# Automatic Door Locking System For Lavatory In Train

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**Abstract-** *Over the last few years, we are facing big issues related to public hygiene and health matters. The idea regarding this project came up in our mind from the same tendency, a step to add solution for this cleanliness issue. Our project is an effort to overcome this cleanliness issue in most crowded zone, ever rushed zone Indian Railways in which the toilets were used at stations that degrades the environment and creates harmful diseases. To control the usage of toilets at stations we use RFID. RFID reader is placed on the train and RFID card is placed on the station. Train is entered the station RFID reader signal is given to the microcontroller. The microcontroller output signal is controlling L293D motor drive. When RFID tag comes in contact with the train at the station, the circuit closes and also the door closes. PIR sensor placed on the inside of the rest room. The PIR sensor using to sense of the human. When the train starts moving the circuit becomes open and waste is discharged. The sensor is sense input signals door is not locked otherwise door is lock.*

**Keywords**- Railway lavatory door lock, RFID, PIR Sensor.

## I. INTRODUCTION

A prototype that emphasizes on automatic door locking of railway lavatories. Plenty of drift and pollution occur due to use of lavatories at stations so, here we have mentioned some solution to this problem. Door locking system is used with various techniques. We have proposed to use RFID system. It can be taken to door system and based on RFID system; doors can be locked or opened. Prime Minister Mr. Narendraji Modi's mission works on "Clean India" (commonly known as "Swacha Bharat") our project is an effort to bring this movement alive in most crowded zone, ever rushed zone Indian Railways (Railways). This will bring a solution for problem of using toilet at stations. Though the notice has been kept by the Rail Board that one should not use the lavatory while train is on station, it is found that the notice is not followed by many. So for the solution on this, automatic door lock for lavatories when train is on station can be done. Automatic door locks are used in many areas nowadays but the use of such mechanism can be done in Railways too. In current working lavatories this is manual and one can enter in lavatory while the train is on station. To avoid this, the main thing to be achieved is identifying the signal about arrival of train at station and departure of train from station. In this case the signaling department of railways can help.

Conventional automatic door systems use fixed settings for various door parameters such as opening widths, opening timings, opening and closing speeds, etc. These settings generally cannot be altered by end user. If the door settings need to be changed, the end user has to call a technician to fix it. A new approach is proposed in this paper which enables the end users to do the changes by themselves by means of a handheld device.

## II. HARDWARE DESCRIPTION

The proposed systems consist of RFID reader, PIR Sensor, power supply (battery), L293D motor driver, DC gear motor. RFID reader is placed on the train and RFID card is placed on the station. Solenoid valve using west is discharge. Train is entered the station RFID reader signal is given to the microcontroller. Shown in figure 1.

(a) Receiver Block Diagram, (b) Transmitter Block Diagram
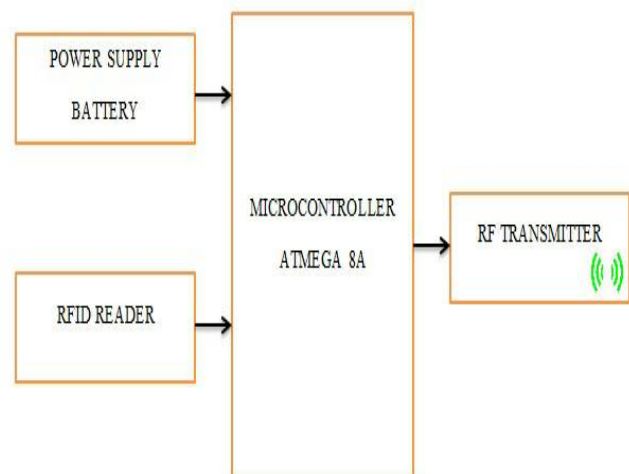


(**a**)  Receiver Block Diagram
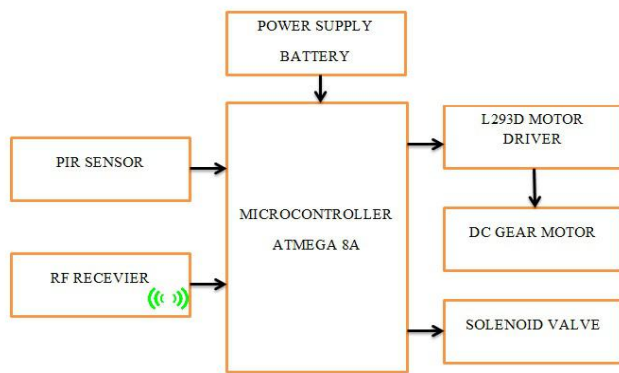
(**b**) Transmitter Block Diagram
Figure 1 - Block Diagram

The PIR sensor using to sense of the human. PIR sensor placed on the inside of the rest room. The sensor is sense input signals door is not locked otherwise door is lock. The following section consists of hardware specification, methodology of our proposed system.

## RFID

Radio-frequency identification (RFID) is a technology that uses radio waves to transfer data from an electronic tag, called RFID tag or label, attached to an object, through a reader for the purpose of identifying and tracking the object. RFID shown in figure 2. Some RFID tags can be read from several meters away and beyond the line of sight of the
reader.



Figure 2 -RFID Module

The application of bulk reading enables an almost-parallel reading of tags. RDM 125KHzcard mini-module is designed for reading code from 125KHz card compatible read-only tags and read/write card. It can be applied in office/home security, personal identification, access control, anti-forgery, interactive toy and production control systems etc.

## MICROCONTROLLER – ATMEGA 8A

Microcontroller is one of the AVR Microcontroller Family, the ATmega8. This member has many features similar to that of ATmega32. Microcontroller- Atmega 8A shown in

figure 3 but it has reduced number of features and capabilities, yet it has enough features to work with. Now let me tell you that if you want to gather knowledge and at the same time want to do it in less cost than the budget of ATmega32, you can think of making projects with ATmega8. In that case, one feature you won't be able to realize is the JTAG interface.



Figure 3 - Microcontroller– Atmega 8A

But rests of the features are available in this IC. Let us see what one can get from ATmega8.The ATmega8A is a low-power CMOS 8-bit microcontroller based on the AVR RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega8A achieves throughputs approaching 1 MIPS per MHz, allowing the system designed to optimize power consumption versus processing speed.

## L293D DUAL H-BRIDGE MOTOR DRIVE

L293D is a dual H-Bridge motor driver, so with one IC we can interface two DC motors which can be controlled in both clockwise and counter clockwise direction and if you have motor with fix direction of motion the you can make use of all the four I/Os to connect up to four DC motors. L293 Dual – Bridge Motor Driver shown in figure 4.



Figure 4 -L293D Dual H-Bridge Motor Driver

As you can see in the circuit, three pins are needed for interfacing a DC motor (A, B, Enable). If you want the o/p to be enable completely then you can connect Enable to VCC and only 2 pins needed from controller to make the motor work

## DC GEAR MOTOR

Geared DC motors can be defined as an extension of DC motor which already had its Insight details demystified here. A geared DC Motor shown in figure 5.
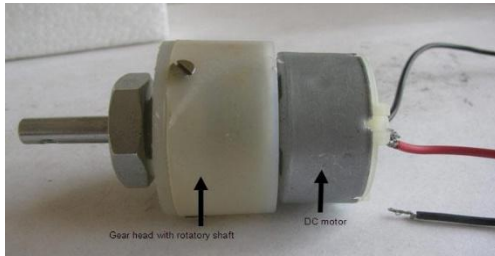


Figure 5 -DC Gear Motor

The gear assembly helps in increasing the torque and reducing the speed. Using the correct combination of gears in a gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor

## PYROELECTRIC ("PASSIVE") INFRARED SENSOR

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) light radiating from objects in its field of view. They are most often used in PIR-based motion detectors. All objects with a temperature above absolute zero emit heat energy in the form of radiation.



Figure 6 – PIR Sensor

PIR sensor shown in figure 6, usually this radiation isn't visible to the human eye because it radiates at infrared wavelengths, but it can be detected by electronic devices designed for such a purpose. SB0061 is a pyroelectric sensor module which developed for human body detection. A PIR detector combined with a Fresnel lens are mounted on a compact size PCB together with an analog IC, SB0061, and limited components to form the module. High level output of variable width is provided.

## SOLENOID VALVE

These valves operate on the servo assistance principle, which requires a specified differential pressure for opening

and closing. The solenoid opens the pilot seat. This relieves the pressure on the main closure device, which is raised into the open position by the increasing effective force on its underside. Solenoid valve shown in figure 7.



Figure 7- Solenoid Valve

Closure of the pilot seat builds up a closing force on the main closure device via bleed orifices. Provided the inlet pressure is at least the required differential higher than the outlet pressure, the valve remains securely closed.

## PROPOSED SYSTEM

A prototype that emphasizes on automatic door locking of railway lavatories. Plenty of drift and pollution occur due to use of lavatories at stations so here we have mentioned some solution to this problem. Door locking system is in used with various techniques. I have proposed to use RFID system.

To control the usage of toilets at station we use RFID. When RFID tag comes in contact with the train at the station, the circuit closes and also the door closes. When the train starts moving the circuit becomes open and waste is discharged.

## III. SOFTWARE DESCRIPTION

The battery +ve supply is given to the input of voltage regulator. The working of voltage regulator is 12 v dc converted into 5 v dc regulator output is given to the controller pin number 20. Circuit diagram shown in figure 8. PIR sensor consists of 3 lead.1 lead is input & 3 lead is GND .2 lead is using to signals passed through on the microcontroller pin no of 4
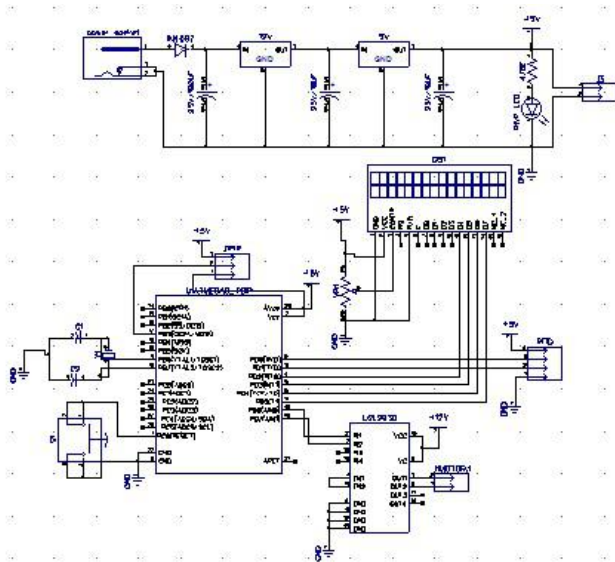
Figure 8 - Circuit Diagram

The L293Dmotor drive used to the control of the dc motor. Motor is working to on and off condition. Input is given to microcontroller of pin number 12 & 13 the output supply is connected through on the motor. RFID reader consists of 3lead 2nd lead is using to connect through on controller pin number 2. The L293D drive 2 & 9 pin connected through controller pin number of 12 & 13. The L293D motor drive 3 &6 pin connected through on the motor. RFID & PIR operating voltage is +5v. RFID 3rd and PIR 3rd connected through on the GND. Battery negative is connected through on the controller pin 21.

## Hardware Part
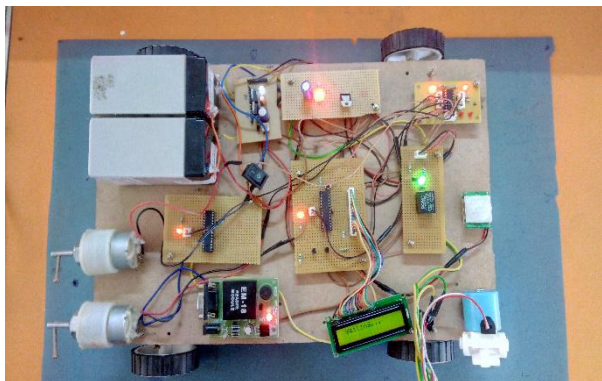
Our Project hardware tool kit, shown in figure 9.



Figure 9- Project Tool kit

## IV. CONCLUSION

In present days every passenger need a clean, comfort and safe journey. So we proposed advanced applications in railway system to meet their needs. A hygienic system maintained in a railway station, with this low cost method. In this project we have described a new approach for lavatory door locking system. This system works on the basis of analyzing of human with PIR sensor

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