



GLOBAL JOURNAL OF RESEARCHES IN ENGINEERING: F
ELECTRICAL AND ELECTRONICS ENGINEERING
Volume 14 Issue 3 Version 1.0 Year 2014
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4596 & Print ISSN: 0975-5861

Rail Parameters Monitoring for the Fire Safety System in the Compartments using Automation Technology

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GJRE-F Classification : FOR Code: 290903



RAIL PARAMETERS MONITORING FOR THE FIRE SAFETY SYSTEM IN THE COMPARTMENTS USING AUTOMATION TECHNOLOGY

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Rail Parameters Monitoring for the Fire Safety System in the Compartments using Automation Technology

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I. INTRODUCTION

Travel is fascinating, of these train travel is comfortable. With the increased comfort level in train transport and traffic in rails we are in an extremely important situation to improve the safety concerns in train travel. This paper explains the safety measurements in compartments for the passengers to travel. Indian Railways is quite unique and distinctive in character, really a microcosm of India. To make it a safe and reliable system is an enormous challenge. The Railways has the most intricate and involved inter-dependencies. A single flaw in the 64,600 route kms of track that criss-cross the country, a defect in over 9,500 locos, 55,000 coaches and 2.39 lakh wagons that haul about 23 million passengers and nearly 2.7 million tonnes of freight every day, an incorrect indication on one of the thousands of signals that dot the rail landscape, a mistake or an act of negligence by one of its staff directly associated with train running, even a rash act by one of the millions of road users who daily negotiate around odd level crossing gates spread across the system, an irresponsible act of carrying inflammable goods—any one of these multiple possibilities has the potential to cause a major tragedy. Added to these are the acts of sabotage by misguided elements spanning the whole country. Thus utmost vigil is safety in operations and also security of the traveling

public is accorded by the Railways. Despite a number of safety drives carried out by railways, fire accidents continue to take place, raising serious questions over the effectiveness of the national transporter's preparedness. There were 10 major fire incidents on trains since 2012 which claimed 65 lives besides causing a damage to the railways to the tune of around Rs 8 crore. Realising the seriousness of the situation, the railways is now planning to introduce an Australian technology to make fire alarms efficient. On 30 June, 2012, 35 passengers were killed and 25 others injured when a coach of the Delhi-Chennai Tamil Nadu Express caught fire near Nellore in Andhra Pradesh Though railways claim to have taken various measures to prevent fire in trains, recurrence of such mishaps on regular basis is a matter of concern for the government This paper also explains the possible future in automation compartments system in global scale. These system design is very cost worth system and on implementation can yield better results. India leading in the train compartments all over the world and with its varsity will be the best place to implement the system. This system comes in challenging models with TAS.

II. TRAIN- FIRE ACCIDENTS

The term "accident" envelopes a wide spectrum of occurrences with or without significant impact on the system. Consequential train fire accidents include mishaps with serious repercussion in terms of loss of human life or injury, damage to railway property or interruption to rail traffic in excess of laid down threshold levels and values. These consequential train accidents include collisions, derailments, fire in trains, road vehicles colliding with trains at level crossings, and certain specified types of "miscellaneous" train mishaps. Why we have taken this survey there are lot of fire accidents happens in train continuously. So in this proposed paper we are going to give the basic idea to avoid the fire accidents. Here the Table showing the trend of train Fire accidents on Indian Railways since 1960-61 is as follows:

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Table 1 : Train Fire Accidents on Indian Railways since 1960-61

Year	Fire in trains
1960-61	405
1961-62	236
1962-63	55
1963-64	81
1964-65	31
1965-66	42
1966-67	50
1967-68	42
1968-69	48
1969-70	47
1970-71	12
1971-72	22
1972-73	25
1973-74	13
1974-75	23
1975-76	27
1976-77	16
1977-78	14
1978-79	12
1979-80	21
1980-81	29
1981-82	23
1982-83	20
1983-84	17
1984-85	30
1985-86	21
1986-87	13
1987-88	12
1988-89	3
1989-90	8
1990-91	9
1991-92	9
1992-93	9
1993-94	3
1994-95	5
1995-96	5
1996-97	4
1997-98	6
1998-99	6
1999-2000	21
2000-01	17
2001-02	9
2002-03	14
2003-04	14
2004-05	10
2005-06	15
2006-07	4
2007-08	5
2008-09	3
2009-10	2
2010-11	2
2011-12	4
2012-13 (upto January 2013 Prov.)	8

Fire on a running train is more catastrophic than on a stationary one, since fanning by winds helps spread the fire to other coaches. Moreover, passengers sometime jump out of a running train on fire resulting in increased casualties. In case of fire in running train, every railway staff available on the train or at the site shall immediately try and stop the train and plunge into action to save lives and property.

a) *Following Sources are main causes of fire in trains*

- Carrying stoves, sigris, gas cylinders, kerosene oil, petrol, fire works etc. in passenger compartments.
- Lighted match sticks, cigarette ends carelessly thrown.
- Short circuit in electrical wirings.

All railway staff and passengers should take all possible precautions to avoid any of the above mistakes so that possibility of fire breaking out can be minimized. In general fire originates in a small level. When it is surrounded by burning materials with adequate supply of air, fire spreads.

b) *Action to be Taken in case of fire in Train*

- First and foremost immediately summon the fire brigade.
- Secondly, if you smell gas or vapour, or even in case of excessive smoke, hold a wet cloth loosely over your nose & mouth and breath through it in as normal a manner as possible.

III. LITERATURE REVIEW

a) *Existing Methods*

i. *Measures to reduce incidents of fire in trains:*

IR have always endeavoured to enhance fire worthiness of coaches by using more fire retardant furnishing materials such as Compreg Board/PVC for coach flooring, laminated sheets for roof, ceiling wall & partition panelling, rexene and cushioning material for seats and berths, FRP windows and UIC vestibules etc. Specifications for such furnishing materials have been periodically upgraded to incorporate the fire retardant parameters in line with UIC/other international norms. All new manufacture of coaches/periodical overhauling of existing coaches is being carried out with fire retardant specifications of the furnishing materials. With a view to improve fire safety in running trains, a pilot project for provision of Comprehensive Fire and Smoke Detection System has been taken up in one rake of Rajdhani Express on East Coast Railway. Similar automatic fire alarm system in 20 more rakes for extended field trials has also been decided. Guard-cum-Brake Van, AC coaches and Pantry Cars in all trains are provided with portable fire extinguishers to cater for emergencies due to fire accidents. Improved materials for electrical fittings and fixtures such as MCB, light fittings, terminal boards,

connectors, etc., are being used progressively. Detailed instructions have been issued to Zonal Railways for observance of safe practices in handling of pantry cars and for ensuring periodical inspection of electrical and LPG fittings in the pantry cars. Intensive publicity campaigns to prevent the travelling public from carrying inflammable goods are regularly undertaken. Measures have also been taken to prevent fire due to electrical short circuits in coaches, which include three levels of protection in non AC coaches in case of short circuits. Failure of 1st level fuse protection will cause fuse at 2nd level and 3rd level to protect the coach from short circuit. To enhance electrical safety of coaches, only halogen free, fire retardant, low smoke e-beam irradiated cable is being provided in new coaches. Two separate Fire Safety Audit Teams have been constituted recently to plan fire safety audits.

b) Proposed System

The proposed system implements the Fire Safety system (FSS) using automation techniques. In this techniques the train engine wants to be fully automated, so we can called (ATE) Automated train engine. In this concept ATE is fully automated and connected to all the coaches from engine. In all the compartments we want to fix the temperature sensor and alarm, whenever the temperature exceeds in the coaches the temperature sensor will sense and it will send the message to the engine through zigbee. At the same time (ECU) Engine control unit is fixed with Alarm & LED. So the signal will be received from coaches, the alarm will blinks and at the simultaneously time the LED will shows which compartment is having the fire. Here in this scenario we have to take two conditions because in all trains we are having two types of coaches AC & Non AC. So we will fix the temperature sensor based on the coaches. At the same time we want to fix the alarm in all coaches to give alert to all passengers.

IV. HARDWARE MODULE

a) Zigbee WSN

The sensor is a basic unit and platform of the wireless sensor network. A sensor is commonly composed of a sensor module, a processing module, a ZigBee wireless module and a driver display module. The sensor module is responsible for wave Avoidance of Fire Accident on Running Train Using ZigBee Wireless Sensor 585 electrical conversion and collecting parameters such as relative humidity and atmospheric temperature. This module processing is used to calculate the temperature, sensing alarm node and sending the signal to engine driver. The ZigBee wireless module is responsible for receiving a reliable signal and it illuminates the warning light indicating to stop the train by engine driver. The LED display module monitors the coaches and prevents the fire accidents by using Temperature sensor. In this Sensor, it calculates the

increased temperature over the atmospheric temperature and then it transmits the signal to the engine driver through ZigBee wireless technology. Simultaneously alert the passenger by alarm.

b) IR Temperature sensor

Temperature sensor been common place in a variety of automotive applications, enabling the enhancements of automotive systems. The ongoing trends to improve the systems performance and efficiencies, the driver convenience and reduction of emissions to drive new temperature sensor applications. The paper will discuss the IR temperature sensors how to protect the fire compartments in the rails. The IR temperature sensor is used to measure the temperature of the train coaches. The readings from this sensor are then fed back to the Engine control unit (ECU). This data from the sensor is then used to find out the temperatures position of the Coaches through LED.

c) LED

The led used here is to know for the coach temperature position. If temperature is increasing in some coaches it will shows in the LED display.

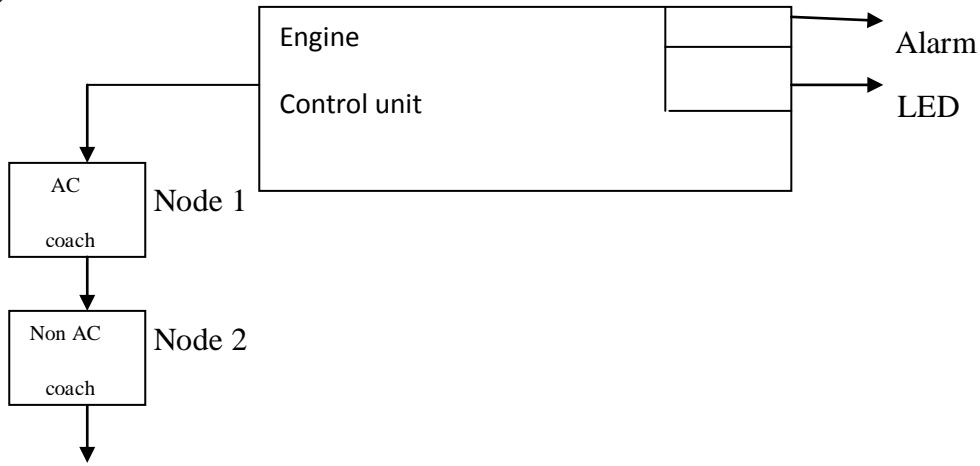
d) High Alarm Detection

Here we are using high detection to find the fire accidents; due to some malfunctions in the coaches the alarm will blinks and the engine driver will stop the train. At the same time alarm fixed in the coaches it will give alert to the passengers.

V. NATURE OF WORK

Here our work is to design the coaches with IR temperature sensor and alarm in the coaches. In trains all coaches want to be fixed with the IR temp sensor. Before we are going to fix the IR temperature sensor we have to fix the sensor in two modules. One module for AC coaches and other for the Non AC Coaches. The IR temperature sensor is fixed in all coaches, all sensor are interconnected in the serial row with WSN and it will send the message to the ECU through Zigbee communication. All sensor in the coaches connected to the node 1 and node 2, and the nodes are connected with the gateway sensory node and then to the Engine control unit. If the Temperature will exceeds in the both modules, the temperature sensor will sense and it will send the signal to the ECU, at the same time ECU is fixed with Alarm and LED. So once the signal gets received the alarm will blink in engine and in coaches also. Now with the help of alarm the driver can stop the train and they monitor the coaches with LED which coach is having fire alert. Here in this scenario the condition will differ for two modules. Because the AC & Non AC coaches having different temperature. The alarm already fitted in the coaches it will give alert to the passengers.

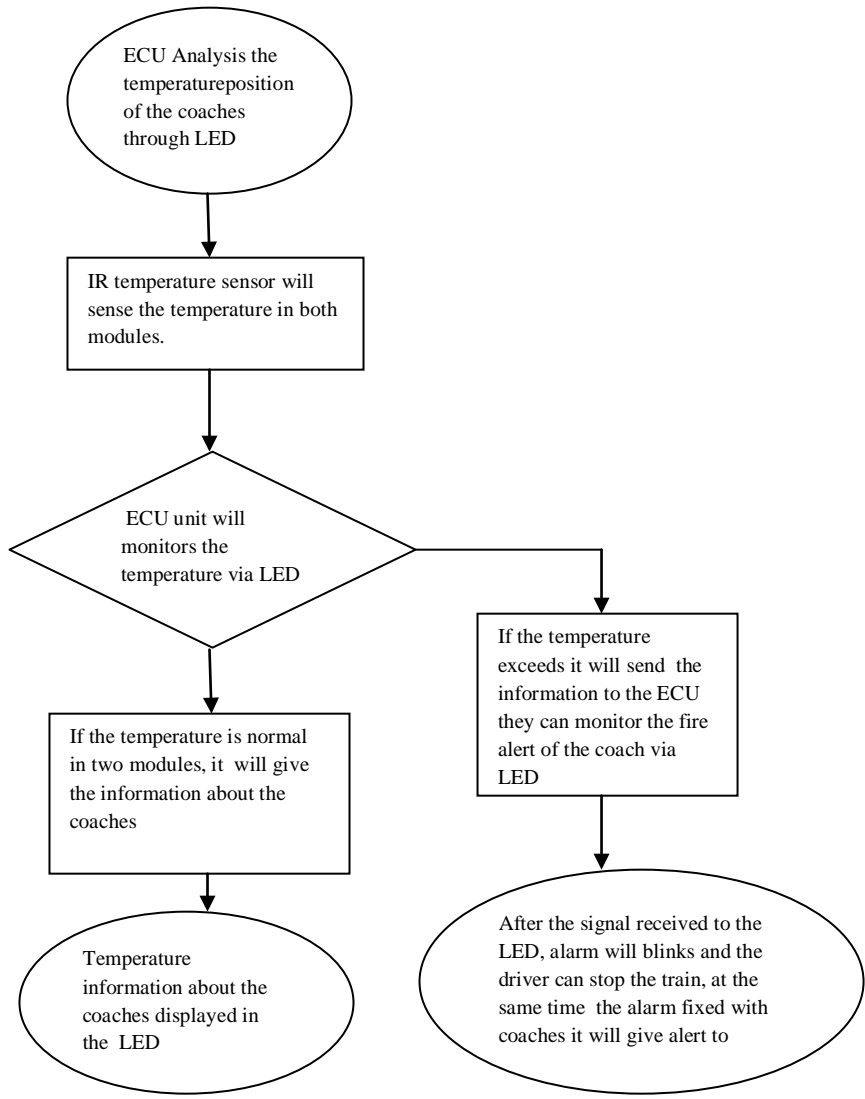
• *Block Diagram*



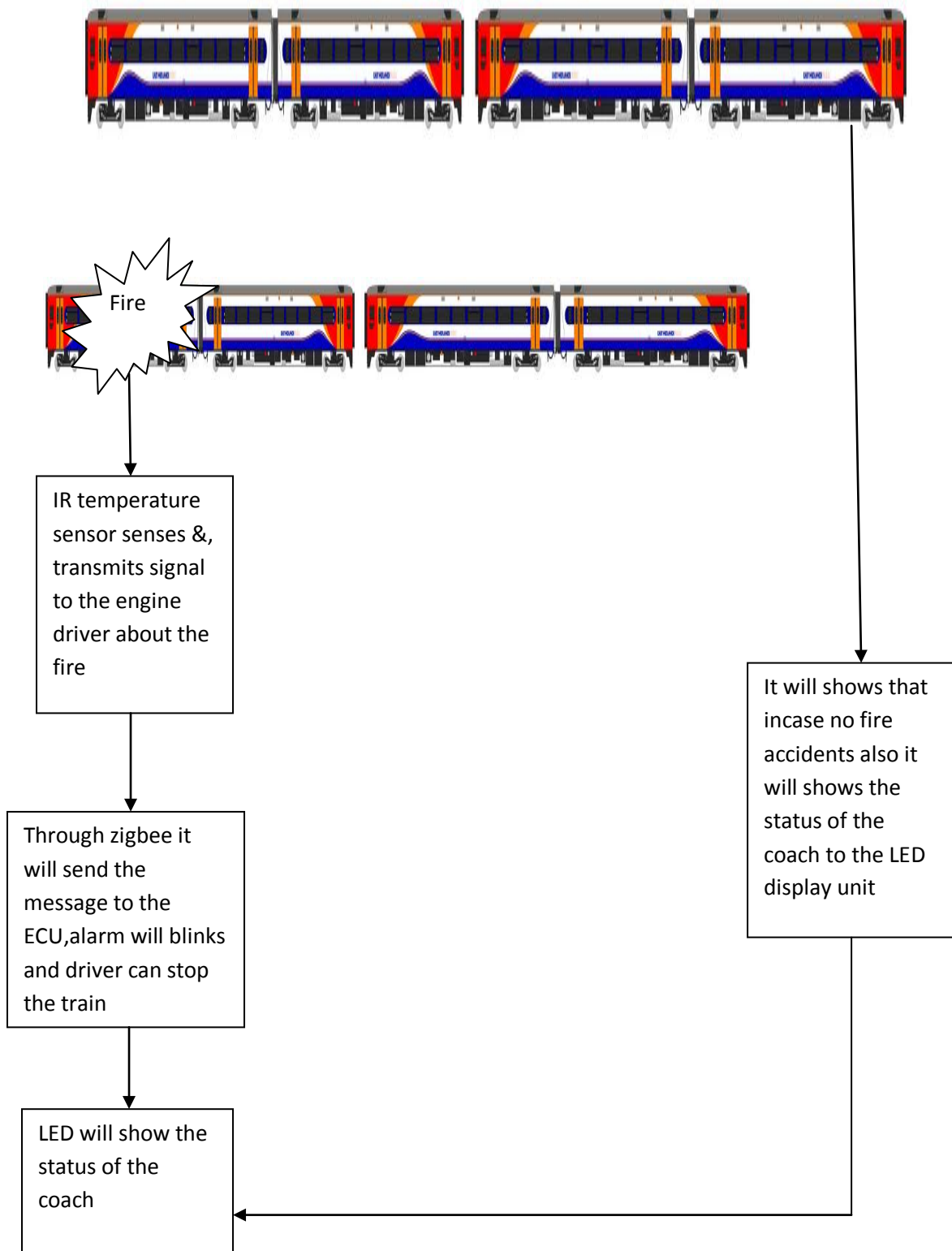
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• *Flow Chart Design*



- Overall View Process



VI. CONCLUSION

Safety has come to be recognized as the key issue for the railways and one of its special attributes. No railway system can survive by ignoring this vital aspect as safe and timely transit is not only significant for passenger traffic but also for transportation of materials, in today's highly competitive environment. In recent years, safety of railways is becoming over arching concern in major countries like USA, England, Australia and those governed by the European Commission. In the working of railways system in these countries, the trend is to statutorily ensure that safety is accorded highest priority. Thus, the above scenario presents a strong case for immediate steps to bolster safety orientation of Indian Railways along with inculcating a culture of zero tolerance of accidents. The constant Endeavour of the Indian Railways is to become the leader in the nation's transportation sector by providing modern, reliable, safe, customer-led and customer-focused services to the nation. Safety is an ethos that should pervade all activities of railway operations and maintenance. There are lot of train accidents happens like Detection, collision, derailment, fire. Here we can take the analysis for fire safety system and the proposed model also discussed. The survey taken from Indian railway networks alone and solution also discussed for this only. To reduce the fire accidents this methods will definitely applicable. Once we tried this design in real time it will helpful for railway to reduce the fire accidents in the coaches at the same time we can assure that it will save the fire accidents.

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