

# Review: IoT based Smart Washroom

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**Abstract** - In 21st century, technologies are increasing day by day, and at the same time our major task is cleanliness. From this paper we spread the message of hygiene and cleanliness of our surrounding. We need to maintain the hygiene or cleanliness in public place or toilets. In cities government provides many facilities to make our surrounding clean. This paper is helpful to keep the India clean called as "Swachh Bharat". In this system, we are targeting only on, how to maintain the hygiene in washrooms, and observing to the workers activities and also stopping the public to use the dirty washrooms. This paper are alerting to public about hygiene, and to keeping the surrounding clean.

So, our main intension of this paper is safe, hygiene and disease free washrooms.

**Key Words:** Microcontroller, IR sensor, LCD, GSM module, Odor sensor, IOT.

## 1. INTRODUCTION

IOT means Internet of things. It is the interconnection between computing devices. IOT has the ability to transfer the data over network without manual interventions. It is the huge network and the simple concept connecting all computing devices to the network in the world. Simply, it transmits or receives the information with the help of media/ devices or using sensors. IOT is important architectural framework. It allows data exchange and integration between the computers a physical world over existing network infrastructure.

At present only Mobiles, Computers, Tablets and Smart TV is connected with internet. By using IOT all the devices e.g. Coffee maker, A.C, Washing Machine, Ceiling Fan, lights almost anything you think of having sensors can be connected with internet.

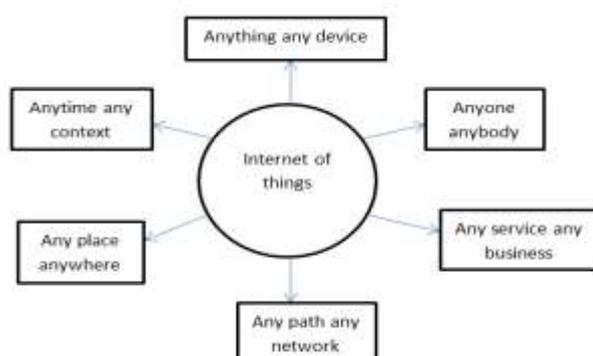


Fig -1: Internet of Things

## 1.1 Important Internet of Things Components

IOT is an independent technology. Interestingly internet of things is being enabled by the presence of other independent technologies which make fundamental components of IOT.

The fundamental components that make internet of things a reality are:

**Hardware:** Making physical objects responsive and giving them capability to retrieve data and respond to instructions

**Software:** Enabling the data collection, storage, processing, manipulating and instructing

**Communication Infrastructure:** Most important of all is the communication infrastructure which consists of protocols and technologies which enable two physical objects to exchange data

In our country, people do not have enough knowledge of how to use washroom and they really don't know how to maintain proper hygiene. 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 introduces to use and to maintain the toilets in the clean and hygienic way. The paper is based on IOT concepts using different sensors like smell sensor, dirt sensor, sonic sensor, RFID reader and database. Using these materials we are trying to provide the clean toilets and create the awareness among the people.

The main aim of this paper is to keep our surrounding clean. This paper helps to avoid infections, which occurs from common washroom. This system is helpful to create bacteria free washrooms. Toilets in public places like Universities, Schools, Offices, etc. as people use the public washroom bacteria level increases. According to the survey of doctor national medical, the infection of urinary tract is near about 8.3 million per year.

## 1.2 Overview Of Sensor Based Mechanism

### Methane and Ammonia Gas Sensor:

Methane sensor is the device widely uses to detect and monitor level of methane in environment. Methane is natural gas used as fuel to make heat and light. It prevents industrial safety danger.

Ammonia is a colorless gas, it affects on skin, eyes. The range of ammonia gas sensor is 0-50ppm, 100ppm or 0-500ppm. It works on the electrochemical principle used for measuring the partial pressure in the environment. It is the safety device and gives the information about the small leakage from pipes.

**Turbidity Sensor:**

Turbidity sensors can be used in measurement of water quality in rivers and streams, waste water and effluent measurements, sediment transport research and laboratory measurement as well as in many water bodies.

**IR sensor:**

IR sensor means Infrared sensor. It is an electronic instrument or sensor which measures the infrared light from the object. It is capable to measure the heat. It is the simple circuitry and IR sensor requires low power. This technology is implemented in night vision.

**BLE Beacon Technology:**

BLE stands for Bluetooth low energy device. It is small Bluetooth radio transmitter, powered through batteries. It is similar to a lighthouse in functionality and capable to scanning and displaying signals. BLE beacon transfer small amount of data at regular interval of time.

**2. LITERATURE SURVEY**

**W.Sherine Mary, S.Muthukumar et.al** [1], This paper reviews the various statistics which shows that poor sanitation is a cause for various life threatening diseases. Here, considered the hygiene of washrooms in public places as they are the places from where diseases can be contracted. The cleanliness of washrooms in airports, malls and other public places also decide on business, as customers will be unsatisfied if washrooms are not cleaned regularly. Taking into consideration the various positive benefits of cleaning washrooms consistently in public places, we have come out with an automated sensor based system which monitors washrooms for cleanliness by monitoring the air inside the washroom. The air inside the washroom can indicate various components of gases present inside the washroom thereby helping to identify whether the washroom is clean. If the values exceed the threshold value then an alert is sent via text to the cleaning team at the public space.

**Mithya V, Divya Prabha.N et.al** [2], In this paper there is a use of sensor i.e turbidity. It detects the particles or measures the quality of water. The main aim is environment should be free of bacteria. The purpose of this system is to maintain hygienic level with the help of various types of sensor or by using IoT devices. Sweepers are not performing their work on time for that we are going to use the RFID reader.

**Ms. Nidhi R Mishra, Mr. Paras M Suri et.al** [3], This paper introduced the design of smart toilet system. In this paper

there is a use of coin cell battery, it's having the lifetime of two years and transmission range near about 70 meters. In this system python, MYSQL software is required. Beacons are expensive as compared to RFID system. The application of this paper is that, capabilities to receive, store and analyze data by using BLE Beacon and readers technology. BLE is more power efficient.

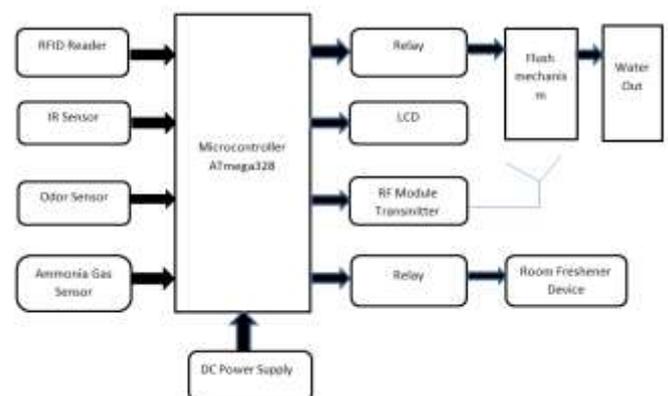
**3. OVERALL ANALYSIS OF REPORTED WORK**

All the reviewed paper previously has work on the developing smart washroom using various types of sensors like Methane and Ammonia gas Sensor, IR sensors and BLE Beacon technology. Internet of things using sensor are effective, it decreases the rate of health issue based on automatic flusher. Here, Smart Washroom uses Internet of things with the use of smart and automated sensor and every actions show on LCD display.

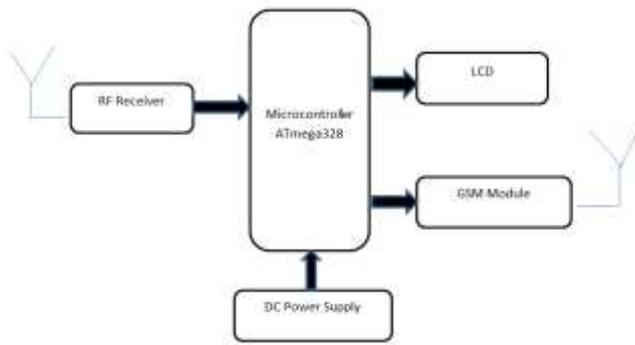
**4. PROPOSED WORK**

In this proposed system will trying to create awareness among the people about the proper hygiene or sanitation of using washrooms by using internet of things. It is a rapidly emerging technology. Our proposed system will make everyone to strictly follow the cleanliness and proper sanitation in the toilets and to produce disease free toilets. It prevents from many diseases that spread due to improper sanitation of the washroom. So, by using IOT technologies in the smarter way, we can maintain the proper cleanliness which is next to godliness. Be clean Be safe.

In below system first phase is, IR sensor which is used to detect person present in the washroom. If person present is present in the washroom it will sense. After using the toilet, the flush system will start automatically. Then there are two sensors first is Ammonia sensor and another one is odour sensor measure odour into the washroom. If odour is present more than natural odour then room freshener system will ON automatically it maintain good smell in washroom. If number of person use washroom and then odour level increase more than nature odour, then system send signal automatically to receiver hub station.



**Fig -2: Washroom System Block Diagram**



**Fig -3:** Receiver Hub Stations

Hub station is for continuously taking signal from different washroom. If cleanliness is not present in the washroom then directly message goes to sweeper. From this monitoring activity, the sweeper can realize there duties.

Second phase of this system is, no needs to do attendance manually for sweeper. If sweeper is going to clean washroom then RFID scans his or her identity card by RFID scanning system which present outside the washroom and with the help of this system automatic attendance recorded.

## 5. HARDWARE & SOFTWARE TOOLS

Following Hardware tools are required:

- Microcontroller Atmega328
- LCD Display
- RF Transmitter/Receiver
- GSM Module
- Odor Sensor
- IR Sensor
- Dc Power Supply
- Ammonia Sensor
- Relay
- Water Motor
- RFID Reader Module

Following Software tools are required:

- PCB Artist For PCB Design
- Atmel Studio 6.0 Compiler
- Proteus For Circuit Design

## 6. CONCLUSION

From this paper we are going to use the smarter technologies and will create the awareness to the public about proper hygiene by using hardware based prototype module with all the automated sensor along with new technology internet of things. It makes use of Internet of Things, which is rapidly emerging technology. Thus by using technologies in smarter way, we can maintain cleanliness which is next to godliness. Be Clean, Be Safe.

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