

# Fire Suppression System in Locomotives

Munaga Siva Prasanth, Kallepalli Venkatesh

**Abstract:** Still we had seen a lot of fire accidents and gas leakages are present in trains. So in this paper it is a remedy to reduce the death loss occurring due to fire accidents in trains. Fire on a running train is more catastrophic than on a stationary one, since fanning by winds helps spread the fire to other coaches. The damage is heavier due to improper reach of service at right time due to improper communication. This time delay is causing heavier damage. Thus, eliminating the time between when an accident occurs and when first responders are dispatched to the scene decreases the damage. This projects help in notifying the passengers and emergency services. The project consists of a microcontroller which is interfaced with the thermistor, gas sensors, water sprinkler and GSM modem, Once the sensors attached in the compartments of train sense the gas detection and fire detection, it assumes a fire accident. The controller assumes it as an emergency and power supply will be automatically off, starts the buzzer, doors are opened, Sprinkler on and GSM modem present in the train sending the message alert to loco pilot and near the railway stations.

**Keywords:** Sprinkler, D.C. Motor, Thermistor (NTC) & Smoke sensors, GSM, Buzzer, Submergible pump or centrifugal pump.

## I. INTRODUCTION

Security in travel is primary concern for everyone. Now a days fire accident are most often occurring in trains. When these accidents are occurring in remote areas or during night times the loss or damage being caused is at higher rates. The damage is heavier due to improper reach of service at right time due to improper communication. This time delay is causing heavier damage. Thus, eliminating the time between when an accident occurs and when first responders are dispatched to the scene decreases the damage. One approach to stop the fire is by identifying the water sprinklers is automatically on, power supply will be automatically off, doors are automatically opened. Passengers will be notified by ringing the buzzer and loco pilot and near the railway stations will be notified by sending the message alert. In the same time the railway authorities and emergency services are notified by sending SMS through GSM service.

## II. SYSTEM ARCHITECTURE

Once there is a fire accident, immediately the fire sensor will immediately sense the change in temperature and thus the micro controller is supplied with power supply. When there is no fire accident the sensor was not activated and the micro controller is not working. In case the fire sensor is activated in compartments sends a signal and the power supply, GSM, Buzzer, dc motors, sprinkler which are kept ON all the time will respond.

The GSM modem will be Send messages continuously. The GSM modem will then send messages to the numbers specified about the accident specifying the latitude and longitude values. The micro controller is supplied with power supply. In case Any sensor is activated, immediately the water sprinkler and buzzer will be ON And at the same time doors are automatically opened.

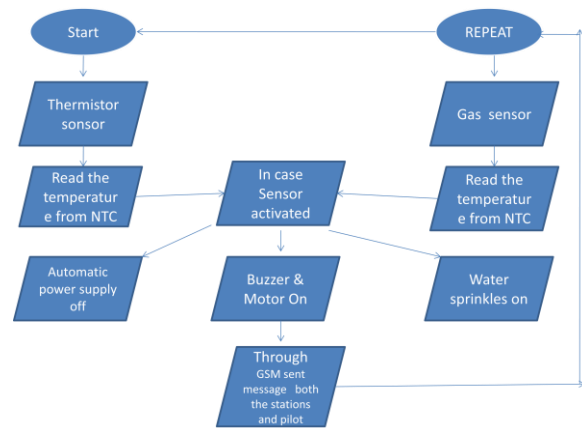


Fig.1 Flow Diagram of Micro Controller

### Block Diagram of Micro controller:

Here we are using an AT89C52 microcontroller is interfaced serially to a DC MOTORS (automatically door opening system) Centrifugal pump (water sprinkler), buzzer (alert all the passengers), GSM Modem. A GSM modem is used to send the position (Latitude and Longitude) of the vehicle from a remote place and message alert. The same data is sent to the mobile at the other end from where the position of the vehicle is demanded. An EEPROM is used to store the mobile number. The hardware interfaces to microcontroller are GSM modem. The design uses RS 232 protocol for serial communication between modems and microcontroller. A serial driver IC is used for converting TTL voltage levels into RS 232 voltage levels.

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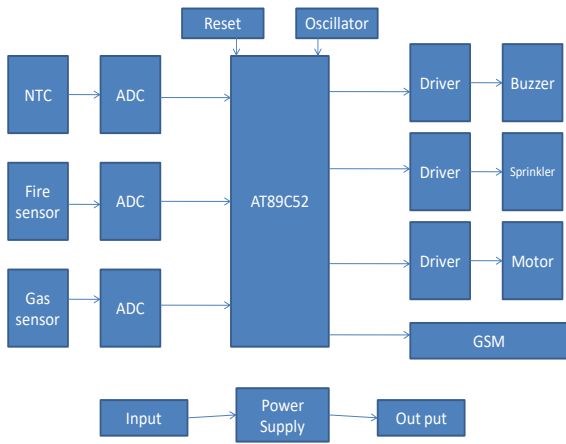


Fig.2 Block Diagram of Micro Controller

III. HARDWARE DESIGN

**The Information Detection Module:**

Information detection module consists of fire sensor and gas sensor installed in every copes of all compartments in the train. Whenever fire accident occurs any of the cope in the bogie. The sensor senses and immediately it sends signals to the microcontroller in engine. Fire sensor and smoke sensor consist of modern sprinkler systems with the help of centrifugal pump. A wireless sensor network, which combines computer and communication technology with the technology of sensor network, is considered to be one of the emerging technologies that will affect the future of human civilization. This network is composed of numerous and ubiquitous micro sensor nodes which have the ability to communicate and calculate. These nodes can monitor sense and collect information of different environments and various monitoring objects cooperatively. Compared with other wireless technologies, GSM has unique advantages of safe and reliable data transmission, an easy and flexible network configuration, low Cost. Thus, it has great development potential and a promising market application in the field of industrial control. By applying a wireless sensor network based on microcontroller, GSM to a train fire detection system, information such as temperature and humidity at any place of the train is covered by the network could easily be collected, dealt with and analyzed at any time. In addition, the system can be extended significantly, the cost of equipment maintenance could be reduced and the whole system could be optimized.

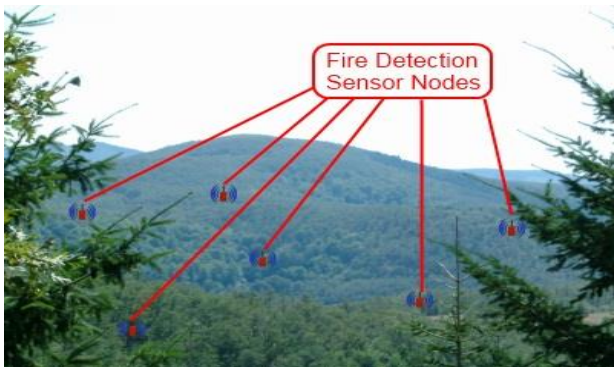


Fig.3 (a) Wireless fire and smoke sensors are used the forest area based on the GSM

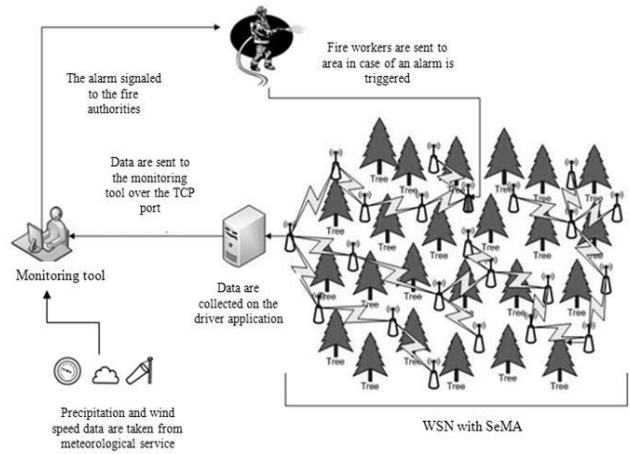


Fig.3 (b) Wireless fire and smoke sensors are used the forest area based on the GSM



Fig.4 Water sprinklers are used in the forest area With the help of sensors and GSM technology



Fig.5 Water sprinkler are working on forests with high pressure

**Message Transmission Module GSM**

Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication. GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz frequency.



Cellular is one of the fastest growing and most demanding telecommunications applications. GSM (Global System for Mobile communication) is a digital mobile telephony system that is widely used in Europe and other parts of the world. GSM uses a variation of time division multiple access (TDMA) and is the most widely used of the three digital wireless telephony technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It operates at either the 900 MHz or 1800 MHz frequency band.

The structure of a GSM network: The network is structured into a number of discrete sections: The *Base Station Subsystem* (the base stations and their controllers). The *Network and Switching Subsystem* (the part of the network most similar to a fixed network). This is sometimes also just called the core network. The *GPRS Core Network* (the optional part which allows packet based Internet connections). The *Operations support system (OSS)* for maintenance of the network.

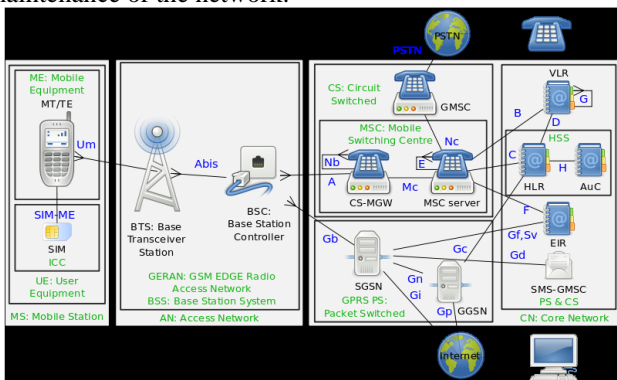
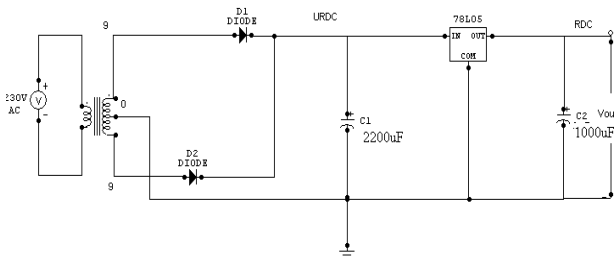


Fig.6 Structure of GSM network

IV. SCHEMATIC DIAGRAM

Power Supply Design



In this power supply we are using on transformer, diodes, capacitor etc.

Complete Schematic:

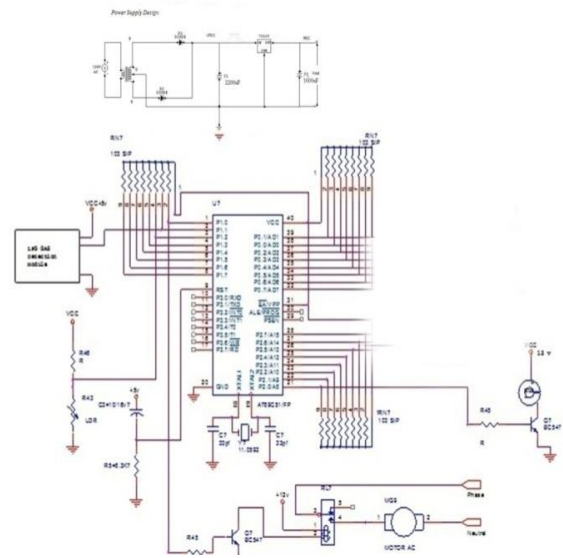


Fig.7 Circuit Diagram

V. CONCLUSION

The main importance of the system is to reduce the fire accidents and gas leakages. At the same time it requires less maintenance which would increase the income as money spend on maintenance will be saved. The life time of the system is more than the existing system. System size is reduced drastically.

The project is an idea of how technology has developed in reducing the human affords and how large systems are being replaced by small and effective systems. The idea implemented here is to make the large individual systems for measurement of various parameters in loco can be replaced by a small individual system which is more accurate.

VI. TRADITIONAL WORK



Fig.8 Making a railway coach

We are making a railway coach of working model. And start the project with electronic gadgets. It can successfully complete.



**Fig.9 Final report of this project**

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