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**ABSTRACT**

In the existing Indian railway systems, there is no facility to alert the passengers during their long journeys, fire safety and rescue operation. This can be done using sophisticated embedded system designs. Our Proposed system highlights the need for careful assessment and automation to overcome the difficulties faced by the human operators to ensure the passengers safety in real time applications. The proposed system includes the station Name display in Train which alerts the passenger as the station is in proximity, fire & smoke detector in train and also intimates the same to the nearest station for rescue operation using wireless module.

**KEYWORDS:** Station name display, fire & smoke detector.

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**INTRODUCTION**

Railways provide the cheapest and most convenient mode of passenger transport both for long distance and suburban traffic. The project presented here is an advanced system in the field of Automation of Railway Department to facilitating the various essential & critical features associated with Railways Safety & Monitoring.

Rail accidents occur when trains travelling on the same tracks collide or when trains derail because of technical faults in the rolling stock, the rails or the security systems, or because of landslides.

Such accidents cause direct and indirect damage to people and the environment, especially when they involve trains carrying freight or dangerous or polluting substances.

Railways have been in the news for wrong reasons with the rapid increase in passenger and goods traffic, the frequency of train accidents is increasing very fast. This has raised serious doubts in the public mind about safety of Rail travel and the general health of the railway network.

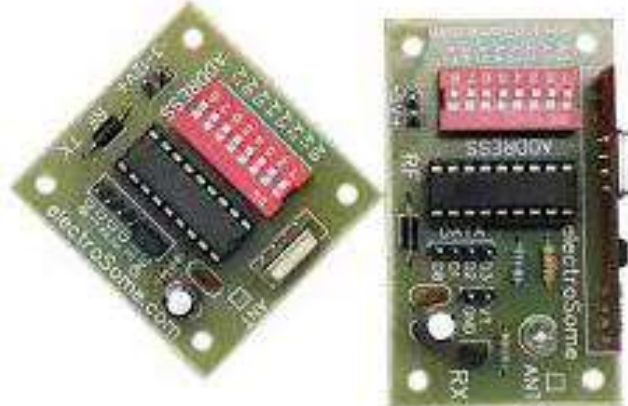
The highlight of this Embedded Safety Tool is that, this single system is going to help us in Monitoring & Controlling of the Railway Safety parameters like Station Name display in Train, Automatic station alerter/vibrator, Fire & smoke detector in train and compartment detachment.

**HARDWARE DESCRIPTION**

Power supply unit: This section needs two voltages viz., +12 V & +5 V, as working voltages. Hence specially designed power supply is constructed to get regulated power supplies.

RF Transmitter and Receiver: An RF module (radio frequency module) is a (usually) small electronic device used to transmit and/or receive radio signals between two devices. In an embedded system, it is often desirable to communicate with another device wirelessly. This wireless communication may be accomplished through optical communication or through Radio Frequency (RF) communication. For many applications the medium of choice is RF since it does

not require line of sight. RF communications incorporate a transmitter and/or receiver. RF modules are widely used in electronic design owing to the difficulty of designing radio circuitry.



*Fig 1: R F Module*

**Temperature Sensor Thermistor:** A Thermistor is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is a portmanteau of thermal and resistor.

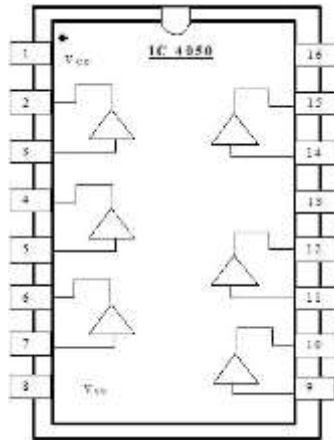


*Fig 2: Thermistor*

**Monostable Multivibrators:** Monostable Multivibrators have only ONE stable state (hence the name: “Mono”) and produce a single output pulse when it is triggered externally. Monostable Multivibrators only return back to their first original and stable state after a period of time determined by the time constant of the RC coupled circuit.

**Microcontroller:** A microcontroller (sometimes abbreviated  $\mu\text{C}$  or MCU) is a small computer on a single integrated circuit containing a processor core, memory, and programmable input/output peripherals. Program memory in the form of NOR flash or OTP ROM is also often included on chip, as well as a typically small amount of RAM. Microcontrollers are designed for embedded applications, in contrast to the microprocessors used in personal computers or other general purpose applications.

**Buffers:** Buffers do not affect the logical state of a digital signal (i.e. a logic 1 input results in a logic 1 output whereas logic 0 input results in a logic 0 output). Buffers are normally used to provide extra current drive at the output but can also be used to regularize the logic present at an interface.



*Fig 3: Buffer*

**Drivers:** This section is used to drive the relay where the output is complement of input which is applied to the drive but current will be amplified.

**Relays:** It is an electromagnetic device which is used to drive the load connected across the relay and the o/p of relay can be connected to controller or load for further processing.



*Fig 4: Relays*

**DC motor:** A DC motor relies on the facts that like magnet poles repels and unlike magnetic poles attract each other. A coil of wire with a current running through it generates an electromagnetic field aligned with the centre of the coil. By switching the current on or off in a coil its magnetic field can be switched on or off or by switching the direction of the current in the coil the direction of the generated magnetic field can be switched 180°.



*Fig 5: D C Motor*

## PROPOSED SYSTEM

The Proposed system contains various essential & critical features associated with Railways Safety & Monitoring. The highlight of this Embedded Safety Tool is that the single system helps us in Monitoring & Controlling of the Railway Safety parameters like:

A: Station Name Display in train: As the station approaches, the station name will be displayed on the screen inside the train. There is a RF transmitter fitted in the station and the receiver is fitted in the train. The transmitter sends the code of the station and it is read in the train receiver.

B: Automatic Station alerter/vibrator: As the station approaches, the respective station dropping passenger's seat vibrator/alerter starts activated inside the train. There is a transmitter fitted in the station and the receiver is fitted in the train. The transmitter sends the code of the station and it is read in the train receiver.

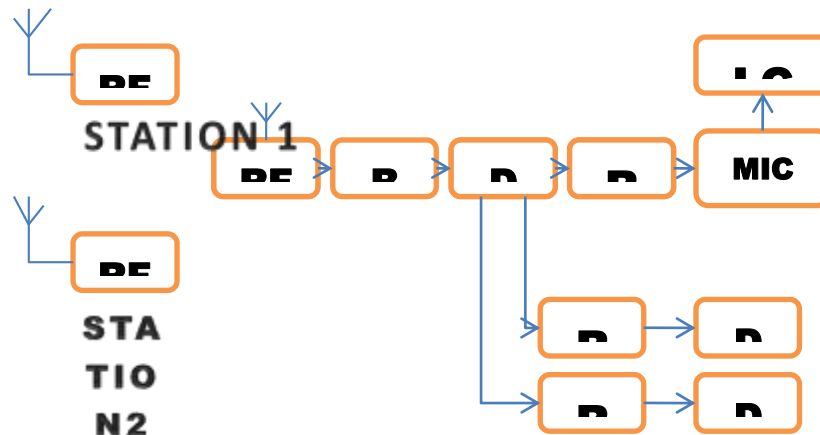


Fig 6: Passenger alerter & station name display system

C: Fire and smoke detector in train: There is a Temperature sensor in every compartment, if any fire occurs to the compartment then this temperature sensor will sense the fire and activates one relay for Back Compartment Detachment and Timer 1 will activate then after the timer 1 time period another timer i.e. Timer 2 will activate to Detach the Front Compartment.



Fig 7: Fire and smoke detection system in train & automatic detachment of compartment

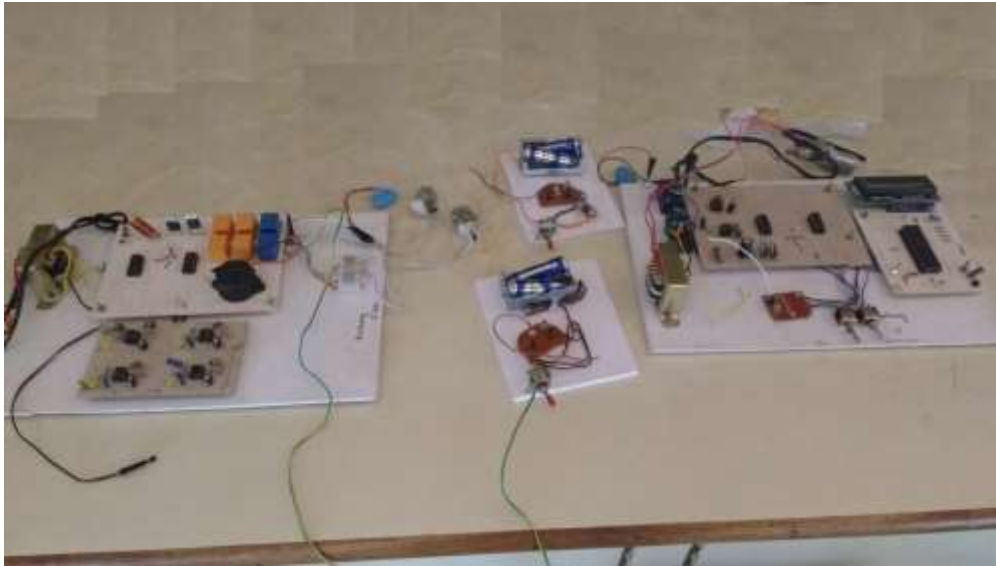
## IMPLEMENTATION

Station Name Display in train: As the station approaches, the station name will be displayed on the screen inside the train. There is a RF transmitter fitted in the station and the receiver is fitted in the train. The transmitter sends the code of the station and it is read in the train receiver.

Automatic Station alerter/vibrator: As the station approaches, the respective station dropping passenger's seat vibrator/alerter starts activated inside the train. There is a transmitter fitted in the station and the receiver is fitted in the train. The transmitter sends the code of the station and it is read in the train receiver.

Fire and smoke detector in train: There is a temperature sensor in every compartment if any fire occurs to the compartment then this temperature sensor will sense the fire and activates one relay for Back Compartment Detachment and Timer 1 will activate then after the timer 1 time period another timer i.e. Timer 2 will activate to Detach the Front Compartment.

### WORKING MODEL OF THE SYSTEM



*Fig 8: Working model of the proposed system*

### CONCLUSION

In this system, we have presented the RF based railway automation system using station display system, Passenger alerter, temperature sensors for fire safety mechanism. The idea can be implemented in large scale in the long run to facilitate better safety standards for rail and provide effective testing infrastructure for achieving better results in the future. This system surpasses the existing railway systems by using RF transmitter and receiver for station name display in the compartments and passenger alerting system. Also enabling various critical features associated with Railway Safety with the help of sensors enabling automatic detachment of fired compartment.

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