Early Stage Detection of Fire Accidents Using Gsm and Gps Modules

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ABSTRACT— *Now a days there is a problem with fire detection & establishing immediate protection against fire in Trains, Buses etc, and also difficult to sending message to the relevant controlling authority and finding the position of train. The existing system is a complete manual one, sometimes detection is there but, there are no protection parameters. Here we have taken a train as an example and established a complete control system in train bogies. The control system automatically detects fire, smoke, heat in three aspects if anything occurs it automatically sprays water through the sprinklers in bogies itself and automatically exhausts a carbon dioxide gas immediately along with the voice through voice module to alert passengers, it subsequently opens the emergency window of the bogie automatically with help of bidirectional reversible linear motors. One more facility is awarded is that the alarm which is in the form of voice is alerting the driver and guard and subsequently sends SMS to the driver, guard, nearby station (relevant authorities) along with the position of train using GPS module. This is a complete automation project man made mistakes of preventive maintenance can be eliminated with this. It is completely designed with Micro controllers, Sensors, Regulators, GSM Modem, GPS module and Drivers etc.*

Keywords: **GSM Modem, GPS module, voice module, sprinklers etc**.

PREVIOUS MODEL

In previous model they used only GSM and GPS modules which are used to send the message and position of train along with water sprinklers to avoid fire in bogies. It subsequently opens the emergency window of the bogie automatically with help of bidirectional reversible linear motors.Only alarm is used in previous model to alert the passengers.

PROPOSED MODEL

In your proposed model we are using GSM, GPS modules along with water sprinklers to avoid fire .we also using bidirectional motors to open emergency doors of bogies automatically. In place of alarm we are using voice message to alert passengers in bogies using "**VOICE MODULE**".

INTRODUCTION

The trains are one of the vehicles used for transportation. Most of the trains we have are induction trains there is 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. 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. There are no sophisticated protection parameters in the existing system protecting people's lives from there fire accidents has become a serious

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concern now. 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 the further action. For sending the message to relevant controlling authority GSM technology can be used to know the position GPS module is used and to alert the passengers through voice using voice module is 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 along with the position of the train to relevant authorities and are made quickly by this system.

CRITERIA OF CHOOSING AT89C52 MICRO CONTROLLER

GPS The AT89C52 is a low-power, high-performance CMOS 8-bit microcomputer with 8K bytes of Flash programmable and erasable read only memory (PEROM). The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry-standard 80C51 and 80C52 instruction set and pinout. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional nonvolatile memory programmer. By combining a versatile 8-bit CPU with Flash on a monolithic chip, the Atmel AT89C52 is a powerful microcomputer which provides a highly-flexible and cost-effective solution to many embedded control applications.
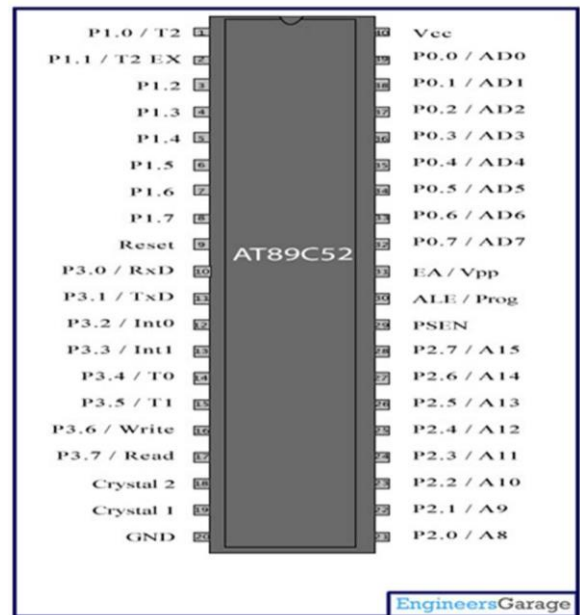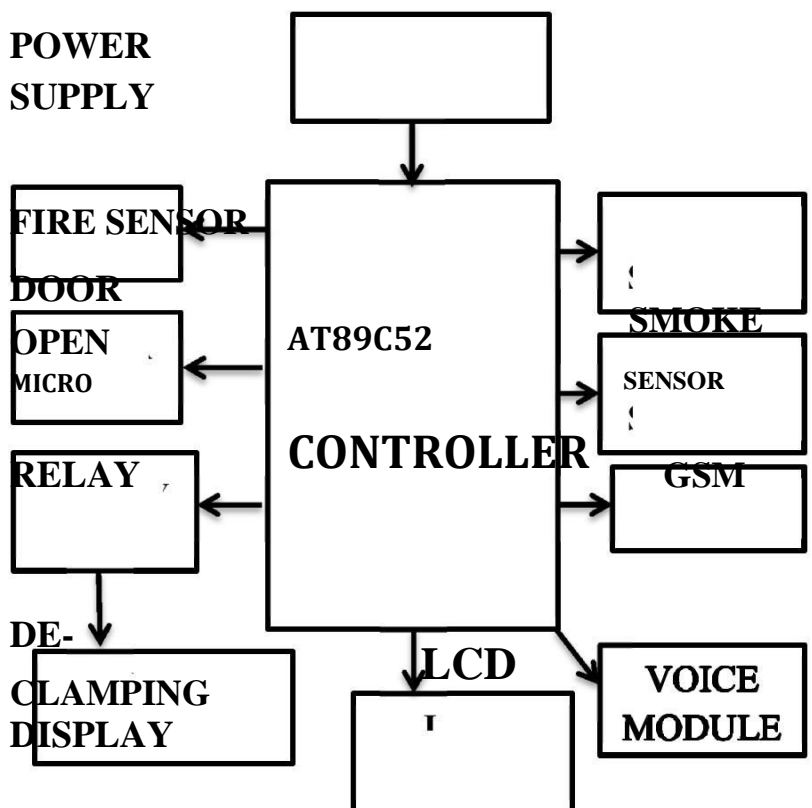
PIN DIAGRAM

FIG:PIN CONFIGURATION OF AT89C52 MICRO CONTROLLER

BLOCK DIAGRAM

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Explanation:

The Block diagram consists of a GSM modem, a Micro controller, a LCD display, sensors, buzzers and power supply.

A GSM modem is used to get the messages from the mobile as well as reading the message also. In this system mainly we have microcontroller, power supply, LCD, GSM. A Micro controller is a heart of this project. The total controlling action will be done through this micro controller. Here we have taken train as an example and established a complete control system in the train bogies. When the fire, heat, smokes has detected by the sensors then it automatically sends a message to the relevant control system with the help of microcontroller and GSM modem. After the signal send by the GSM modem, it also ensures the fire sprinkler system gets operated and the fire extinguisher or the temperature is brought down subsequently. One more facility is awarded is that the alarm is alerting at the driver and guard with bogie member indication and subsequently sends SMS to the driver, guard, nearby station with the help of buzzers. The maximum power supply required to operate the circuit is +5V DC voltage. A LCD display is used at the output section to display the status of the GSM .

Thus, it has great development potential and a promising market application in the field of industrial control. By applying a wireless sensor based GSM technology for train fire monitoring system, information can be easily collected 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.

CIRCUIT DIAGRAM
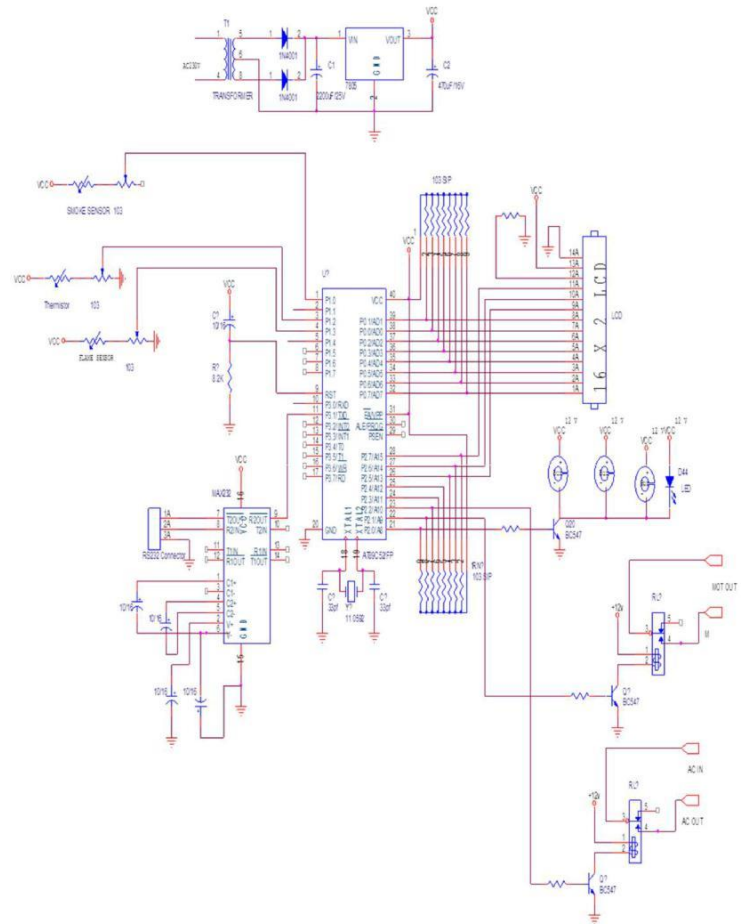
Explanation:

The hardware interfaces to the microcontroller are Sensor, power supply, DC Motor, LCD display, GSM modem. The sensors are used to sense the temperature above the normal atmospheric temperature in three aspects. If anything occurs it automatically sprays water through the sprinklers in bogies itself and automatically exhausts a carbon dioxide gas immediately along with the alarm with the help of buzzers, it subsequently opens the emergency door of the bogie automatically with the help of bidirectional reversible linear motors and it also sends a signal to the microcontroller and then the signal is converted and sends a message to the GSM modem. A GSM Modem is used to send the position of the vehicle from

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a remote place when fire detected. The LCD Display is used to indicate a message to the driver ,so that the engine driver stops the running train and take necessary action. This data will be continuously transmitted to the GSM modem connected to the microcontroller. It automatically sends location of the vehicle to its owner as a SMS through GSM modem. An EEPROM is used to store the data received by the receiver. An LCD display is connected to the micro controller it displays Tracking information. The design uses RS-232 protocol for serial communication between the modems and the microcontroller. A serial driver IC is used for converting TTL voltage levels to RS-232 voltage levels.

HARDWARE COMPONENTS

Power supply:

The Power Supply is a Primary requirement for the project work. The required DC power supply purpose center tapped secondary of 12V-012V transformer is used. From this transformer we get 5V power supply. In this +5V output is a regulated output and it is designed using 7805 positive voltage regulator. This is a 3 Pin voltage regulator, can deliver current up to 800 milliamps.

Voltage regulator:

The LM 78XXX series of the three terminal regulations is available with several fixed output voltages making them useful in a wide range of applications. One of these is local on card regulation. The voltages available allow these regulators to be used in logic systems, instrumentation and other solid state electronic equipment. Although designed primarily as fixed voltage regulators, these devices can be used with external components to obtain adjustable voltages and currents.

Relay:

A relay is an electrically operated switch. Many relays use an electromagnetto operate a switching mechanism mechanically, but other operating principles are also used. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal. Relays were used extensively in telephone exchanges and early computers to perform logical operations.

Liquid Crystal Display:

To understand the operation of an LCD, it is easiest to trace the path of a light ray from the backlight to the user. The light source is usually located directly behind the LCD, and can use either LED or conventional fluorescent technology. From this source, the light ray will pass through a light polarizer to uniformly polarize the light. So it can be acted upon by the liquid crystal (LC) matrix. The light beam will then pass through the LC matrix, which will determine whether this pixel should be "on" or "off".
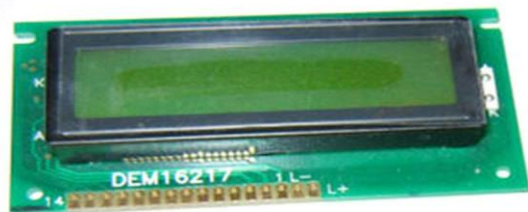
A general purpose alphanumeric lcd, with two lines of display.

GSM MODEM:

GSM/GPRS **module** is used to establish communication between a computer and a**GSM**-GPRS system. Global System for Mobile communication (**GSM**) is an architecture used for mobile communication in most of the countries. Global Packet Radio Service (GPRS) is an extension of **GSM** that enables higher data transmission rate.

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GPS MODULE:

The global positioning system is a satellite-based navigation system consisting of a network of 24 orbiting satellites that are eleven thousand nautical miles in space and in six different orbital paths. The satellites are constantly moving, making two complete orbits around the Earth in just under 24 hours. If you do the math, that's about 2.6 kilometers per second. It is mainly used to know the position of the particular object .

DC MOTORS:

DC motors are configured in many types and sizes, including brush less,servo, and gear motor types. A motor consists of a rotor and a permanent magnetic field stator. The magnetic field is maintained using either permanent magnets or electromagnetic windings. DC motors are most commonly used in variable speed and torque. These are mainly used to divide the compartments during the fire accidents.

VOICE MODULE:

This Voice Recognition Module is a compact and easy-control speaking recognition board.This product is a speaker-dependent voice recognition module. It supports up to 80 voice commands in all.Max 7 voice commands could work at the same time. Any sound could be trained as command. Users need to train the module first before let it recognizing any voice command. This board has 2 controlling ways: Serial Port (full function), General Input Pins (part of function). General Output Pins on the board could generate several kinds of waves while corresponding voice command was recognized.It operates at Voltage: 4.5-5.5V.

MAX232 IC:

Max232 is designed by Maxim Integrated Products. This IC is widely used in RS232 Communication systems in which the conversion of voltage level is required to make TTL devices to be compatible with PC serial port and vice versa. This chip contains charge pumps which pumps the voltage to the Desired Level. It can be powered by a single +5 volt power supply and its output can reach +_7.5 volts.MAX232 comes in 16 Pin Dip and many other packages and it contains Dual Drivers. It can be used as a hardware layer convertor for 2.systems to communicate simultaneously.Max232 is one of the versatile IC to use in most of the signal voltage level conversion problems.
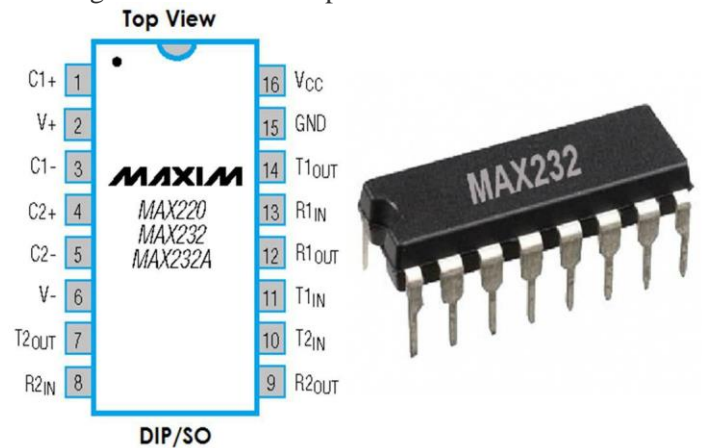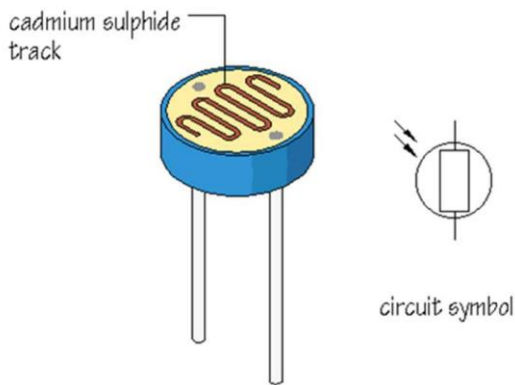

SENSORS:

HEAT SENSOR:

A thermistor is a type of resistor whose resistance varies significantly with temperature, more so than in standard resistors. The word is portmanteau of thermal and resistor. Thermistor is widely used as in rush current limiters, temperature sensors, self-resetting over current protectors, and self-regulating heating elements. Thermistor differs from resistance temperature detectors (RTD) in that the material used in a thermistor is generally a ceramic or polymer, While RTDs use pure metals. The temperature response is also different; RTDs are useful over larger temperature ranges, while Thermistor typically achieve a higher precision within a limited temperature range, typically $-90\ °C$ to $130\ °C$.

FIRE SENSOR:

LDR can be used as fire sensor. The light-sensitive part of the LDR is a wavy track of cadmium sulfide. Light energy triggers the release of extra charge carriers in this material,
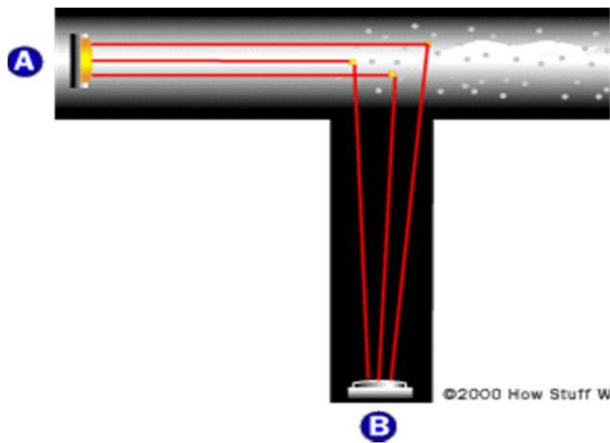
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so that its resistance falls as the level of illumination increases.

LDR as Fire Sensor

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:

RESULTS

when heat or smoke were detected by the sensors then it automatically display the message on a LCD which is connected in the driver room and a voice message through the voice module which indicating loco to halt the train immediately and to alert passengers. The detection of fire accidents kit is as shown in

When the fire occurs then automatically water sprinklers starts sprinkling water to reduce fire and to save the effect of fire. When the fire is detected the message is sent to the nearby control station along with the position of train using GSM and GPS modules to take further action. The output at the control room (mobile) is as shown along with latitudes and logitudes.

FIG:Output in the LCD display

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ADVANTAGES AND APPLICATIONS

ADVANTAGES:

It reduces the time delay.
Simple and easy to implement. Works effectively.

APPLICATIONS:

Can be used in trains and other vehicals. Used in home automation system. Used in industries.

CONCLUTION

The project "EARLY STAGE DETECTION OF FIRE ACCDENTS USING GSM AND GPS MODULES" has been successfully designed and tested. Integrating features of all the hardware components used have developed it. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit. Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented.

FUTURE SCOPE

Wireless sensor network are increasingly applied in the field of fire safety and monitoring. In addition, wireless sensor technology has a broad application background in the field of real time forest fire monitoring.In future we can also use different technologies to detect fire accidents.

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