

DESIGN AND DEVELOPMENT OF AUTOMATIC URINAL FLUSHING SYSTEM FOR MEN

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ABSTRACT

Many bacteria and viruses have killed thousands of individuals across the world. From bathrooms, some of these deadly viruses and germs are aerosolized. In an effort to solve the problem of airborne bacterial transmission through toilet bowls, this project team has set off to design a smart toilet device. By shutting the seat lid while hazardous bacteria and viruses are released into the air during flushing, this device will reduce their ability to spread. The smart lavatory appliance is constructed using an Arduino microcontroller in conjunction with two electric motors (a brush DC motor and a stepper motor) and two sensors (an ultrasonic sensor and a button sensor). The cost of this device is intended to be low, and installation is simple. One of the most significant problems confronting India is the prevalence of disease in public toilets, especially in the urinals, about which no one seems to care. As a result, contaminated urinals cause diseases to users by spreading infectious germs; therefore, full urinal cleaning is required to maintain hygienic conditions. These days, the robotics industry includes computer programming languages and sensors. The automatic urinal flushing system has been available on the market for a long time. But none of them are intelligent. Its purpose is to supply the caretaker with information on the water level. A caretaker can utilize the data collected from the automated system to fill the storage tank and prevent a lack of water needed for flushing. The suggested technology has been tested in a variety of environments. The findings demonstrate that the suggested system is operating as anticipated under typical circumstances. Additionally, it will automatically begin flushing when impediments or objects are identified. If an odor is detected, the fragrance device will also activate automatically. The design addresses the current water issue by flushing with limited water. This approach mechanism is completely automatic and does not require any human.

Keywords: Arduino Uno, sensors, IDE software tool, Urinal, Flushing.

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 Project 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 toilet 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.

Flushing may be available in one of the following types

- Manual handles
- Timed flush
- Automatic flush using electronic sensors
- Door-regulated flush
- Waterless urinals

2. OBJECTIVES

- To offer a clean and healthy atmosphere near public restroom urinals by automatically flushing them.
- To flush with a reduced volume of water.
- To avoid running out of water when flushing.
- To stop unnecessary wasteful use of water and preserve the water supply for upcoming generations.
- To Prevents disease-causing unpleasant odors in unsanitary environments.

3. EXPERIMENTAL PROCEDURE

The experimental setup requires the following components

1. Arduino Uno
2. Ultrasonic Sensor
3. Relay
4. Water Pump
5. 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 like Arduino, ARM, PIC, raspberried. It is 4 pin modules. Whose pin names are Vcc, Trigger, Echo and ground respectively. This sensor used in many applications where distance or sensing objects are required. This module has two eyes like project in front which forms ultrasonic transmitter and receiver. power the sensor using a regulated +5 volt through the VCC and ground pins of the sensor. The trigger and echo 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.

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 relays are 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.

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. Using Arduino 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.

4. DESIGN PROCESS

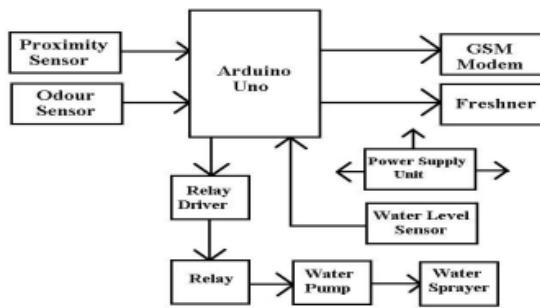
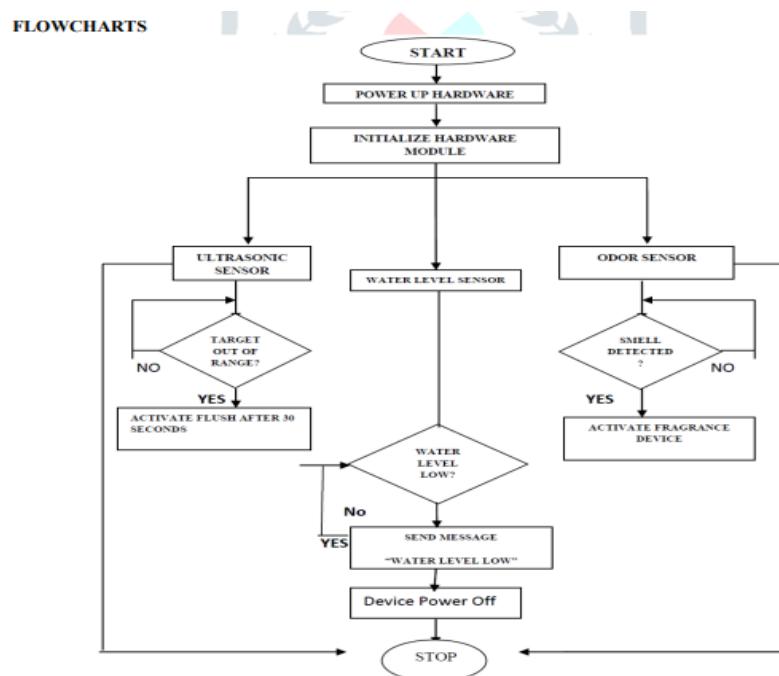


Fig 1: System Overview

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.



5. ADVANTAGES

- Wastage of water in the urinal would be greatly prevented.

- This type of automatic urinal flushing system does not require external electricity source
- This system is totally hands-free system.
- This system is comparatively less expensive and simple in design than the sensor or electric operated automatic urinal system.
- This system prevents bad odor and unhygienic environment in the public restroom and stand,
- 100 % efficiency in cleaning the urinal can be achieved by using this proposal.
- The excreta of one user are flushed away before the next user arrives.

6. DISADVANTAGES

- This system is only useful for men's toilets.
- Springs and link used in this system are required lubrication regularly.
- Requires a constant source of water.

7. APPLICATION

This type of automatic urinal flushing system could be used in places such as

- Public restrooms
- Railway stations
- Parks
- Bus stands
- Government offices
- Schools

8. 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 and to keep the toilet cleaner and tidier 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

Acknowledgements

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