discover the dirt present in the toilet.

- Here the set of sample images are given as input.
- After using the toilet, the sensor senses the basin of the toilet.
- Then it relates the sensed image with the input image.
- If the dirt present, it increases the alarm.
- Then the user wants to be clean the waste. Through this activity, people can get the awareness about the toilet management.
- In the second phase, Figaro sensor is used to perceive the unwanted gases present in the toilet.
- In the Figaro 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.
- In the third phase, 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/her 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. Then they protect the people by disposing all the unwanted materials (dirt, unwanted gases) present in the toilet.
- In the final phase, the sonic sensor is used to detect the depth of the septic tank.
- Here, the range of septic tank is fixed prior manner.
- If the sewage reached with the range, then it directs message to an organization.
- All the message transfer can be done by the GSM (Global System for Communication)

7. 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

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