

Automatic Urinal Flushing System

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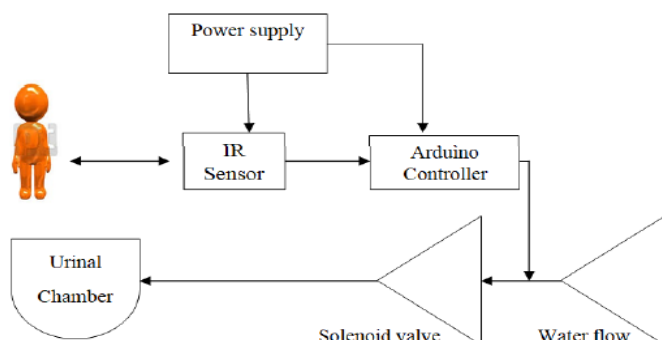
Abstract— Today water is a scarce & precious commodity and it is emerging as a demand everywhere. Most of the water is wasted when people do not turn off the flush after use out of laziness or negligence. People leave water running, which consumes 13 -16ltrs of water for every flush. Moreover, sometimes people leave the urinals unflushed, which creates bad odour and unpleasant environment, thus affecting the health of the people using it. An efficient solution to this problem is the use of urinals with automatic flush controller fitted with sensors that controls the wastage of water and provides a hygienic [1] environment near the urinals thereby reducing the risk of diseases. Our mission is to recommend this technique in public institutions and colleges in order to have economical water system.

Keywords—Urinal, flush, solenoid valve, IR sensor

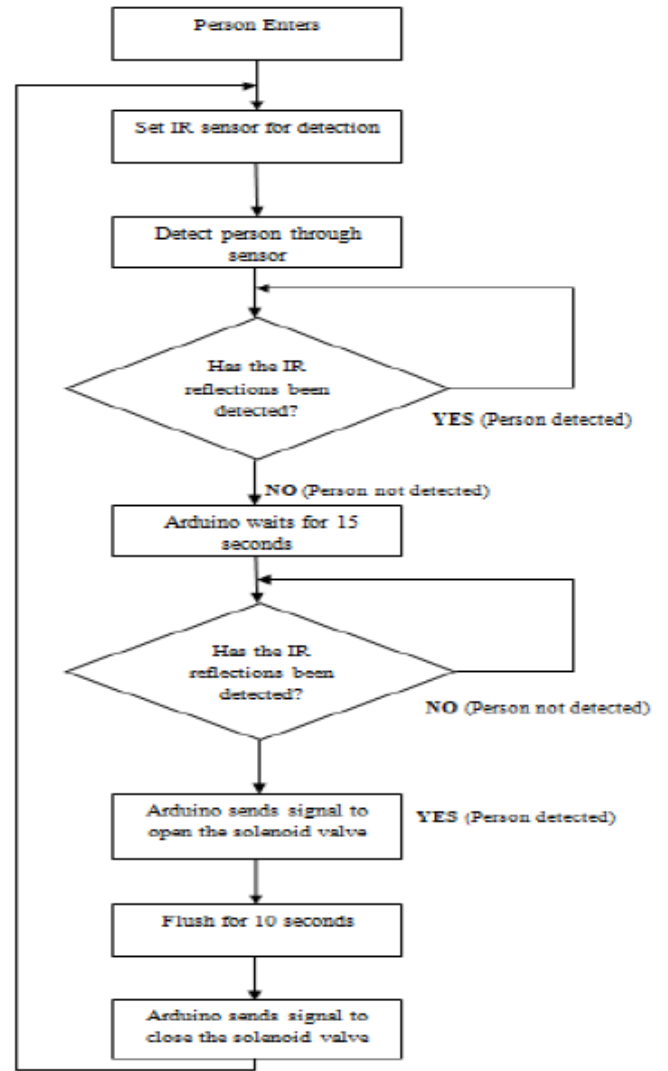
I. INTRODUCTION

Maintaining a good hygiene and pleasant sight in every washroom is a key priority in every public and commercial establishment. [1] Traditionally, urinals were provided with mechanical actuators to flush after using the urinal. Unfortunately, since urinals are usually installed in public places, place of work, users pay no obligation to the cleanliness of the premises. Such a mechanical system cannot be guaranteed and soon breaks down and without maintenance; users continue to use it in that condition resulting in foul smell. Recent developments have taken the urinal flushing system a step further by designing automatic flushing system that flushes at regular time interval. These facilities can be retrofitted to existing systems wherein the handle-operated valves of a manual system are replaced with a suitably designed self contained electronic valve which eliminates direct contact with the urinal and eliminates several health problems. This device is the solution to cleaner and safer public toilets that not only ensures that urinals are always flushed, odour -free and presentable, but also eliminates both any cross-infection from touching handles and odours from unflushed fixtures. [3] An infrared (IR) sensor identifies when the urinals have been used, by detecting when someone has stood in front of it and moved away, and then activates the flush. As there is also wastage of water continuously for hours, this new development also ensures proper flushing of toilets thereby causing only limited amount of water to get flushed after every use, automatically.

II. BLOCK DIAGRAM

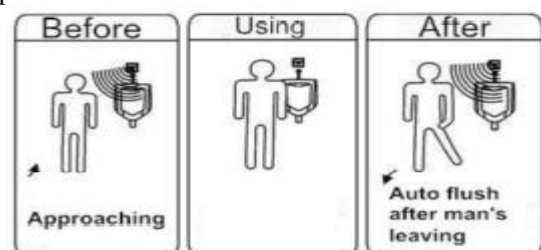


III. FLOWCHART



IV. IMPLEMENTATION PLAN

- This paper proposes an Automatic flush system containing IR sensor, solenoid valve and Arduino controller for automatic flushing of urinals at regular intervals.
- When a person stands at a distance of half a meter in front of the urinal, the IR sensor pair detects his presence.
- The sensor sends this information to the Arduino.
- As soon as the person leaves the urinal, the Arduino actuates the solenoid valve which starts the flushing process.



V. HARDWARE DESIGN

A. Urinals

The urinal is the basin in which the person would be urinating into. The urinal is connected to the water exhaust pipe. [2]



Fig-1: Urinal

B. Valve

A 24 VDC, ½" BSPP, 2-way normally closed plastic solenoid valve has been used for automatically opening and closing the pipe line to control the flushing of the urinal. The chosen valve is less expensive and the body is made of plastic so the issue of corrosion is eliminated. Figure-2 shows the diagram of proposed solenoid valve. [1]



Fig-2: Solenoid valve

C. Sensors

The IR led keeps transmitting IR infrared rays up to some range. There is also a potentiometer in the design with the help of which the range can be altered. When some object comes in the (IR) infrared range, the IR waves hits the object and comes back at some angle. The Photo diode next to IR led detects that IR infrared rays which got reflected from the object and hence works as a proximity sensor.



Fig-3: IR Sensors

VI. ADVANTAGES

1. Wastage of water in the urinal would be greatly prevented.
2. Keeps your hands and washroom germ free resulting in improved sanitation.
3. Provides hand free user experience leading to prolonged lifespan.
4. It provides efficient functionality and easy maintenance.

VII. DISADVANTAGES

1. The systems cannot be operated during power cut.[1]

VIII. APPLICATIONS

1. Commercial Complexes such as Markets, Malls, Theatres, Airports, Sports complexes, Stadium, Railway Station, Bus stands etc
2. Tourist Places, Social gatherings, Administrative buildings and offices.
3. Academic institutions such as school & colleges.
4. Government and Private institutions.

CONCLUSION

Water is the universal resource and every living being has the right to access clean and hygienic water. It is our responsibility to pass this natural resource to the future generations. Measures have to be taken by everyone to save water by all possible means. [2] Public places, banks, schools, restaurants and bus stop terminals can give a consideration to this design as a means of conserving water and keeping the urinals in a good hygienic condition. [1]

References

- [1] Akparibo Richard Awingot and Joyce Apanga, "Development of a hands free urinal flushing system", International Journal of Research in Engineering and Technology(IJRET), 2319-1163 | pISSN: 2321-7308 ,Volume 4,Issue 8, August 2015.
- [2] Mohamed Aamir. M and Kamalanathan.P , "Automatic Urinal Flushing System", International Journal Of Science, engineering and technology research(IJSETR), Volume 4, issue 4, April 2015, 6pp.
- [3] Cheng-Hung Tsai, Ying-Wen Bai, Ming-Bo Lin, Roger Jia Rong Jhang and Yen-Wen Lin, 'Design And Implementation Of An Auto Flushing Device With Ultra-Low Standby Power ', International symposium on consumer electronics(ISCE), 2013 IEEE.
- [4] Parth M. Sarode, "Design and implementation of automatic flush system for sanitation in public toilets", International Journal Of Researches In Biosciences, Agriculture and Technology, Vol. II, Issue(7), Nov 2015:56-58.