



DESIGN AND IMPLEMENTATION OF AUTOMATIC FLUSH SYSTEM FOR SANITATION IN PUBLIC TOILETS

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Abstract:

Automatic flush system for sanitation in public toilets is designed and implemented using Microcontroller. In manual flush systems, the user presses a button, which opens a flush valve allowing mains – pressure water to flow into the bowl, or sometimes the user presses directly a flush lever. The valve contains an air-filled mechanism that closes it after a preset time. A Microcontroller based system using sensor technology; this automatic flush system is designed. Microcontroller based automatic flush system is given in figure 1 and 3. The Infra-Red transmitter LED and the Infra-Red receiver modules are mounted side by side such that when the user approaches the mechanism, the Infra-Red receiver module receives the Infra-Red signals reflected off the person. A solenoid operated water valve is used in the system. The AT89C2051 8-bit microcontroller with 2 kB of flash based program memory, 128 bytes of RAM, 15 input/output lines, two 16-bit timers/counters, on-chip oscillator and clock circuitry is used for the implementation of the system. Another approach of this work is to save water.

Introduction:

As the world's population is increasing, more of the water supplies have been used and polluted leaving less fresh water available. This makes it necessary ensure that adequate and sustainable water supplies can still be made available for this and future generations.

This paper exactly is about the automatic flush system. It means that –“as if for flushing we need to press 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 automatic flush system. In this system when an user sits on a seat of kamods; the sensor situated exactly above the seat gets activated and when person stands or moves away, the sensor sends some signals to flush tank and the tank gets flushed automatically. As well as if person sits on a seat for more than five minutes the flush system will get automatically activated and will start working.

Flushing Mechanisms:

The flushing mechanism provides a large flow of water into the bowl. ULFTs (Ultra-

Low-Flush Toilets) are offered in three classifications; flush valve, Pressure-assisted and gravity toilets. In general, the flush valve and pressure-assisted ULFTs perform better than gravity toilets since they use the water system pressure to assist in their operation.

To implement the idea of automatically flushing the toilet with just enough water to clean it, a water purity sensor is attached to the bottom of the toilet bowl. If the sensor detects change in water purity from a present value, it will activate a controllable flushing system using a microcontroller based circuit which stops immediately whenever the sensor detects the initial water purity value back. In order to make the system work only when the person finishes using the toilet, the flushing mechanism is activated either manually or automatically when the impurity level of the water reaches a stable value over a short time. The block diagram of the smart flushing system is shown in figure 1.

Design and Implementation of Automatic Flush System:

A solenoid means a coil of wire acts as electromagnet when current passes through it is used to actuate the flush system from a 6 volt power is passed through it. It also contains a backup battery which helps to provide power to sensor circuit. The flush system is completely based on a microcontroller. This flush system will also be activated even if user does not depart after five minutes. The installation of the microcontroller is given in the figure 3. The IR transmitter LED and IR receiver modules are placed side by side such that when the user approaches the mechanism, the IR receiver

module receives the IR the IR signals reflected from the person. The figure shows the circuit of microcontroller based flush system . This system is totally controlled by microcontroller. The AT89C2051 microcontroller is an 8 bit microcontroller with 2 kB of flash based program memory , 128 bytes of RAM , 15 input / output lines , two 16 – bit timers / counters , on – chip oscillator and clock circuitry . A 6MHz crystal is used for providing clock . Port pins P1.0 through P1.4 of the microcontroller are connected to buffers N1 through N5 of CD4050 via 10 kilo-ohm pull up resistors, respectively. All the input/output (I/O) pins are reset to ` 1 ' as soon as RST (pin 9) goes high on pressing switch S3 . Holding the RST pin high for two machine cycles while the oscillator is running resets the device . Power-on-reset is achieved by capacitor C2 and resistor R9 .

Pin 12 (P1.0) of microcontroller IC2 provides the 38kHz clock frequency , which is buffered by N1 to drive the two parallel IR – LEDs . These IR-LEDs act as the infrared signal transmitter . Resistor R10 limits the current through the LEDs . Port pins P1.1 , P1.2 , P1.3 and P1.4 are used for indication of standby , alert , active and flush , respectively . Port pin P1.4 also drives relay RL1 through transistor T1 . Diode D5 acts s a free – wheeling diode . The solenoid coil operated off 6 volt is connected to the contacts of relay RL 1.

The infrared LEDs continuously transmit signals and because of this the standby led is always “ on ” . When an person comes near this IR LEDs , the IR receiver module receives the reflected signal and alert led lights up . If this *alert* LED lights up for more than five seconds then the *active* led lights up , which shows that the circuit is ready to flush now. The glowing of *alert* led for five seconds allows the validation for a person to use the pot . It means that if the person sits on a pot for more than five seconds the system understands that the person is using the pot . When the person moves away from the pot the flush gets activated for 10 seconds means that the pot is flushed for 10 seconds. If the person continues to sit on the pot for more than five minutes the system flushes automatically and waits for the person to move away. Hence in this manner the

microcontroller works and makes the pot flushed automatically.

Conclusion

A smart toilet flushing system using a sensor technology and a microcontroller was introduced. The circuit was designed, implemented. The preliminary results of the implemented circuit shows that an amount of water as low as 1.2 LPF is enough to flush the toilet. The system is fully automated. It will reduce the dirtiness of the public toilets.

References:

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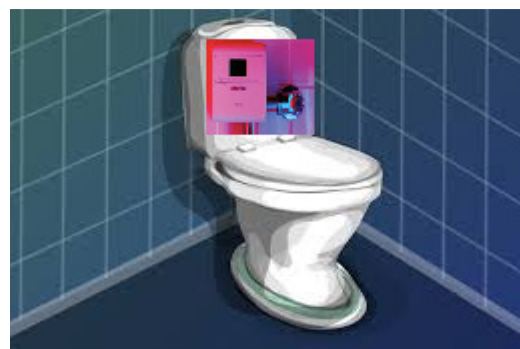
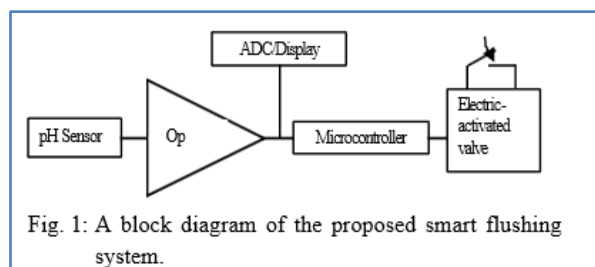


Figure 2: Installation of Automatic Flush system

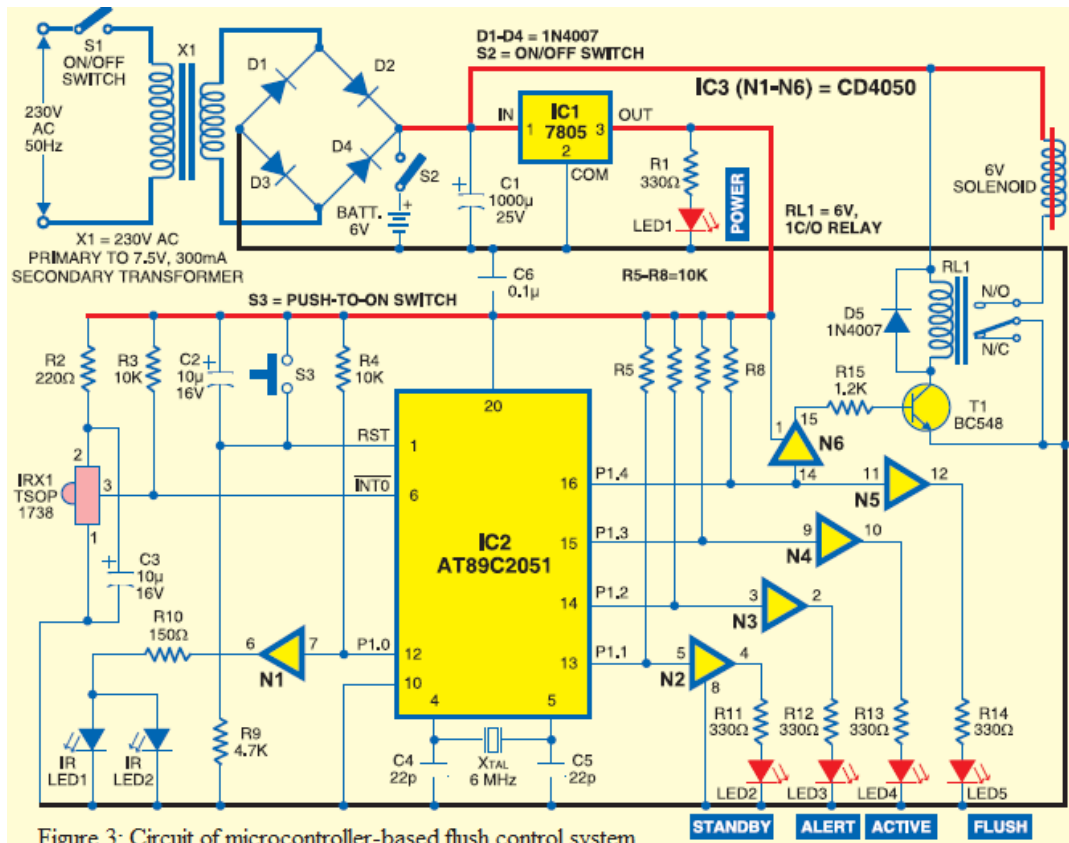


Figure.3: Circuit of microcontroller-based flush control system