International Journal of Advanced Research and Development
ISSN: 2455-4030, Impact Factor: RJIF 5.24
www.newresearchjournal.com/advanced
Volume 1; Issue 5; May 2016; Page No. 12-15

Railway protection system using Lm-35 sensor

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Abstract
Now-a-days, fire accidents are occurring very frequently in public transport system which causes the loss of most valuable human lives and the government property. There are a number of methods to avoid fire accidents and to reduce the severity of loss in case of fire accidents in public transport system. But the damage is catastrophic as a rescue service could not reach at right time due to improper communication. So we can further reduce the loss caused by fire accidents in trains and buses if we are able to inform the respective authorities immediately after the accidents and open the emergency door automatically. The system which is proposed in this paper uses the modern technology to detect the fire accidents and also to inform the respective authorities with minimum delay. Three types of sensors fire, smoke and heat sensors are used to detect the fire accidents. The signals from these sensors will activate the microcontroller which in-turn activates the message transfer system, alarm system, water sprinkler system and the motor to automatically open the emergency door of the bogie in which the accident took place. The proposed system is designed by using GSM technology and AT89c52 microcontroller along with sensors.

Keywords: GSM, Microcontroller, Motor drivers, Sensors, Water sprinklers, LCD Displays

Introduction
The railway system is an important transportation system in our country. Most of the trains in our country are the induction trains and hence there a chance of fire mishaps. Fire on a running train is more catastrophic than on a stationary one, since fanning by winds helps spread the fire to other coaches very soon after the accident. Moreover, passengers sometimes jump out of a running train on fire resulting in increased casualties. These fire accidents are causing serious threat to lives of people. Although there are sophisticated protection parameters in the existing system but the time taken by those systems to detect the accident and to inform the respective authorities is high. For avoiding the fire accident we can use an automatic fire accident avoiding system which senses the fire and alarms the passengers, driver and guard of the train. It also helps to put off the fire by using automatic water sprinklers and emergency door also gets opened. As soon as the fire is sensed a message is sent to relevant controlling authorities to take further action. For sending the message to relevant controlling authority GSM technology can be used.
The fire may occur in any form of activities such as short circuit in the electrical wires, prohibited activities of carrying explosive materials and smoking. The system can detect fire in three aspects: 1. Fire 2. Temperature increase (Heat) 3.Smoke. From the information collected from the sensors decisions of stopping the train, opening the emergency doors, automatic water sprinkling, and sending message to relevant authorities are made quickly by this system. It also gives message about the train in which the accident took place and what is detected i.e.; smoke or heat.

Block Diagram of the System
In this system microcontroller and the sensors are the main elements. Along with these there are a motor, an LCD display, water sprinklers and a GSM modem. The two sensors are placed in the bogie at the appropriate places to detect the fire. They are connected to the microcontroller by using connecting wires. The block diagram of the system is shown in the Figure 1.Fire accident if any occurs in the trains will result in smoke, and then a high degree of heat. So whenever a fire accident occurs in trains any one of the sensors or all the sensors will be activated and will give the signal to the microcontroller.

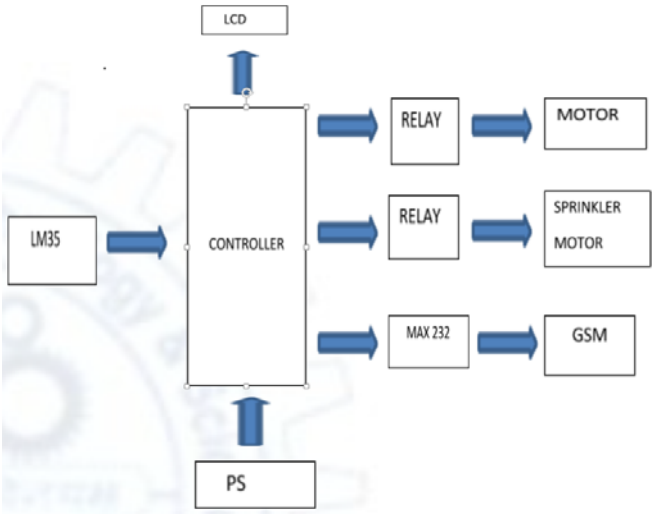

Fig 1: Block diagram of the system

Immediately the controller turn ON the water sprinklers to extinguish the fire, motor to open the emergency door. The GSM system is also activated and sends an emergency message to the mobile numbers of the officials which are already stored in the memory. An LED display is also provided in the bogies to display the alert message and the

condition of the GSM system. The maximum power needed to operate the circuit is +5V DC.

Microcontroller

Microprocessors and microcontrollers stem from the basic idea. The contrast between a microcontroller and a microprocessor is best exemplified by the fact that most microprocessors have many operational codes for moving data from external memory to the CPU; microcontrollers have one or two operational codes. The microprocessor is concerned with rapid movement of code and data from external addresses to the chip; the microcontroller is concerned with rapid movement of bits within the chip. The microcontroller can function as a computer with the addition of no external digital parts; the microprocessor must have additional parts to be operational.

In this system we are taking 8052 MICRO CONTROLLER.A High-speed 8-bit Micro controller with 8k bytes of flash memory is used. The Microcontroller has serial ports for interfacing with zigbee modem. The timings are generated through a Quartz crystal oscillator operating at 11.09 MHZ is used. And MAX232 is a Serial Line Driver used to establish communication between microcontroller and modem.

Features of 8052:

- Compatible with MCS-51 product.
- 8 K Bytes of In-System reprogrammable flash memory.
- Endurance: 1000 Write/Erase Cycles.
- Fully static operations 0 HZ-24 MHz Three-level program memory lock.
- 256× 8-Bit internal RAM.
- 32-programmable Input/output lines.
- Three 16-Bit Timers/Counters.
- Eight Interrupt sources.
- Programmable Serial Channel.
- Low power Idle and Power-down Modes.

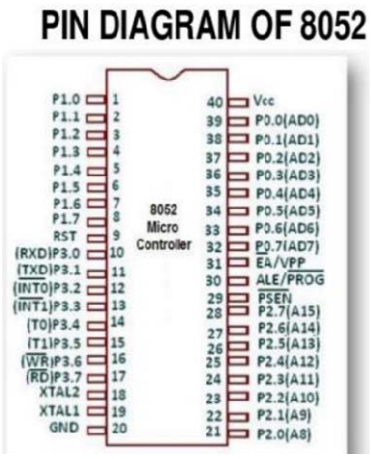

Fig 2: Pin Diagram of 8052 MC

Sensors

LM 35 Sensor

LM 35 is a precision IC temperature sensor with its output proportional to the temperature (in ºC). The sensor circuitry is sealed and therefore it is not subjected to oxidation and other processes. With LM35, temperature can be measured more accurately than with a thermistor. It also possess low selfheating and does not cause more than 0.1 ºC temperature rise in still air. The LM35 datasheet specifies that this ICs are precision integrated-circuit temperature sensors, whose output voltage is linearly proportional to the Celsius (Centigrade) temperature.

The LM35 thus has an advantage over linear temperature sensors calibrated in ˚ Kelvin, as the user is not required to subtract a large constant voltage from its output to obtain convenient Centigrade scaling. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4 ˚C at room temperature and ±3⁄4˚over a full −55 to +150 ˚C temperature range.

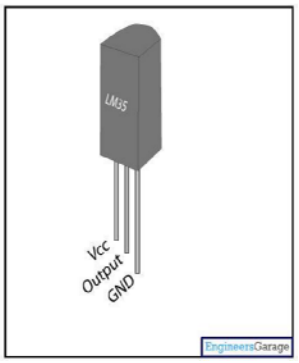

Fig 3: LM35 SENSOR

LM35 Features

- Calibrated directly in º Celsius (Centigrade)
- Linear + 10.0 mV/ºC scale factor
- 0.5ºC accuracy guarantee able (at +25ºC)
- Rated for full −55º to +150ºC range
- Suitable for remote applications
- Low cost due to wafer-level trimming
- Operates from 4 to 30 volts
- Less than 60 µA current drain
- Low self-heating, 0.08ºC in still air
- Nonlinearity only ±1⁄4ºC typical
- Low impedance output, 0.1 Ω for 1 mA load

Smoke Sensor

Photoelectric diode can be used as a smoke detector. The light from the light source on the left shoots straight across and misses the sensor. When smoke enters the chamber, however, the smoke particles scatter the light and some amount of light hits the sensor**.** The sensor then sets off the horn in the smoke detector. Photoelectric detectors are better at sensing smoky fires, such as a smouldering mattress.

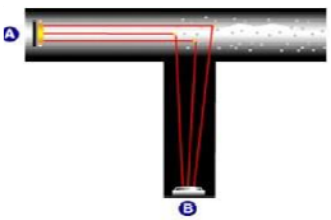

Fig 4: Smoke Sensor

GSM Technology

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 A GSM modem is a wireless modem that works with a GSM wireless network. A wireless modem behaves like a dial-up modem. The main difference between them is that a dialup modem sends and receives data through a fixed telephone line while a wireless modem sends and receives data through radio waves. Definition: GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services. GSM differs from first generation wireless systems in that it uses digital technology and time division multiple access transmission methods. GSM is a circuit-switched system that divides each 200 kHz channel into eight 25 kHz time-slots. GSM operates in the 900MHz and 1.8GHz bands in Europe and the 1.9GHz and 850MHz bands in the US. The 850MHz band is also used for GSM and 3GSM in Australia, Canada and many South American countries. GSM supports data transfer speeds 9.6 kbit/s, allowing the transmission of basic data services such as SMS (Short Message Service). GSM satellite roaming has also extended service access to areas where terrestrial coverage is not available. The transmission power in the handset is limited to a maximum of 2 watts in GSM850/900 and 1 watt in GSM1800/1900. GSM has used a variety of voice codec's to squeeze 3.1 kHz audio into between 5.6 and 13 Kbit/s. Originally, two codes named after the types of data channel they were allocated, were used, called Half Rate (5.6 Kbit/s) and Full Rate (13 Kbit/s). These used a system based upon linear predictive coding (LPC). In addition to being efficient with bitrates, these codes also made it easier to identify more important parts of the audio, allowing the air interface layer to prioritize and better protect these parts of the signal.

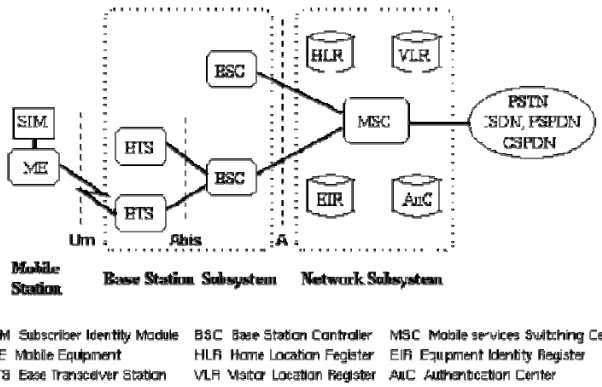

Fig 5: Architecture of GSM

GSM Characteristics

- TDMA over radio carriers (200 KHz carrier spacing).
- 8 full rate or 16 half rate TDMA channels per carrier.
- User or terminal authentication for fraud control.
- Encryption of speech and data transmission over the radio path.
- Low speed data services (up to 9.6 Kb/s).
- Support of short message service (SMS).

Advantages of GSM

- Capacity increases.
- Reduced RF transmission power and longer battery life.
- International roaming capability.
- Better security against fraud.
- Encryption capability for information security and privacy.
- Compatibility with ISDN, leading to wider range of services.

Water Sprinklers

The main function of the water sprinkler is for sprinkling the water. In this system when the sensors get activated it produces power to the motor and the watis released through the water sprinklers. Some of the models of the water sprinklers that are used in the train bogies are as follows

Fig 6: Water sprinklers

Result

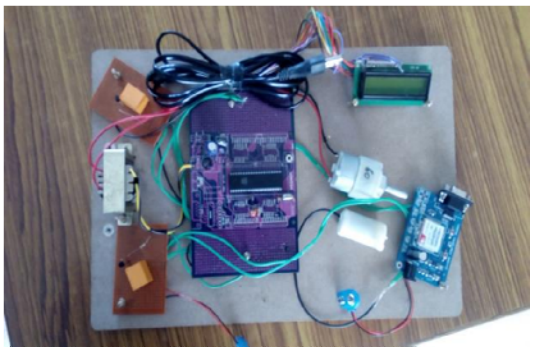

Fig 7: Target board

Fig 8: After Detection

Fig 9: Sends SMS using GSM technology

Fig 10: Temperature sensor on

Fig 11: Smoke sensor on

Conclusion

Human lives which are the most valuable and priceless thing in the world are getting affected due to the delay in the systems used for detection in case of fire accidents that are occurring in trains. So, we have proposed a system which uses the modern technologies such as sensor technology and the familiar technology such as GSM to reduce the delay in detection of fire accidents and alerting the respective authorities. The proposed system needs a much less power for its operation and is also cheap. So we can reduce the loss caused by fire accidents in trains. In future with advent of the wireless sensor technology the system can be made further faster and reliable.

References

1. JA Stankovic, TF Abdelzaher, C Lu, L Sha, JC Hou. Realtime communication and coordination in embedded sensor networks.
2. The 8051 Micro Controller Architecture, Programming and Application by Kenneth J aioli.
3. Micro Controllers [Theory and Applications] by Ajay V Deshmukh
4. Introduction to fire prevention by Robert W.Kl in off.
5. By John Vetelion Aravind Reghu Sensor Thermistors Frederick Josept Hyde.
6. http://www.atmel.com
7. www.technologystudent.com
8. www.electronicschematic.com