SMART INDIAN RAILWAYS

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ABSTRACT

Washroom is a service facility that is used frequently in train. The utilization efficiency directly affects the whole use efficiency and comfort of train. It is an important topic of train design to improve the efficiency of train's washing room and to reduce the cost of maintenance. Our project is a step towards making Indian Railways Cleaner, Energy Efficient and advanced i.e Green and Hygienic so our concept is a small contribution toward India's "SWACH BHARAT ABHIYAN " and "SMART CITY" .Healthy and Hygenic surrounding is expected by every passenger while travelling by train but due to openly disposal of human waste on the railway tracks the problem of sanitation arises. Hence to combat this problem we are proposing the idea of "SMART INDIAN RAILWAYS".

1 Introduction

Indian Railway covers about 104,000 km with 7083 stations and it carries 2.2 crore people and 2.5 million tones of goods daily.Indian Railways transport million of people everyday through its wide network of trains all over India. However despite all these efforts, one problem that is of major concern and needs immediate action to be taken is 'sanitation in Indian Railway premises'

Currently the Human waste is disposed on the track which causes problems such as environmental pollution, spreading of viral disease and various health related issues. This also causes bad impression of the country on the visitors. Presently the only solution to this problem is workers have to clean every track and this work is unhygienic and hazardous as far as health of the workers is concerned. This process is time consuming and is not cost efficient. The major issue of Indian railway is the problem of cleanliness and disposal of human waste.Hence the intention is to develop a system which will prevent the disposal of Human waste openly and will assure good sanitation habits into railway. So the idea of 'Automatic Door Locking System in the Railway Toilets' is been introduced under the concept of "SMART INDIAN RAILWAY".This system will help to keep Platform area clean and as well as it will reduce the cost of maintanence.

I. 2. SYSTEM DESIGN

Modules under Smart Indian Railways are as follows:-
1.Automatic door locking system in Railway Toilets.
2.Display System for upcoming station using GPS.
3.Energy conserving Platform.

Automatic door locking system in Railway Toilets:-
This module has been divided into two sections such as section1 and section2. The section1 consists of RF transmitter module which is at railway stations and section2 is connected with the train.

When station arrives then the door of the toilets of the train automatically gets locked. The section1 RF transmitters transmits the signals and section2 unit RF receiver will sense this signal and perform the door locking operation but in case if someone is already using the washroom when the train enters the platform the IR sensors of that washroom will sense the human body and door for that particular washroom will not get locked.As soon as the human body leaves the washroom the door for that washroom will get closed thereby preventing it from any further use till the time the train is on the platform.

If train stops for more than 10 minutes the door will get open and whole mechanism will turn off

Block Diagram consist of following blocks.

1. RF Transmitter.

2 .RF Receiver.

3. ARM Microcontroller.

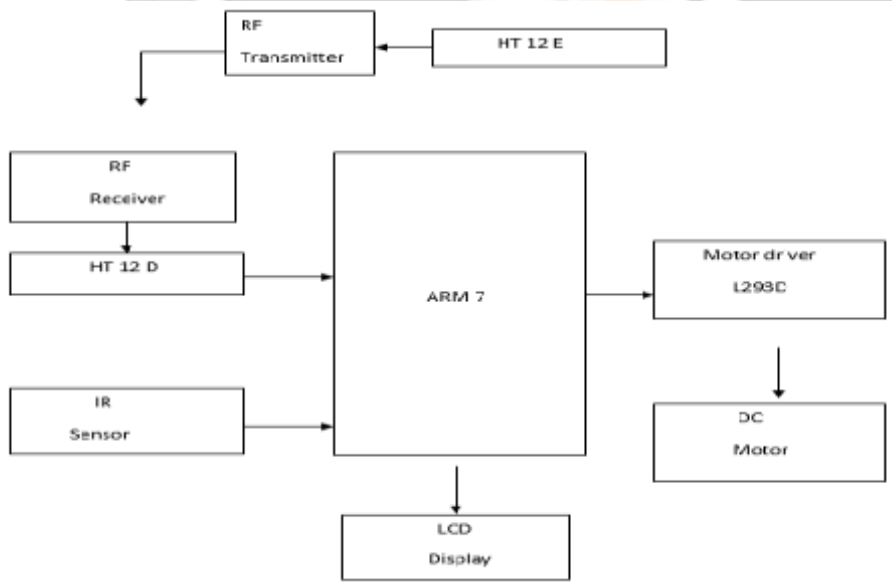
4 .L293D motor driving IC.

5. DC motor.

6. IR Sensor.

RF transmitter which is placed on platform,continuously transmits the RF signal when the train arrives in the vicinity of the station the RF receiver which is implanted on the train will receive the RF signal and the output of this receiver will be given to the ARM microcontroller.ARM microcontroller will process this received signal and will give command to L293D motor driving IC which will drive the DC motor 90degree clockwise which will close the doors of the washroom.

Once the door gets locked at the same time the timer for 10min will start and when the time exceeds the duration of 10min the whole mechanism will turn off i.e the door of the washroom will get opened.



Block Diagram

2.1 SYSTEM PARAMETERS

1.ARM**:**

ARM7 is a Reduced Instruction Set Computing (RISC) architecture.ARM7 uses fewer transistors as compared to other processors ,this reduces cost, heat and power use. Thus ARM processor is used in light, portable and battery operated devices such as mobile phones and laptops.

ARM7 LPC2148 works on 3.3V power supply .The transformer used in power supply circuits a step down 230V AC to 9V AC supply. As there is built in ISP in LPC2148 we can program the IC within the systemitself using serial communication on COM0.

2. RF Module:

For transmitting and /or receiving radio signals between two devices we use an RF module. Wireless communication between two devices is often desirable in embedded systemand for accomplishing this wireless communication we use RF communication .

Due to the complexity while designing a radio circuitry we use RF module in electronics. RF modules are mostly use in application such as industrial remote control, wireless home automation system and wireless alarm system .They are often used to replace older infra red communication design.

3.IR Sensor:
The working of IR sensor is dependent on the use of specific light sensor to detect a select light wavelength in the infra red spectrum.The main advantage of IR sensor is that it can detect both heat of an object as well as its motion.

2.Display System for upcoming station using GPS:

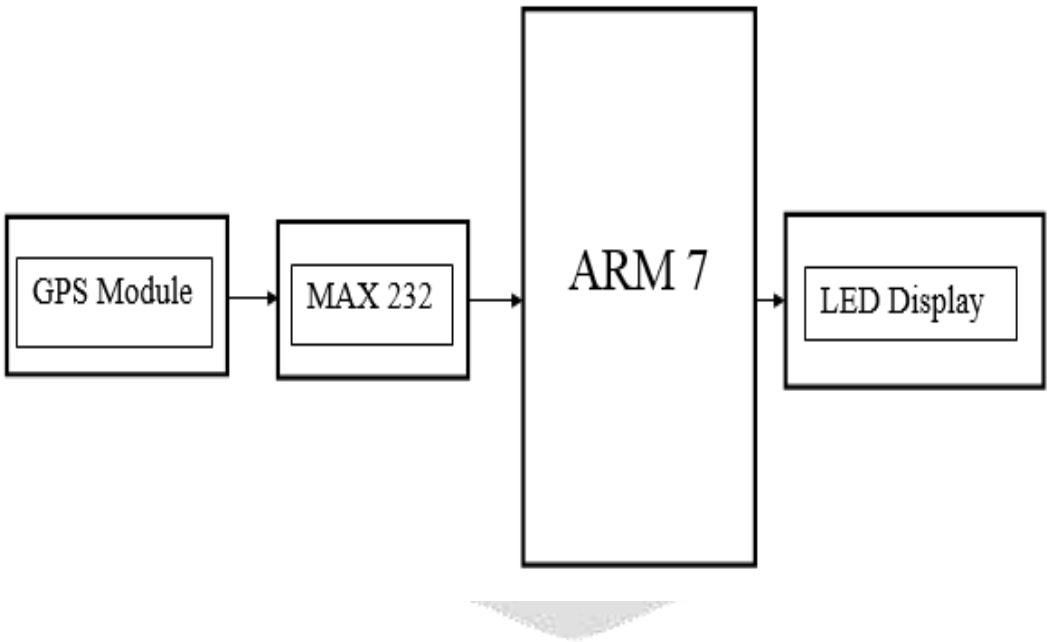
Display module is used to display the information regarding the upcoming station as well as the current location of the train using GPS module.

Along with the upcoming station information we can also display information such as:

1) Time for arrival of next station.

2) Date and Time.

3) Approximate distance of next station.



2. GPS:-
GPS navigation device accurately calculates geographical location by receiving information from GPS satellites.It is a satellite based navigation system.It requires a network of minimum 24 satellites but currently it uses 30 satellites placed in orbit by the U.S.

3. . Energy Conserving Platform

This module of "SMART INDIAN RAILWAYS" is concerned with making the railway platforms across our country more energy efficient. This technology is based on a principle called the piezoelectric effect,The piezoelectric material converts the pressure applied to it into electrical energy.
A tile of piezoelectric material is made which is placed on the surface of the platform. Here the source of pressure is from the weight of the people walking over it.

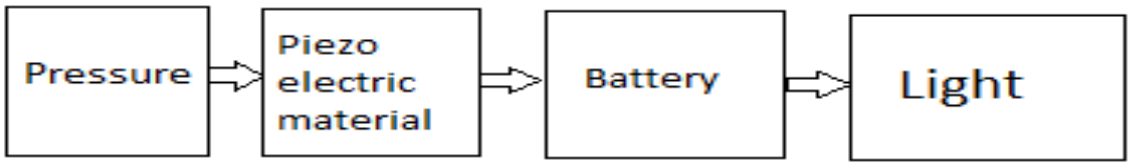
Thus the mechanical energy of the footstep of the people is thereby converted into electricity by using piezoelectric material.Electricity generated by using this technology is then stored in the battery so that it can be utilized during night.

Block Diagram consist of following blocks.

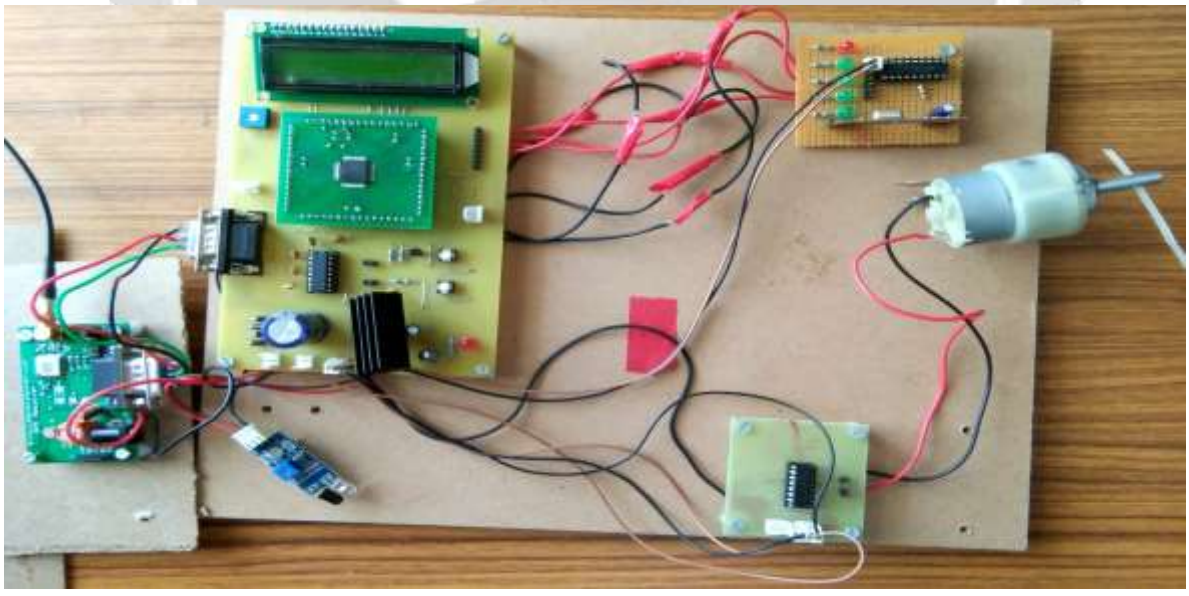
1. Piezo electric material.

2. Storage element.

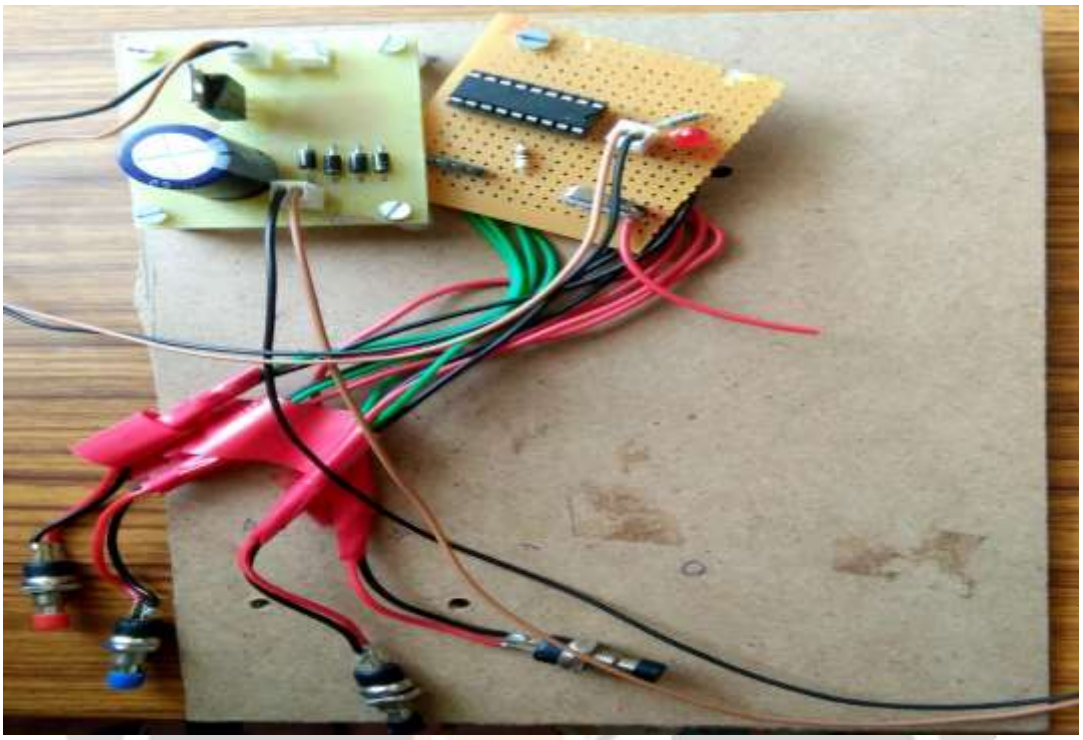
3 .LED.



3. Hardware Implementation:-



Receiver circuit of Door locking system and GPS module.



Transmitter circuit using RF transmitter.

4. CONCLUSIONS

Our project "SMART INDIAN RAILWAY" provides improvised and efficient sanitation system thereby making Indian railways clean and hygienic as well as energy efficient. The different parameters such as preventing the use of washroom on stations through a door locking mechanism, using GPS module to display the information regarding the upcoming station , using piezo electric sensors to generate pollution free electricity together contribute to the advancement of Indian Railways.Proper Sanitation system could be only achieved with the proper coordination between the passengers and the Railway administration.Hence it is the responsibility of every citizen to act wisely and use the sanitation system in a proper way thereby avoiding the problem of unhygienic and filthy Railway station.

5. ACKNOWLEDGEMENT

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Finally yet importantly I would like to thank all Staff Members and all our colleagues for their valuable suggestions and support.

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