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Minimization of the Fire Accidents in Automobiles by Automatic Spraying of Fire Retards and Utilization of a Fire Fighting Robot

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Abstracts

Automobiles are the necessary medium for the purpose of the transportation from many decades. There are drastic changes in the automobiles which are doing services for the mankind on our own basis. Travelers expecting many luxuries from the transportation systems. These luxuries bring many problems to the travelers, because to provide these luxuries we need some extra materials for manufacturing them. The materials used are fibers, cotton based seat covers, bus body decorations, refrigerant, sheets made up of ply wood, plastic covers and panels etc.

But now days we are facing many accidents caused by fire causing a high loss of human, property as well as adversely affecting the environment by pollution. Our project consists of two sections: transmission section and receiver section .In transmitting section, smoke sensor always seeks for sensing the smoke caused by fire. When it senses the smoke, it sends the information to micro controller and then from micro controller to zigbee transceiver.

In receiver section, another zigbee transceiver receives the information and transmits it to the micro controller. IR sensors which follow the black line and reach the destination then it sprinkles the water and then it return back to the original position. The automatic opening of valve as well as a wireless transmission signal to the robot and these will help them to stop the fire fastly

Keywords: Transmission section, Receiver section, Robot, Fire Fighting Robot, etc..

Introduction

The project title "MINIMIZATION OF THE FIRE ACCIDENTS IN AUTOMOBILES BY AUTOMATIC SPRAYING OF FIRE RETARDS AND UTILIZATION OF A FIRE FIGHTING ROBOT" indicates that the system continuously checks for the presence of fire in Automobiles i.e., buses. This is done with the help of a smoke sensor. This project is designed around a microcontroller. The Micro controller plays a major role in the project for controlling purpose. Whenever the fire is detected by the sensor is indicated to microcontroller. Then the microcontroller takes the control action by switching on or off the water sprinkler.

By making use of these kinds of projects we can provide the security in industries. Mechatronics plays a vital role in the emerging world. Without these there are no possibilities to produce or safeguard any component in present era. This is a part of present world with a great peak of usage. Mechatronics is defined as the "the combination of mechanical, electrical, electronics, computer science and information technology." Mechatronics also applicable in the automobiles. We are using mechatronics as the aid for the minimization of fire accidents. Automobiles have many mechanical as well as electrical components.

There are many causes for the fire accidents in automobiles. There are three main elements which will cause the fire. They are oxygen, fuel &heat. In general by the leakage of the fuel vapours combined with the oxygen and the raise in temperature will cause fire, electrical shocks, carrying of explosive materials in automobiles etc.In present days there are different combustible materials are using in the manufacturing of a bus they are mats made of cotton fibers, plastics, ply woods sheets for covering the cabin, seats made up of plastic and covered with clothes. These all will give comfort to the passenger. So increase in luxuries will lead to rise in fire accidents. So we should make an account to decrease these fire accidents. By using this technology we can decrease the fire accidents. We use fire retarders to decrease the fire like DI CHEMICAL POWDER, AFFF FOAM, CARBON DIOXIDE, and WATER.

Transmission section

The block diagram of transmission section is shown below. It contains smoke sensor, zigbee module, micro controller and power supply.
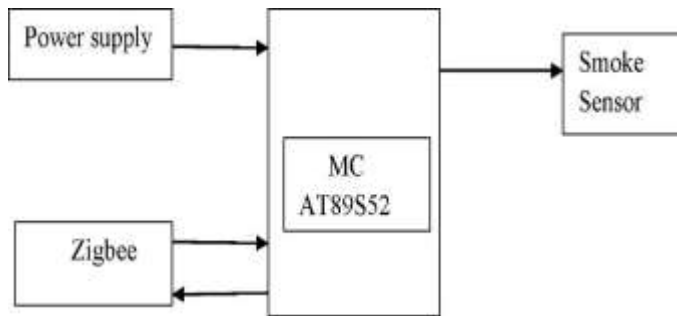
Figure: 1 Block diagram of Transmitter

The power supply can continuously adjust as per our requirements and is supplied to the micro controller and all other devices used in the block diagram. The smoke sensor senses the smoke and transmits the information to the micro controller. Now the micro controller will communicate with the zigbee module to transmit the information to the receiver section.

Receiver section

The block diagram of receiver section consists of micro controller, zigbee module, IR sensors, motor drivers, motors, water sprinkler.
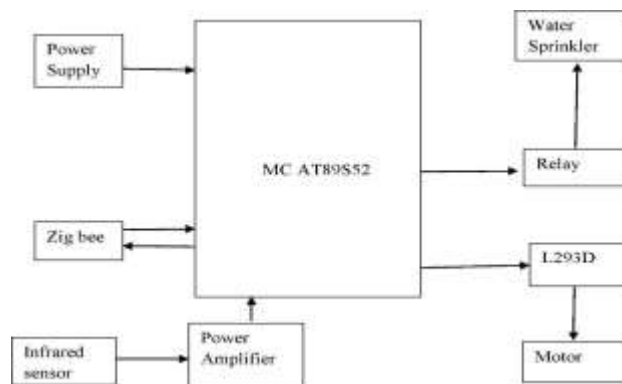

Fig.2 Block Diagram Explanation

This Project mainly consists of Power Supply, Microcontroller, ZIGBEE, relay, motor, and water sprinkler.

Power supply section

This section is meant for supplying Power to all the sections mentioned above. It basically consists of a Transformer to step down the 230V ac to 12V ac followed by diodes. Here diodes are used to rectify the ac to dc. After rectification the obtained rippled dc is filtered using a capacitor Filter. A positive voltage regulator is used to regulate the obtained dc voltage.

Microcontroller (AT89S52)

In this project work the micro-controller is playing a major role. Micro-controllers were originally used as components in complicated process-control systems. However, because of their small size and low price, Micro-controllers are now also being used in regulators for individual control loops. In several areas Micro-controllers are now outperforming their analog counterparts and are cheaper as well.

The purpose of this project work is to present control theory that is relevant to the analysis and design of Micro-controller system with an emphasis on basic concept and ideas. It is assumed that a Microcontroller with reasonable software is available for computations and simulations so that many tedious details can be left to the Micro controller.

Zigbee Transceiver

Zigbee modules feature a UART interface, which allows any microcontroller or microprocessor to immediately use the services of the Zigbee protocol. All Zigbee hardware designer has to do in this case is ensure that the host's serial port logic levels are compatible with the XBee's 2.8 to 3.4 V logic levels. The logic level conversion can be performed using either a standard RS-232 IC or logic level translators such as the 74LVTH125 when the host is directly connected to the XBee UART.

Relay

This section consists of an interfacing circuitry to switch ON / OFF the system whenever any unhealthy conditions i.e. overload is detected. This circuitry basically consists of a Relay, transistor and a protection diode. A relay is used to drive the 230V devices. The relay takes advantage of the fact that when electricity through a coil, it becomes an electromagnet. The electromagnetic coil attracts a steel plate, which is attached to a switch. So the switch's motion (ON and OFF) is controlled by the current flowing to the coil, or not, respectively.

Robotics:

The field of computer science and engineering concerned with creating robots, devices that can move and react to sensory input. Robotics is one branch of artificial intelligence.

Robots are now widely used in factories to perform high- precision jobs such as welding and riveting. They are also used in special situations that would be dangerous for humans -- for example, in cleaning toxic wastes or defusing bombs.

Although great advances have been made in the field of robotics during the last decade, robots are still not very useful in everyday life, as they are too clumsy to perform ordinary household chores.

Robot was coined by Czech playwright Karl Capek in his play R.U.R (Rossum's Universal Robots), which opened in Prague in 1921. Robota is the Czech word for forced labor.

The term robotics was introduced by Writer Isaac Asimov. In his science fiction book *I, Robot,* published in 1950, he presented three laws of robotics:

• A robot may not injure a human being, or, through inaction, allow a human being to come to harm.

• A robot must obey the orders given it by human beings except where such orders would conflict with the First Law.

• A robot must protect its own existence as long as such protection does not conflict with the First or Second Law.

Fire Fighting Robot (AT89S52)

The need for a device that can detect and extinguish a fire on its own is long past due. Many house fires originate when someone is either sleeping or not home. With the invention of such a device, people and property can be saved at a much higher rate with relatively minimal damage caused by the fire. Our task is to design and build a prototype system that could autonomously detect and extinguish a fire. Also aims at minimizing air pollution. In this Project we design a Microcontroller controlled Robot. It is the Robot that can move through a model structure, find a burning oil derrick (lit candle) and then extinguish it with help of a splinter. This is meant to simulate the real world operation of a Robot performing a fire extinguishing function in an oilfield. We are using the Popular 8 bit Microcontroller the 8051 family Microcontroller. Program code to control the firefighting robot is written in assembly language.

Firefighting robot can be easily and conveniently used. Operate automatically when any fire occurs. Robot comprises of very small size, less in weight, hence require less space. Rechargeable batteries are used here. Rechargeable batteries produce less waste because they can be recharged with a simple battery charger and reused hundreds of times.
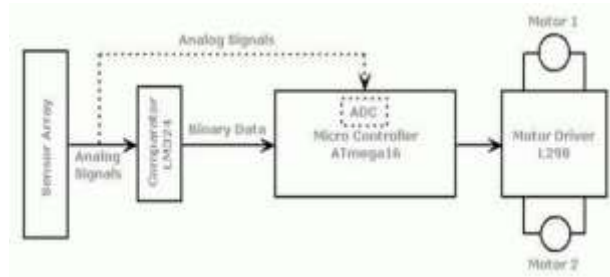

Figure .3: Block diagram of firefighting robot

Theory overview

Infrared sensor

Infrared sensors work by emitting a beam of infrared light. This light has a wavelength of 800 nm. This beam will travel out, bounce off of an object, and come back to the sensor. When the beam comes back to the sensor, it will hit the sensor at an angle. The farther the object is away, the smaller this angle will be, with respect to the normal of the sensor. Therefore, a beam that travels back from an object far away will hit the sensor, at almost a 90 degree angle. The distance to the object is measured by the angle of the returning beam. This type of sensor will get less interference from soft, cushion type materials. It will however receive interference from stray light radiation.

Figure 4: Infrared sensors

Gallium arsenide is a direct-gap semiconductor with an energy gap of 1.4eV at room temperature. A typical GaPs LED is made by solid- state impurity diffusion with zinc as the p-type impurity diffused into an n- type substrate doped with tin, tellurium or silicon. The external efficiency at room temperature is typically 5 percent. A GaAs diode can also be fabricated by liquid-phase epitaxial with silicon as both its n and p dopants. If a silicon atom replaces a Ga atom, it provides one additional electron, thus the resulting GaAs in as n-type. If a silicon atom replaces arsenic atoms, an electron is missing and the resulting GaAs is a p-type. In Si doped GaAs diode, the emission peak shifts down to 1.32eV. Since the emission is in infrared region, GaAs light sources are suitable for application such as the optical isolator.

The high switching speed, with a recovery time between 2 and 10ns, makes them ideal for data transmission. The

disadvantages of the GaAs emitter are emitted wavelength and the associated attenuation and dispersion. A critical issue of using an LED for the fibre optics is the coupling of light from the semiconductor to the fibre. Because of the larger refractive index of GaAs relative to air, the internal efficiency of LED can be quite low.

An infrared sensor is an electronic instrument that is used to sense certain characteristics of its surroundings by either emitting and/or detecting infrared radiation. It is also capable of measuring heat of an object and detecting motion. Infrared waves are not visible to the human eye.

In the electromagnetic spectrum, infrared radiation is the region having wavelengths longer than visible light wavelengths, but shorter than microwaves. The infrared region is approximately demarcated from 0.75 to 1000|m.

The wavelength region from 0.75 to 3|m is termed as near infrared, the region from 3 to 6|m is termed mid-infrared, and the region higher than 6|m is termed as far infrared.

Infrared technology is found in many of our everyday products. For example, TV has an IR detector for interpreting the signal from the remote control.

Types of infra-red sensors
Infra-red sensors are broadly classified into two types:
- Thermal infrared sensors - These use infrared energy as heat. Their photo sensitivity is independent of wavelength. Thermal detectors do not require cooling; however, they have slow response times and low detection capability.
- Quantum infrared sensors - These provide higher detection performance and faster response speed. Their photo sensitivity is dependent on wavelength. Quantum detectors have to be cooled so as to obtain accurate measurements. The only exception is for detectors that are used in the near infrared region.

Working principle
A typical system for detecting infrared radiation using infrared sensors includes the infrared source such as blackbody radiators, tungsten lamps, and silicon carbide. In case of active IR sensors, the sources are infrared lasers and LEDs of specific IR wavelengths. Next is the transmission medium used for infrared

transmission, which includes vacuum, the atmosphere, and optical fibres Thirdly, optical components such as optical lenses made from quartz, CaF2, Ge and Si, polyethylene Fresnel lenses, and Al or Au mirrors, are used to converge or focus infrared radiation. Likewise, to limit spectral response, band-pass filters are ideal. Finally, the infrared detector completes the system for detecting infrared radiation. The output from the detector is usually very small, and hence preamplifiers coupled with circuitry are added to further process the received signals.

Voltage regulator
Voltage regulator ICs is available with fixed (typically 5, 12 and 15 V) or variable output voltages. The maximum current they can pass also rates them. Negative voltage regulators are available, mainly for use in dual supplies. Most regulators include some automatic protection from excessive current ('overload protection') and overheating ('thermal protection').

Figure 5: Voltage Regulator

Many of the fixed voltage regulators ICs have 3 leads and look like power transistors, such as the 7805 +5V 1A regulator shown on the right. The LM7805 is simple to use. You simply connect the positive lead of your unregulated DC power supply to the Input pin, connect the negative lead to the Common pin and then when you turn on the power, you get a 5 volt supply from the output pin.

Smoke sensor
The Principles of Fire Safety series looks at smoke, gas and flame detectors. Again, research and development has continued to improve well established detection technologies and provided an array of new technologies to improve fire detection while also being less susceptible to the causes of false alarms.

Before we go any further it's important to lay the foundation for what is fire; fire also known as combustion is a sequence of exothermic chemical reactions between a fuel and an oxidant accompanied by the by-products of combustion being; heat, smoke & electromagnetic radiation.

It is also important to recognise that smoke is an aerosol or mixture of particulates suspended in air that comprises a collection of airborne solids, liquid

particulates and gases emitted when a material undergoes combustion
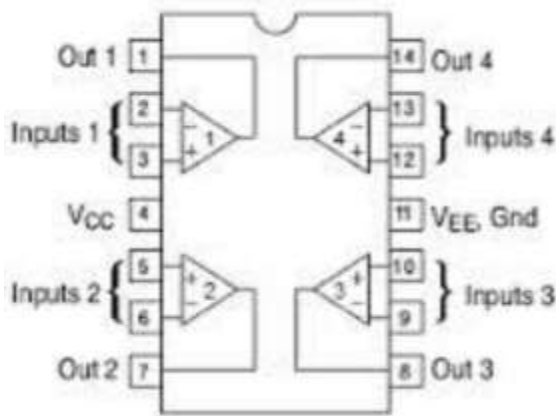

Figure 6. LM324

OP-AMP (LM324)

Description:
LM324 is a quad op amp integrated circuit, which uses 14- pin dual in-line plastic package, shape as shown. It contains four sets of the internal op amp in exactly the same form, in addition to power sharing, the four independent amplifier. Operational amplifier for each group of symbols shown in Figure 1 can be used to indicate that it has 5 leads to the foot, which "+","-" two signal input, "V +", "V-" is positive, negative power supply side, "Vo" for the output. Two signal input in the, Vi-(-) for the inverting input said operational amplifier output Vo of the signal with the input bit contrary; Vi + (+) for the same phase input, said operational amplifier output Vo of the signal phase with the same input.

Micro controller (AT89S52)
8-bit Microcontroller with 8K Bytes
> 8K bytes of In-System Programmable Flash 1000 write/erase cycles
> Three-level Program Memory Lock
> 256 x 8-bit Internal RAM
> Three 16-bit Timer/Counters
> Eight Interrupt Sources
> Full Duplex UART Serial Channel
> Interrupt Recovery from Power-down Mode
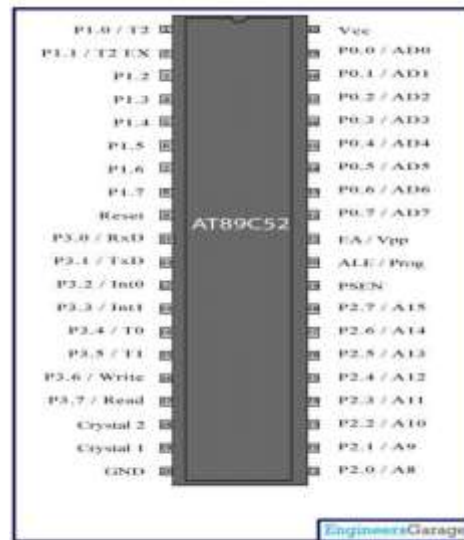> Dual Data Pointer
> Power-off Flag

Figure 7. Microcontroller

The AT89S52 is a low-power, high-performance CMOS 8-bit microcontroller with 8K bytes of in-system programmable Flash memory. The device is manufactured using Atmel's high-density nonvolatile memory technology and is compatible with the industry- standard 80C51 instruction set and pin out. The on-chip Flash allows the program memory to be reprogrammed in-system or by a conventional non-volatile memory programmer. By combining a versatile 8-bit CPU with in-system programmable Flash on a monolithic chip, the Atmel AT89S52 is a powerful microcontroller which provides a highly-flexible and cost- effective solution to many embedded control applications.

The AT89S52 provides the following standard features: 8K bytes of Flash, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, a six-vector two-level interrupt architecture, a full duplex serial port, on-chip oscillator and clock circuitry. In addition, the AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The Idle Mode stops the CPU while allowing the RAM, timer/counters, serial port, and interrupt system to continue functioning. The Power-down mode saves the RAM contents but freezes the oscillator, disabling all other chip functions until the next interrupt or hardware reset.

Motor driver (L293D)
L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-

current signal. This higher current signal is used to drive the motors.

Figure 8: DIP of L293d

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively

Enable pins 1 and 9 (corresponding to the two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

Features
> Wide Supply-Voltage Range: 4.5 V to 36 V
> Separate Input-Logic Supply
> Thermal Shutdown.
> High-Noise-Immunity Inputs
Output Current 1 A Per Channel (600 mA for L293D)
> Peak Output Current 2 A per Channel (1.2 A for L293D).

DC motor
A DC motor relies on the fact that magnet poles repel and unlike magnetic poles attract each other. A coil of wire with a current running through it generates a electromagnetic field aligned with the center of the coil.

Figure 9: Dc Motor

By switching the current on or off in a coil its magnet 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 180If external power is applied to a DC motor it acts as a DC generator, a dynamo.

Relays
Relay is an electrically operated switch. Current flowing through the coil of the relay creates a magnetic field which attracts a lever and changes the switch contacts. The coil current can be on or off so relays have two switch positions and they are double throw (changeover) switches. Relays allow one circuit to switch a second circuit which can be completely separate from the first. For example a low voltage battery circuit can use a relay to switch a 230V AC mains circuit. There is no electrical connection inside the relay between the two circuits; the link is magnetic and mechanical.

Figure 10: Relay

Figure 11 Water sprinkler

The coil of a relay passes a relatively large current, typically 30mA for a 12V relay, but it can be as much as 100mA for relays designed to operate from lower voltages. Most ICs (chips) cannot provide this current and a transistor is usually used to amplify the small IC current to the larger value required for the relay coil.

The maximum output current for the popular 555 timer IC is 200mA so these devices can supply relay coils directly without amplification. Relays are usually SPDT or DPDT but they can have many more sets of switch contacts, for example relays with 4 sets of changeover contacts are readily available.

Most relays are designed for PCB mounting but you can solder wires directly to the pins providing you take care to avoid melting the plastic case of the relay. The supplier's catalogue should show you the relay's connections. Relay coils produce brief high voltage 'spikes' when they are switched off and this can destroy transistors and ICs in the circuit. To prevent damage you must connect a protection diode across the relay coil.

The animated picture shows a working relay with its coil and switch contacts. You can see a lever on the left being attracted by magnetism when the coil is switched on. This lever moves the switch contacts. There is one set of contacts (SPDT) in the foreground and another behind them, making the relay DPDT.
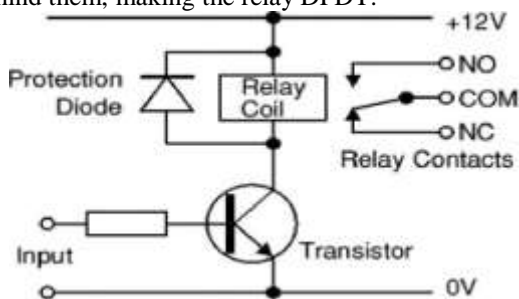

Figure 12: Internal Circuit of Relay

The relay's switch connections are usually labelled COM, NC and NO:

1. **COM** = Common, always have the connection and is the moving part of the switch.
2. **NC** = Normally Closed, COM is connected to this when the relay coil is **off.**
3. **NO** = Normally Open, COM is connected to this when the relay coil is **on.**
4. Connect to COM and NO if you want the switched circuit to be **on when the relay coil is on.**

Connect to COM and NC if you want the switched **circuit to be** on when the relay coil is off.

Normally a wet pipe automatic fire sprinkler system, is fully charged with water coming from a known reliable water supply. The installation is pressurized with the alarm valve secured in the open position. When a fire sprinkler is exposed for a sufficient time to a temperature at or above the temperature rating of the heat sensitive element (glass bulb or fusible link) it releases, allowing water to flow from only the affected sprinkler. Additional fire sprinklers may also operate if they too are exposed to sufficient heat.

When this occurs water from the water supply will pass through the alarm valve to the affected fire sprinkler and also past the alarm bell. The resultant pressure drop will also activate the alarm pressure switch, which in turn will activate an alarm calling the fire brigade. A flow switch will also operate in the affected section of the fire sprinkler system, indicating the location of the water flow. The flow switch will indicate its location a fire indicator panel. The water supply may be isolated by closing the stop valve.

Encoder (HT12E)

Figure 13 Encoder

Features

1. Operating voltage 2.4V~5V for the HT12A 2.4V~12V for the HT12E
2. Low power and high noise immunity CMOS technology
3. Low power and high noise immunity CMOS technology
4. Low standby current: 0.1_A (typ.) at VDD=5V
5. HT12A with a 38kHz carrier for infrared transmission medium
6. Minimum transmission word
7. Applications
8. Burglar alarm system
9. Smoke and fire alarm system
10. Garage door controllers
11. Car door controllers
12. Car alarm system
13. Security system

Decoder (HT12D)

Figure 14 Decoder

Features

1. Operating voltage: 2.4V~12V

2. Low power and high noise immunity CMOS technology
3. Low standby current
4. Capable of decoding 12 bits of information
5. Binary address setting
6. Received codes are checked 3 times
7. Address/Data number combination
8. HT12D: 8 address bits and 4 data bits
9. HT12F: 12 address bits only

Applications
1. Burglar alarm system
2. Smoke and fire alarm system

FLAMMABLE MATERIALS AND FIRE RETARDARS

Certain types of substances can ignite at relatively low temperatures or pose a risk of catastrophic explosion if ignited. Such substances obviously require special care and handling.

Flammable materials and fire retardars

Class A combustibles.

These include common combustible materials (wood, paper, cloth, rubber, and plastics) that can act as fuel and are found in non-specialized areas such as offices.

To handle Class A combustibles safely:

> Dispose of waste daily.

> Keep trash in metal-lined receptacles with tight-fitting covers (metal wastebaskets that are emptied every day do not need to be covered).

> Keep work areas clean and free of fuel paths that could allow a fire to spread.

> Keep combustibles away from accidental ignition sources, such as hot plates, soldering irons, or other heat- or spark-producing devices.

> Store paper stock in metal cabinets.

> Store rags in metal bins with self-closing lids.

> Do not order excessive amounts of combustibles.

> Make frequent inspections to anticipate fires before they start.

> Water, multi-purpose dry chemical (ABC), and halon 1211 are approved fire extinguishing agents for Class A combustibles.

Class B combustibles.

These include flammable and combustible liquids (oils, greases, tars, oil-based paints, and lacquers), flammable gases, and flammable aerosols.

To handle Class B combustibles safely:

> Use only approved pumps, taking suction from the top, to dispense liquids from tanks, drums, barrels, or similar containers (or use approved self-closing valves or faucets).

> Do not dispense Class B flammable liquids into containers unless the nozzle and container are electrically interconnected by contact or by a bonding wire. Either the tank or container must be grounded.

> Store, handle, and use Class B combustibles only in approved locations where vapors are prevented from reaching ignition sources such as heating or electric equipment, open flames, or mechanical or electric sparks.

> Do not use a flammable liquid as a cleaning agent inside a building (the only exception is in a closed machine approved for cleaning with flammable liquids).

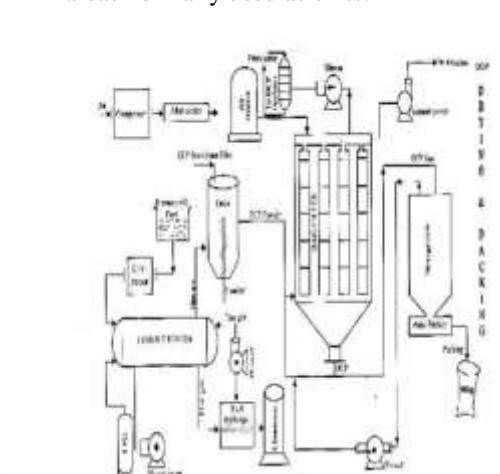> Do not uses, handle, or store Class B combustibles near exits, stairs, or any other areas normally used as exits.


Figure 15: DCP manufacturing process

Fire retards

DCP Manufacturing

Di Calcium Phosphate is the by-product of Ossein manufacturing. Crushed bone contains both inorganic and organic part. In acidulation process the inorganic particles like calcium and phosphate dissolve in hydrochloric acid and form monocalcium phosphate (MCP). MCP is converted into DCP in DCP Plant. MCP is converted into DCP by reacting with lime. Chemical formula of DCP is 2 (CaHPO4 2H2O). DCP is marketed in powder form and is used in poultry feed.

DCP production

In acidulation reaction in acid bath tri calcium phosphate react with Hydrochloric acid and mono calcium phosphate is formed according to the reaction.

$$Ca3(PO4) + 4\ HCl = Ca(H2PO4) + 2CaCh$$
M.C.P.
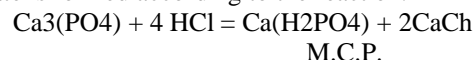
MCP from storage tank is pumped to the reaction tank in DCP plant. In reaction tank lime is added and MCP is converted into di calcium phosphate.

Lime preparation

Lime slurry from lime mixing tank is pumped to the lime tank in DCP plant. Fresh water is pumped to the lime tank. By adding fresh water Baume of lime slurry is reduced to 5.0. This lime is pumped to the DCP reaction tank. In lime and water mixing tanks agitators are used for proper mixing.
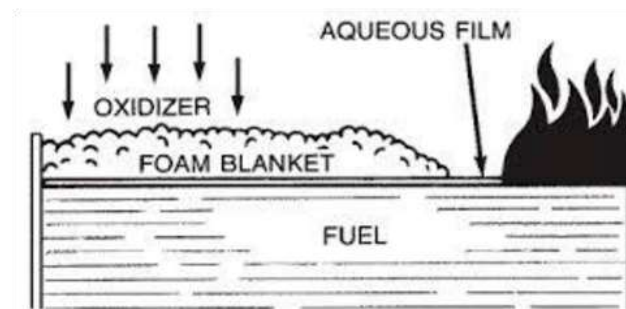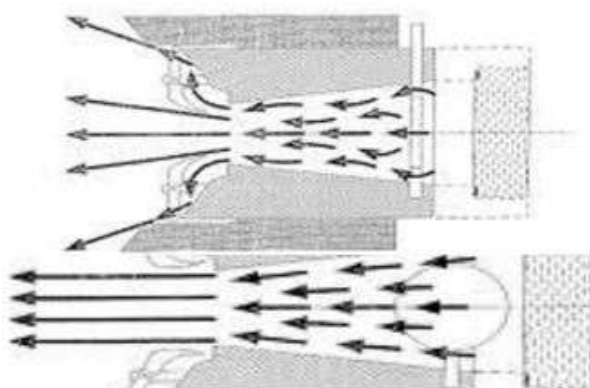

Figure 16: Film forming on fuel

Figure17: Mechanism of AFFF foam from cylinders

Working

PHASE-I (SMOKE SENSING DIVISION)

When the fire takes place smoke will come. There are different types of gases in the smoke when a material burns it is mainly used on the composition used. When the smoke comes it is sensed by the smoke sensor. The operating condition of the entire system is 12v voltage and 1amp current. Here we used smoke sensor (MQ2) which gives the signal when it sensed CNG, CARBONDIOXIDE, CARBONMONOOXIDE, LPG, and NOx. It is a non-tactile sensor. Here we used 12v battery for the power supply.

There is a sensitivity adjuster to adjust the sensitivity of the smoke sensor. Sensor gives the change in the parameters to the microcontroller in the form of the voltage. There is a direct connection between the output of the sensor to the motor. These will opens the valves and sprinkles water on the fire. We concentrated mainly on the initial point of the fire. It is easier to stop in the initial point rather than the fire is spread all over the bus.

We used only water here but we can use afff foam because it is the best retarder to cool the fire as well as the foam will forms as a blanket over the burning surfaces. These also consists of the inputs to the robot like encoder, antenna etc. The encoder encodes the output coming from the sensor i.e., voltage to the bit form. Here we use 12 bit encoder (HT12E). These encoded signals are transmitted through the wireless transmission with 433 MHz and 12 bit transmitter. Transmitter will sends the signal to the robot to move based on the given signal.

Voltage regulator is used because the battery gives 12v supply but for running the controller, encoder we need only 5v these will take care by regulating 12v to the 5v. The main function of the voltage regulator is to maintain the constant output voltage. A series of the capacitors are used because the capacitor stores the electrical energy and it opposes the sudden changes in the voltage. The purpose of the relay is any fault occurrence in the system to trip the circuit breaker. Relay uses small power and gives large amount of the power to other components which are in connection with it.

PHASE-II (ROBOT DIVISION)

DIMENSIONS OF THE ROBOT: Glass thickness-6mm Teeth thickness-2mm Tooth length-24.15mm Large wheel radius-50mm Small wheel radius-30mm Wheel to wheel distance-71mm Ir sensor to sensor distance-40mm Robot has a battery power supply with 12v voltage. Robot has ir sensors, the black coloured led is receiver and the white coloured led is transmitter. The ir sensors

are non-tactile sensors. Different components used in robot are microcontroller (AT 2051), op-amp (LM324), motor driver (L239D), decoder (HT12D), relay and rf module. The output from the smoke sensing division is the input to the robot. The wireless transmitter sends the signal and the receiver is in the robot and it receives the signal. The signal is decoded by the decoder ie., the bit signal to the voltage.

This voltage will activate the op-amp, it is used as a comparator here. It will operate the microcontroller by comparing the signal which is coming from the phase-I. The microcontroller will give the signal to the motor driver. This driver drives the robot by giving power to the stepper motors present at the wheels. The robot moves to the place of fire and it will spray the retarders. We used water as the retarder here. But we can able to use any retarders which are mentioned above.
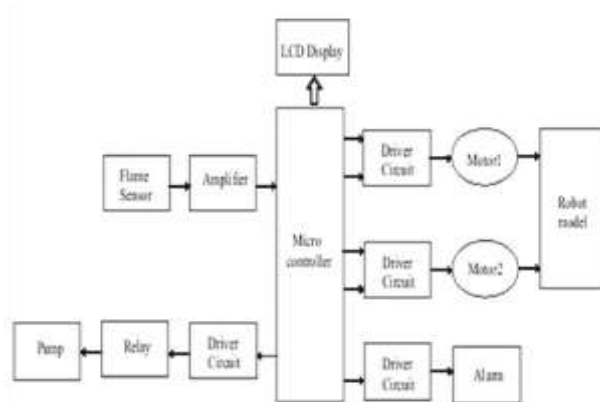

Figure 18: Block diagram of ROBOT division

Result
By this work we can detect the smoke and stops the fire by sprinkling water on fire.
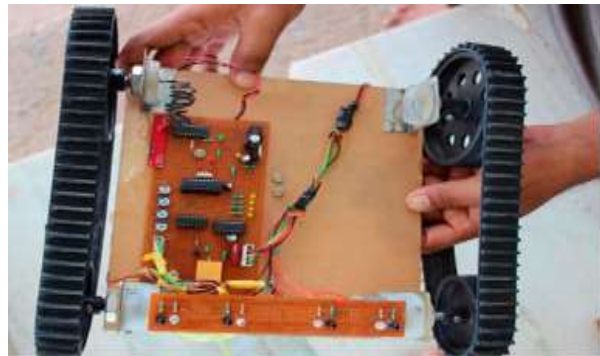

Figure19: Output module of division-I

Figure 20: Output module of division-II (backside)

Figure 21: output module of division II (Front side)

Conclusion
The present work "MINIMIZATION OF THE FIRE ACCIDENTS IN AUTOMOBILES BY AUTOMATIC SPRAYING OF FIRE RETARDS AND UTILIZATION OF A FIRE FIGHTING ROBOT" 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 work has been successfully implemented. Hence the work shows the more security to the automobiles like buses when it is affected by fire where short circuit occurs, leakages of fuel with heat, combustible materials fires.

References
1. http://www.hobbyengineering.com/rmapIndex.html
2. http://www.robotroom.com/RBFB.html //line following robot
3. http://www.dudi30.republika.pl/galeria/index.html //New robot every week
4. http://www.robotics.com/robomenu/index.html
5. http://www.robot fest2013.com

6. Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering, W.Bolten, 3/e, Pearson Edu. Press, 2005
7. Mechatronics, M.D.Singh, J.G.Joshi,PHI.
8. The 8051 Micro controller Architecture, Programming & Applications -Kenneth J. Ayala
9. Fundamentals of Microprocessors and Micro computers-B. Ram
10. Microprocessor Architecture, Programming & Applications- Ramesh S. Gaonkar
11. Electronic Components-D.V. Prasad Wireless Communications - Theodore S. Rappaport