SMART URINAL MECH-AUTOMATIC FLUSH

Nafeesa Muntashar, Sahana KN, Saniya Shilledar
SCET, Belagavi, India

ABSTRACT-Nowadays the sensors and computer programming language have become part of automation field. The automatic urinal flushing system has been developed in the market for a long time. However, none of them is smart. It is designed and implemented to provide water level information to the caretaker. With the smart system, a caretaker will be able to use the information to fill up the storage tank to avoid scarcity of water required for flushing. The proposed system is tested under different areas. The results show that in a normal condition, the proposed system is working as expected. And it will start flushing automatically when object or obstacles are detected and if any odor is detected the fragrance device use to activate automatically. The design takes in consideration that present problem of water by using limited water to flush. This approached system is fully automatic doesn't requires any manpower.

***KEYWARDS*:- ArduinoUno, sensors, IDE software tool.**

1. INTRODUCTION

Whether rich or the poor, tribe or countrymen, Indian or any living organism, the very common thing that everyone does daily, is the intake of food and water, along with the excretion of waste through various forms. In public restrooms, due to the improper flushing of the toilet and maintenance, bad odor and unpleasant environment are common to be found in most public restrooms. This unhygienic environment creates discomfort to the users along with diseases such as Nausea, Asthma, etc. On the other hands, people who use the urinals at the public restrooms, fail to close the faucet (tap) after using it, as they feel uncomfortable to touch the Unhygienic parts of the urinal. This leads to the wastage of the water continuously for hours until another person who willingly closes it and in most cases the water is continuously made to flow non-stopped. Due to this large amount of water has been wasted. To overcome this problem, the smart urinal mech automatic flushing system is the best option for us.

This paper exactly is about the automatic flush system. It means that as if for flushing we need to press the flushing button, but in government or public toilets we found that; lot number of peoples use toilets for their use, but only one percent out of them flushed in that toilets. The mindset of people is that, if we touch the flush button or tap our hands will get infected or will become dirty or most of the peoples ignore to flush. Due to this mind set, lot of dirty waste material is kept itself in that toilets and slowly from these toilets various viruses and bacteria gets released in the nearby area which generates various types of diseases. This takes place only because of improper sanitation. People living in the area surrounding the toilets starts suffering from various diseases.

As a solution of this problem we have developed an idea of smart mech automatic flush system. This device helps to control the amount of clean water running in urinals in the toilets while ensuring that the urinals are always flushed after it has been used. It also prevents the chances of any infection from pushing flushing button. And if there is a no water the system will send message to the caretaker and with the help of message the caretaker can refill the water to the storage tank for time to time. In this paper, a smart urinal mech automatic flushing system is proposed. It is implemented using Arduino Uno, water level sensor, ultrasonic sensor and odor sensor, relay, submersible water pump and GSM module. This project can be applied in Government, private, public, municipalities and any kind of offices. Schools, Colleges, Hospitals, railway stations and bus stands. Social and religious gatherings places, tourist places. Public municipalities, remote areas with urinal toilets.

1.1 OBJECTIVES

- To provide clean and hygienic environment near the urinal at the public restrooms by making it to get flushed automatically.
- To use less amount of water for flushing purpose.
- To prevent scarcity of water while flushing.
- To prevent the unnecessary wastage of water and save the water resource for our future generation.
- To prevent the condition of bad odor resulting in various diseases due to unhygienic environment.
- LED display is used to show the working of current process.

2 RELATED WORKS

A. Design and Implementation of an Automatic Smart Urinal FlusherKitisakOsathanunku et. al. [1] proposed A smart automatic urinal flushing system. It is designed and implemented to provide the usage information to a caretaker. With the smart system, a caretaker will be able to use the usage information to estimate or to analyze the number of users in each day, or each week. It is also possible to know which urinal has been used the most, so it should be taken care more than the other ones. The proposed system is tested under different scenarios. The results show that in a normal circumstance, the propose system is working as expected.

B. Low Power Consumption Mech-Automatic Flush Raja Kandivalasa et. al. [2] proposed an automatic flusher that work on the mechanical linkage, eliminating the use of sensors, programs and finally electricity. The present investigation is economical and operable under all conditions throughout the year without any external driving power.

C. Auto Flushing Devices Tsai et. al. [3] proposed an auto flushing device with an ultralow power consumption. The key of the design in the system is to reduce the standby power consumption. The system uses IR sensor to detect the present of the user for 20ms for every 2 seconds. The system also uses boost regulator and limiter circuit. The design shows that the device consumes 10mW for 24 hours when no user present. Comparing to a typical auto flushing device design, other devices consumes from 0.5 to 1W of power when no user present for one day. This means their solution can significantly save more power consumption in the long run.

D. Water Consumption Monitoring System Yang et. al. [4] implemented a wireless water consumption monitoring system. The system consists of a wireless monitoring unit and a central server. In each wireless monitoring unit contains several wireless data collectors, a wireless gateway and a WIFI router. Wireless data collectors send the collected data to the wireless gateway using 433MHz communication channel. The gateway is then conveyed receiving data to the WIFI router in order to send to the central server on the internet.

3 PROPOSED WORK

3.1 EXPERIMENTAL PROCEDURE

The experimental setup requires the following components

1. Arduino Uno
2. Ultrasonic Sensor
3. Odor Sensor
4. Water Level Sensor
5. Relay
6. Water Pump
7. Adaptors

Arduino Uno: Arduino happens to be an open-source, prototyping platform which is very popular because of its simplicity.Arduino Uno development board consists of two microcontrollers one is of ATmega328 another one is ATmega16u2 which is used for IC and USB controller. Basically, it runs on 16MHz frequency and is has inbuilt RC phase shift oscillator it can generate 2 to 8MHz frequency. It is having 8-bit microcontroller it can process 8 data lines in single clock pulse. It has got 14 digital input/output pins (6 pins can provide Pulse Width Modulation (PWM) output), 6analog inputs, USB connection port, a power jack, an in-circuit serial programming(ICSP) header, and a reset button. It is a readymade microcontroller board with inputs and outputs and it just needs to be connected to computer using USB cable or a AC-to-DC adapter or battery to get started.

Ultrasonic sensor: It is commonly used with both microcontroller and microprocessor platforms likeArduino, ARM, PIC, raspberryPietc. It is 4 pin modules. Whose pin names are Vcc, Trigger, Eco and ground respectively. This sensor used in many applications where distance or sensing objects arerequired. This module has two eyes like project in front which forms ultrasonic transmitter andreceiver. power the sensor using a regulated +5 volt through the VCC and ground pins of the sensor.The trigger and eco pins are both I/O pins and they can be connected to microcontroller. The ultrasonic transmitter transmits an ultrasonic wave this wave travels in air and when it gets objected by any material it gets reflected wave is observed by the ultrasonic receiver module. Distance can be calculated by multiplying speed and time.

Odor sensor:MQ2 Gas sensor is used as anodor sensor. It can detect or measure gases like LPG, alcohol, propane, hydrogen, co and even methane. The module version this sensor 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. When it comes to measuring the gas ppm the analog pin also TTL driven and works on 5v and hence can be used with most common microcontrollers. The power LED on the module to glow and when no gas it detected the output LED will remain turned off meaning digital output pin 0v. This type of sensor has to pre-heat before work will start. This sensor uses both analog and digital pin to detect the gas.

Relay:A relay is an electrically controllable switch widely used in industrial controls, automobiles, appliances and senses an abnormal condition of electric circuit and closes its contacts. Outputs can include visual feedback in the form of indicator lights. The relay allows the isolation of two separate sections of a system with two different voltage sources i.e., a small amount of voltage/current on one side can handle a large amount of voltage/current on the other side but there is no chance that these two voltages mix up. 2 channel relaysare used. The Arduino relay module allows wide range of microcontroller such as Arduino, AVR, PIC, ARM with digital outputs to control large loads and devices like ac or dc motors etc. It has COM, NC, NO pins.

Water pump: We have used an ac submersible pump which requires 165-250V AC, 18W and is capable of lifting water up to a height of 2m.

Adaptors: Here 12v Dc adaptor is used. An ac adaptor converts the electrical current received by the electrical outlet into typically lower alternating current that an electronic device can use.

few steps required to convert 230v AC to 12v DC. First,230v AC is converted into 12v AC by using step down transformer. Second, 12v AC is converted into 12v DC with help of rectifier but it cannot give pure dc. It gives pulsating DC. Third, Pulsating Dc can be filter using capacitor filter and we get pure 12v DC.

3.2 SOFTWARE IMPLEMENTATION

Arduino IDE

It is designed to introduce to artists and other users unfamiliar with software development. The Arduino IDE uses the GNU toolchain and avr-libc to compile programs and uses “avrdude” to upload programs to the board. UsingArduino IDE, you can tell your board what to do by sending a set of instructions to the microcontroller on the board.

Arduino IDE comes with a C/C++ library called “wiring”, which makes input and output operations easier. Programs are written in C/C++, but user only has to define C functions to make a runnable program. Setup () called once at the start of a program; this is where you initialize things.

Loop () called repeatedly until the board is powered off. Code in Arduino is passed on to the AVR-GCC compiler that makes the translation into the language understood by the microcontroller.

3.3 DESIGN PROCESS

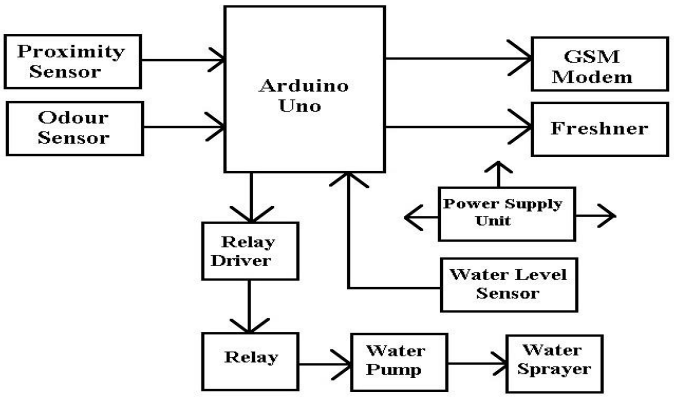
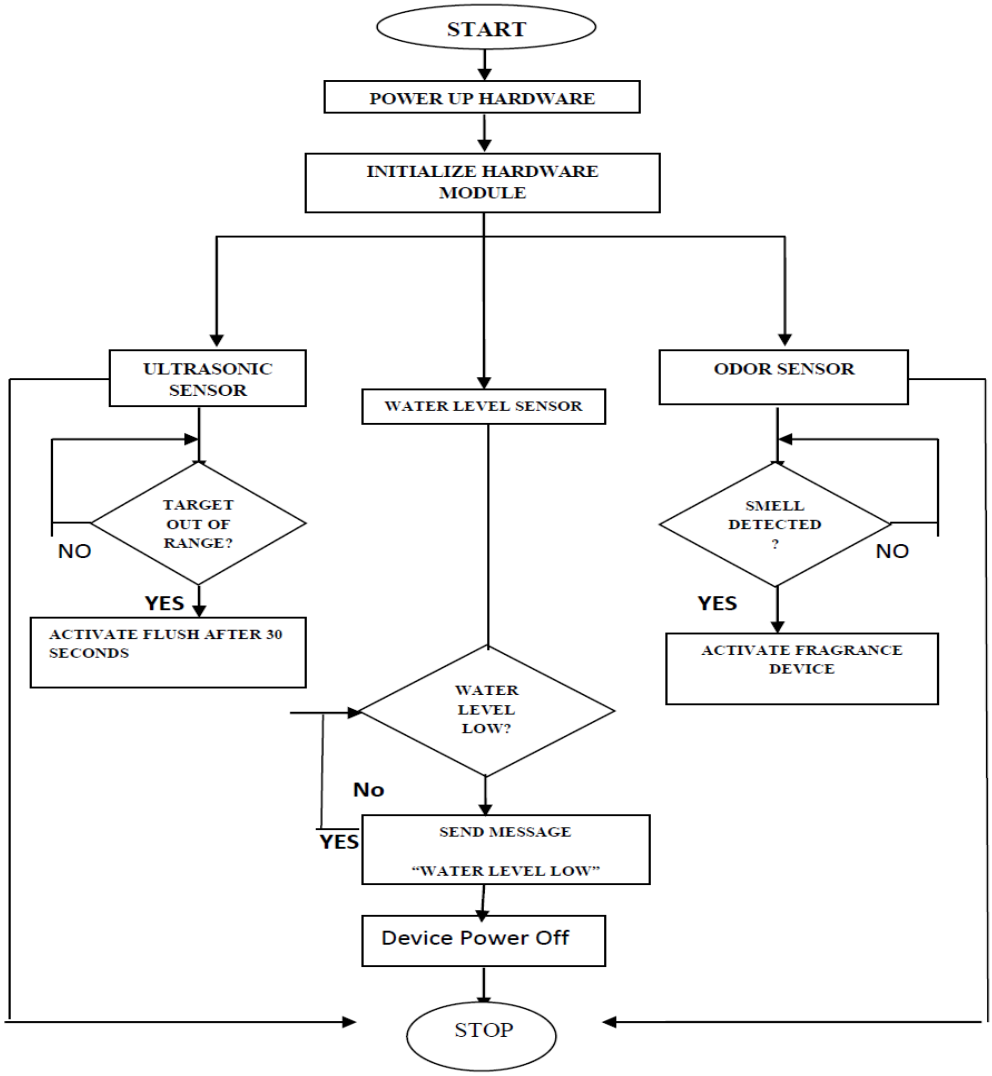


Fig 1: System Overview

Working

- In this system when a user sits on a seat of kamods; the ultrasonic sensor situated exactly above the seat gets activated and when person leaving then the sensor sends signal to Arduino and through the Arduino automatic flushing take place.
- The odor sensor senses continuously if any odor is detected it will send the signal to the Arduino based on the density automatically flushing takes place and activates the fragrance system. This system also helps to avoid bad odor in toilets.
- And if there is no water available for usage then this system send message to the caretaker through the GSM modem and with the help of message the caretaker can refill the water to the storage tank for time to time.

4 FLOWCHARTS



5. RESULTS

GSM module will send the message to the caretaker if the water level is below the threshold level.

Ultrasonic sensor senses the person if the person presents within the sensor range. After the person goes out of the sensor range the system will present 30sec delay then it starts flushing.

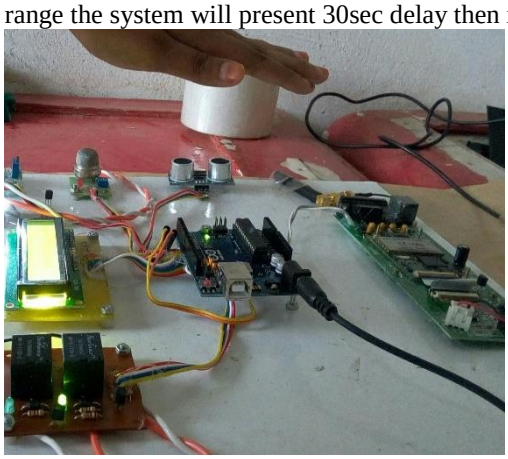
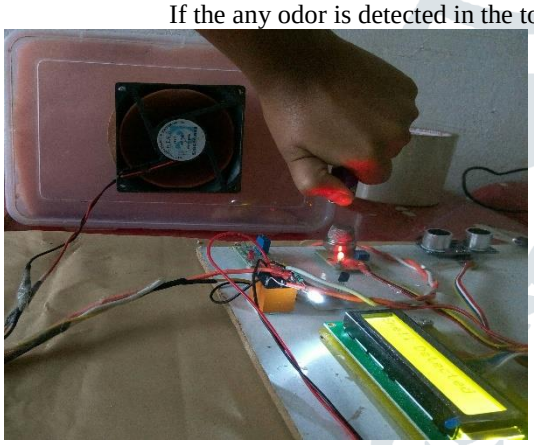


Fig 2 Input and output of ultrasonic sensor

If the any odor is detected in the toilet room, then the room freshener will get turned ON automatically.



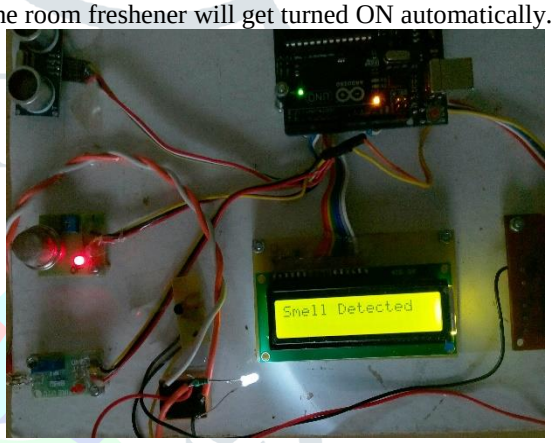


Fig 3 Input and output of odor sensor

5 CONCLUSIONS

In this paper, the automatic smart urinal flushing system is developed. The purpose of system is to improve the efficiency of the use of automatic urinal flushing when comparing with a traditional urinal flusher. The result shows that the automatic smart urinal flusher sends the message to the caretaker if the water is below the threshold level. It helps in refilling the water to the storage tank andto keep the toilet more clean and tidy at all time. This is to save a clean water while still flushing enough water to clean a urinal, and it will start flushing automatically when object or obstacles are detected and if any odor is detected. The design takes in consideration the current problem of water wastage by using limited water to flush. This system is fully automatic so there is no manpower required.

7 REFERENCES

[1] KitisakOsathanunkul, KittikornHantarkul, Part Pramokchon, PaweenKhoenkaw and Nasi Tantitharanukul, “Design and Implementation of an Automatic Smart Urinal Flusher Department of Computer Science, MaejoUnivesrityNongharn, Sansai, Chiang Mai, 50290, Thailand.

[2] Raja Kandivalasa, G.SwamyNaidu, “Low Power Consumption Mech-Automatic Flush”, International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) – 2016.

[3] 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.

[4] S. H. Yang, X. Chen, X. Chen, L. Yang, B. Chao and J. Cao, "A case study of internet of things: A wireless household water consumption monitoring system," 2015 IEEE 2nd World Forum on Internet of Things (WF-IoT), Milan, 2015, pp. 681-686.