International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 07 Issue: 03 | Mar 2020 www.irjet.net p-ISSN: 2395-0072

SMART WASHROOM CLEANING SYSTEM USING HUB TECHNOLOGY

Mr. Chaitanya S. Telradhe, Mr. Krutik A. Dhabliya, Mr. Yogesh D. Dukare, Ms. Manashri G. Zade Ms. Pratiksha P. Wagh, Ms. Amruta P. Shende

Student, Dept. Of Electronic and Telecommunication, Datta Meghe Institute of Engineering, Technology & Research Wardha, Maharashtra, India.

---

1. Abstract: *The paper on smart washroom system is based on innovative concept using hub technology to maintain cleanliness and hygiene of the toilet. All the public toilet in government organization, banks, institute etc. Should be clean, hygiene and odour less. The prime minister of India Narendra Modi following the path of Mahatma Gandhi Swachh Bharat Abhiyan on 2nd oct 2015 to keep the surrounding clean and aware the people about the cleanliness. keeping the toilet uncontaminated is one of the priority factor and objective of this paper, under the Swachh Bharat scheme. In future this paper will be used everywhere, where requires using digital technology. In this system create awareness among the people about toilet management. This paper is based on ATMEGA-328, IR sensor, RF module, odour sensor, GSM module.*

Keywords: IR- Infrared Ray, RF- Radio Frequency, GSM-Global System Module

2. Introduction:

In our country government has introduce the scheme called ***Swachh Bharat Abhiyan****. Keeping the toilet clean is one of the objectives of this system. In India due to lack of education people do not have enough knowledge of maintain and using the toilet. The public washroom remains perceptually dirty because the user doesn't flush water after using the toilet. This results into harmful disease such as material, streptococcus, cholera, flu, hepatitis, typhoid etc. The paper uses hub technology concept using different sensor like odour sensor, Ultrasonic sensor, RFID module, GSM module. Using this we are stepping forward to keep the toilets clean and create the awareness of cleanliness among the people. The clean environment without bacteria is the aim of this project. To avoid bacterial infections in common toilets. To create a bacteria-free toilet in future. Toilets in public areas like airport, Universities, colleges, schools, Offices, etc. may look clean and odourless but the bacteria level increases as people use it. [1]*

3. Block diagram:

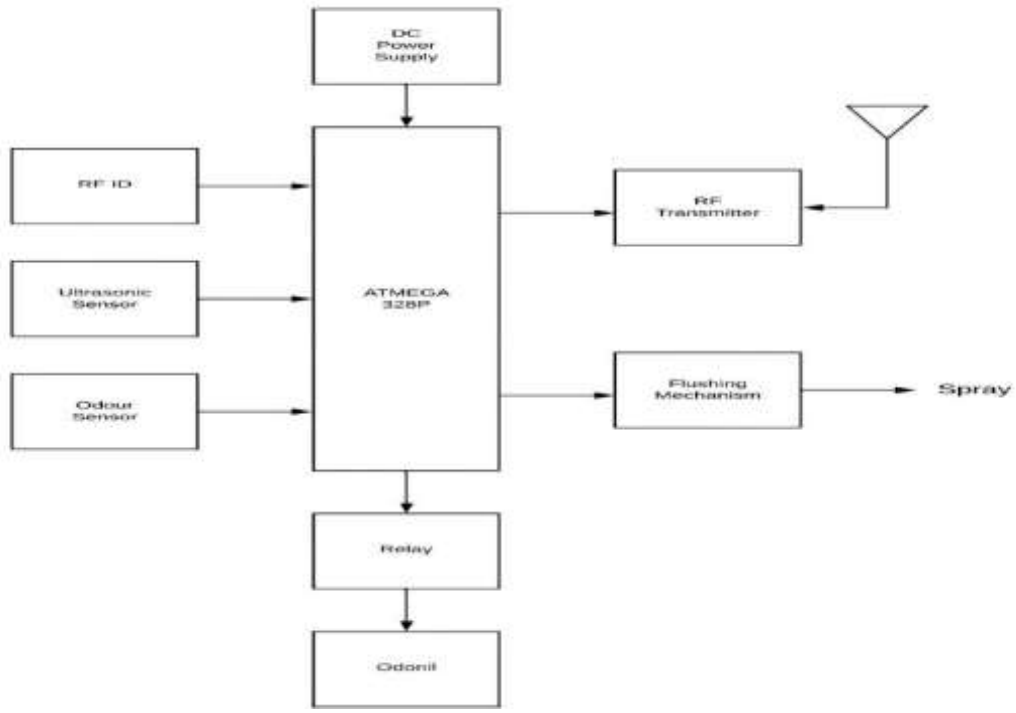

Fig. 3.1 Washroom Section

This is the block diagram consisting of main block of atmega328p. It's a single chip of microcontroller by mega avr family. It has award architecture 8-bit (RISC) processor core. A main block interfacing the microcontroller RFID transmitter, ultrasonic sensor, odor sensor. In this case the Arduino board is used with the microcontroller such as flushing mechanism, odonil kit. When an object enters into a washroom the ultrasonic sensor bat will detect the incoming & outgoing of human being & give command to microcontroller. When an object enters a particular section, the ultrasonic sensor will detect the object. The main purpose of ultrasonic sensor to detect the presence of object inside or outside the washroom. When the object is inside the toilet the flushing mechanism will remain off and the object will leave the washroom the flushing mechanism will remains on at particular time period. When the odor of washroom crosses a certain level, the odor sensor will activated & will give command to flushing mechanism through microcontroller and automatically activate odonil which will convert unpleasant smell to pleasant one. Side by side flushing mechanism will start, which will flush particular section where the object is not present that time. This will prevent the wastage of water. The main advantage of the system is that we can connect multiple toilet in multiple floor using HUB technology. This will help to maintain the data & cleanliness of washroom.

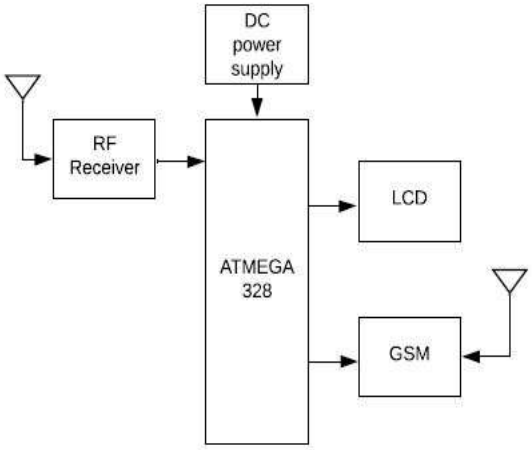

Fig. 3.2 Server Section

This is the block diagram consisting of main block of ATMEGA 328p. It's a single chip of microcontroller by mega AVR family. It has award architecture 8-bit RISC processor core. The RF transmitter sends message to server i.e. HUB & will be received by the RF receiver. Now, message will be sent to authority through GSM. There is a choice of authority to send message for cleaning manually process, but the flushing mechanism has partly cleaned the washroom. The microcontroller is present to handle the multiple activities & instructions. The LCD is used by control section where server is present to display information.

4. Hardware Module

Smart washroom cleaning system using hub technology has following blocks:

1. *Embedded AT328p*
2. *Power Supply*
3. *Odour Sensor*
4. *Relay*
5. *RF Module (Tx/Rx)*
6. *LCD*
7. *GSM Module*

4.1. Embedded AT328p:

It is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash Programmable and Erasable Read Only Memory PEROM). The device is manufactured using Atmel's high-density non-volatile memory technology and is compatible with the MCS-52™ instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel micro-controller is a powerful microcomputer, which provides a highly flexible and cost-effective solution so many embedded control applications.

4.2. Power Supply:

For our project we require + 5 Volt and +12 Volts supply. +5 Volts is given to Micro-controller board, and LCD display.

4.3. Odour sensor:

*The **MQ-135** Gas sensors are used in air quality control equipment's and is suitable for detecting or measuring of NH3, NOx, Alcohol, Benzene, Smoke, and CO2. The MQ-135 sensor module comes with a Digital Pin which makes this sensor to operate even without a microcontroller and that comes in handy when you are only trying to detect one particular gas. If you need to measure the gases in PPM the analog pin need to be used. The analog pin is TTL driven and works on 5V and so can be used with most common micro-controllers.*

4.4. Relay:

Relay are electromechanical devices that use an electromagnet to operate a pair of movable contacts from an open position to a closed position. The advantage of relays is that it takes a relatively small amount of power to operate the relay coil, but the relay itself can be used to control motors, heaters, lamps or AC circuits which themselves can draw a lot more electrical power. The electro-mechanical relay is an output device (actuator) which comes in a whole host of shapes, sizes and designs, and has many uses and applications in electronic circuits. But while electrical relays can be used to allow low power electronic or computer type circuits to switch relatively high currents or voltages both "ON" and "OFF", some form of relay switch circuit is required to control it.

4.5. RF Module (Tx/Rx):

An RF module (short for radio-frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through radio-frequency (RF) communication. For many applications the medium of choice is RF since it does not require line of sight. RF communications incorporate a transmitter and a receiver. They are of various types and ranges. Some can transmit up to 500 feet. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry. Good electronic radio design is notoriously complex because of the sensitivity of radio circuits and the accuracy of components and layouts required to achieve operation on a specific frequency.

4.6. LCD:

A liquid-crystal display (LCD): A liquid-crystal display (LCD) is a flat-panel display or other electronically modulated optical device that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly, instead using a backlight or reflector to produce images in colour or monochrome. LCDs are available to display arbitrary images (as in a general-purpose computer display) or fixed images with low information content, which can be displayed or hidden, such as present words, digits, and seven-segment displays, as in a digital clock. They use the same basic technology, except that arbitrary images are made up of a large number of small pixels, while other displays have larger elements. LCDs can either be normally on (positive) or off (negative), depending on the polarizer arrangement. For example, a character positive LCD with a backlight will have black lettering on a background that is the colour of the backlight, and a character negative LCD will have a black background with the letters being of the same colour as the backlight.

4.7 GSM MODULE:

A GSM Module is basically a GSM Modem (like SIM 900) connected to a PCB with different output taken from the board– say TTL Output (for Arduino, 8051 and other microcontrollers) and RS232 Output to interface directly with the PC (personal computer). The board will also have pins or provisions to attach mic and speaker, to take out +5V or other values of power and ground connections in the system. These type of provisions vary with different modules3 of the system. Lots of varieties of GSM modem and GSM Modules are available in the market to choose from various types. For our project of connecting a gsm modem or module to Arduino and hence send and receive SMS using Arduino – it's always good to choose an Arduino compatible GSM Module – that is a GSM module with TTL Output provisions in the system.[1]

5. SOFTWARE MODULE:

Keil uVision4:

The Kiel C51 C Compiler for the 8051 microcontroller is the most popular 8051 C compiler in the world. It provides more features than any other 8051 C compiler available today. The C51 Compiler allows you to write 8051 microcontroller

applications in C that, once compiled, have the efficiency and speed of assembly language. Language extensions in the C51 Compiler give you full access to all resources of the 8051.

The C51 Compiler translates C source files into reloadable object modules which contain full symbolic information for debugging with the µVision Debugger or an in-circuit emulator. In addition to the object file, the compiler generates a listing file which may optionally include symbol table and cross reference information.

6. Project Model and Output:

7. Conclusions:

*Our proposed system aims to achieve a clean and hygienic public toilet system it contributes to the central government scheme **"Swachh Bharat Abhiyan"** where each and every citizen of the nation is entitled to have a cleaner and hygienic future. This propose system will create awareness among the people about the proper cleaning of toilet. It prevents contagious disease that spread due to improper maintenance of toilet thus by using technology in smart way we can maintain cleanliness which is next to good lines. Be clean, Be safe.*

8. References:

1) *V Mithila, Diva Pradhan, Mahometh, Smart toilet using Turbidity sensor, ISSN, Vol. 2, Issue 5 march 2019.*
2) *Xavier Gibert, Vishal M Patel, and Rama Chellappa, in their IEEE paper titled as "Deep Multi-Task Learning for Railway Track Inspection" Volume 18, Issue 1, Jan 2017, pp 153 – 167.*
3) *S Mohamed Ashiq, K Karthikeyan, S Karthikeyan. "Fabrication of Semi- Automated Pressurized Flushing System in Indian Railway Toilet", International Journal of Engineering and Advanced Technology (IJEAT), Volume-2, Issue- 3, February 2013.*
4) *Dhanajay G Dange, Dattaprakash G Vernekar, Sagar D Kurhade, Prashant D Agwane, "Methodology for Design and Fabrication of Human Waste Disposal System for Indian Railway", International Journal of Science Technology & Engineering, Volume 2, Issue 07, January 2016, pp 14 – 19.*
5) *K. Osathanunkul, K. Hantarkul, P. Pramokchon, P. Khoenkaw and N. Tantitharanukul, "Design and Implementation of an Automatic Smart Urinal Flusher", International Computer Science and Engineering Conference (ICSEC2016), Chiang Mai, Thailand, Dec, 2016, pp 14-17.*
6) *J. Shah and B. Mishra, "IoT enabled Environmental Monitoring System for Smart Cities", International Conference on Internet of Things and Applications (IOTA), Maharashtra Institue of Technology, Pune, India, Volume 3, Issue 2, Jan 2016, pp 383- 388.*
7) *K. Hantrakul, P. Pramokchon, P. Khoenkaw, N. Tantitharanukul, and K. Osathanunkul, "Automatic Faucet with Changeable Flow based on MQTT protocol", International Computer Science and Engineering Conference (ICSEC2016), Chiang Mai, Thailand, 14-17 Dec, 2016.*
8) *C. H. Tsai, Y. W. Bai, M. B. Lin, R. J. R. Jhang and Y. W. Lin, "Design and implementation of an auto flushing device with ultra-low standby power," 2013 IEEE International Symposium on Consumer Electronics (ISCE), Hsinchu, 2013, pp. 183-184.*
9) *Kitisak Osathanunkul, Kittikorn Hantrakul, Part Pramokchon, Paween Khoenkaw and Nasi Tantitharanukul "Configurable Automatic Smart Urinal Flusher based on MQTT Protocol",IEEE 2017.*
10) *Pandya Chintan, Yadav Jatin, Kareliya Sanket, Darshan Adeshara "AUTOMETIC WORKING BIO-TOILET TANK FOR RAILWAY COACHES", International Journal of Advance Engineering and Research Development Volume 2, Issue 10, October - 2015.*