

Automatic Car Engine Fire Protection System

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Abstract: Vehicle usage is very common in this modern days. Generally in cities and urban areas we use cars. Most cars fluids are flammable. Heat and electrical sparks plus leaking fluids are taken to a car fire. Cars can catch fire for many reasons mechanical or electrical issues are most common cause. A car also catches fire as a result of a bad crash. In this proposed work, this project is to integrate temperature operated cooling system for ensuring uninterrupted driving even when vehicle engine gets overheated and also to fire extinguish in the engine. By providing sensor technology, Electrical control unit, AFO Fire extinguisher, we control the issue under overheating and accidental conditions. In this proposed work, system automatically detects and extinguishes the fire condition and it stops the vehicle running. It avoids further enhance in fire condition. This will save the life of vehicle occupants. In most of the vehicles, this provision is not available.

Keywords: Arduino, current sensor, temperature sensor, fire alert sensor AFO Fire Extinguisher, battery, LCD.

I. Introduction: Tens of thousands of lives have been lost globally in the last few decades due to car entrapment deaths. In this section we will analyze the threat of vehicle fires and provide advice on how to act in these emergencies. More people die in vehicle fires than in apartment fires each year in the United States where nearly 1 out of 5 fires involve motor vehicles.[1]

U.S. fire departments responded to an estimated 278,000 vehicle fires in the United States during 2006. These fires caused an estimated 490 civilian deaths and 1,200 civilian injuries. Overturns caused only 3% of these fires but 57% of the associated deaths. Older teens and young adults are age groups at highest risk of highway vehicle fire death. One-third of non-fatal vehicle fire injuries occurred when civilians attempted to fight the fire themselves.

While explosions from car fires are rare, the true danger is the toxic fumes. Motor vehicles are made of many synthetic materials that emit harmful and deadly gases when they burn. A main by-product of fires is a lethal concentration of carbon monoxide, which is odorless, colorless and tasteless gas.[1]

Fire can cause fatal or debilitating burn injuries. A vehicle fire can generate heat upwards of 1,500 F. Flames in vehicles can often shoot out distances of 10 feet or more. Parts of the vehicle can burst because of heat, shooting debris great distances. Bumper and hatchback door unit, two-piece tire rims, magnesium wheels, drive shafts, grease seals, axle, and engine parts, all can become lethal shrapnel. Fires may also cause air bags to deploy. Hazardous materials such as battery acid can cause injury even without burning.[1]

II. Problem Statement:

Every day numerous vehicles ply on the road taking us from one destination to another. For many people around the world, cars are common commutation options. While these are quite convenient transportation options, they are prone to various kinds of accidents. Car fire is one of them. There are various incidents

of cars catching fire on the road occurring every year. A car fire can be caused due to a variety of reasons which can include mechanical failures, driver errors and so on. Once a car catches fire, any additional factors can aggravate the situation. The impact of car fires can be dangerous. If there is a leakage in the engine fluid containers and pipes, it could result in an explosion, thus resulting in various complications. It can result in grave injuries and, in severe cases, can claim lives as well.[2]

Car Accident: One of the most common causes of a car catching fire is a car accident. This depends on the area of the car that has sustained the maximum impact. For example, an accident that affects the gas tank of the car can cause the fuel to leak, thus resulting in a car fire. Even though various cars have metal sheets protecting these crucial zones of the car to ensure that absorbs the blow, but accidents that cause major impacts can still result in a leakage. The contact of the fluids of the car with the heat generated by the accident can quickly start a fire. Therefore, it is important to quickly get out of the car after the accident and move a large distance away from the accident spot and then contact the right authorities.

Improper Maintenance: Failing to maintain a car and keeping it in proper shape is one of the major causes of car fires. Various kinds of maintenance issue can spark a fire. For example, any frayed wiring can turn out to be dangerous if it comes in contact with any flammable materials. Therefore, it is important to get your car serviced at regular intervals.

Aftermarket Accessories: Many of the aftermarket accessories that car owner install inside their vehicles draw power from the electrical wiring of the car. This might turn out to be dangerous since these accessories might run on a different fuse capacity other than the electrical wiring. Additionally, there could be faults in the electrical wiring of the car that may cause car fire. Also, the wiring could be left exposed that could turn out to be the reason behind the car fire.

Car's Batteries: The car's batteries could be a reason for car fire. Since there are various electrical wiring and other components involved with a car's battery, it could catch fire easily. The vehicle uses current from the battery. Electricity is also generated when the car's battery is charged. Therefore, there are ample risks of fire. Any open wire can cause a fire. To prevent such conditions, all wires should be insulated properly.[2]

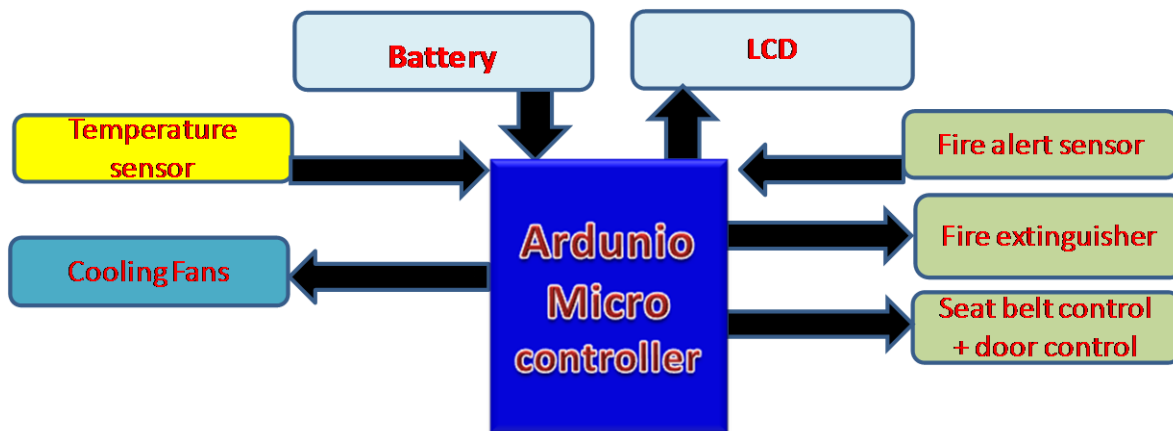
In New Delhi, The family of a 34-year old woman, who was burned to death in a car along with her two daughters on the busy Akshardham flyover yesterday night, has accused her husband of murdering her. The incident took place around 6.30 pm when the car was going towards the Akshardham temple. Initial investigations reveal that compressed natural gas (CNG) leak at the back of the Datsun Go car led to the fire. The woman, Ranjana Mishra and her daughters Ridhi and Nikki were killed in the fire. Her husband and a third daughter survived the blaze.[3]

in Bengaluru, A car caught fire in Bengaluru on Friday evening and caused a major traffic jam. According to the fire department, a Maruti Suzuki Swift caught fire in the evening but the fire engines sent to the spot could not reach the car because of the heavy traffic. Smoke could be seen from a distance as flames spread quickly. The incident took place near the Sakra World Hospital and Eco Space flyover close to Whitefield. The area is known for its traffic issues.[3]

III. Proposed System:

In this proposed system technology used is Sensor technology, Electronic Control Unit (ECU), AFO fire Extinguisher etc. providing a mechanism to ensure engine fire safety and overheating condition. In the case of engine over heat condition is sensed by the temperature sensing unit. If it exceeds the safety level (220degrees Fahrenheit), the cooling fan will try to cool down the engine at running condition. In case of accidental engine fire break out the sensing unit will trigger the microcontroller there by activating the Auto Fire Off (AFO) to neutralize the fire.

BLOCK DIAGRAM



Working:

In this fire alert sensor based fire extinguishing system using Arduino has been proposed in this project work. Once the fire condition is sensed, the proposed system will activate the fire extinguisher unit and stop the vehicle running to avoid further chances for increase of fire due to wind on running condition. Meantime, seat belts, vehicle windows and doors are automatically opened to help the occupants to come out from the vehicle. Simple solution to remove the engine heat temporarily is to absorb it with the help of Air Conditioner fan available inside the four wheelers and by changing the AC knob from cool mode to heater mode. It will absorb the engine heat and take the hot air inside the vehicle chamber. By opening the vehicle windows, the sucked hot air will go into the atmosphere. But, to complete this process, manual intervention is needed. To remove the engine heat up to considerable amount, entire operation is made automatic with the help of Arduino controller and entire positions will be reverted once the engine heat becomes normal. This will assure the continuous journey for the vehicle users and they will get the alert about engine overheat on their vehicle dashboard.

IV. Experimental Setup & Experimental Results

case 1: Another problem considered in this project work is to save the occupants of four wheelers from the Vehicle engine firing and to remove the fire condition from the engine. Perhaps the car's fuel-delivery system or gas tank is defective, leading to ruptures which spew gasoline where it can ignite via one spark. Occupants of a car which catches on fire can be seriously burned or even killed. They may

survive the initial impact completely intact, but if they are inside the vehicle and it's engulfed in flames, they may not survive the car fire. [4]



Figure 1: News about Car Fire condition (Courtesy: Sun News Channel)

Figure 2: Car firing photos (Courtesy: www.cartoq.com)

case 2: Most engines are designed to operate within a "normal" temperature range of about 195 to 220 degrees F. A relatively constant operating temperature is essential for proper emissions control, good fuel economy and performance. But problems can arise that cause the engine to run hotter than normal, resulting in engine overheating. Overheating can be caused by anything that decreases the cooling system's ability to absorb, transport and dissipate heat: A low coolant level, a coolant leak (through internal or external leaks), poor heat conductivity inside the engine because of accumulated deposits in the water jackets, a defective thermostat that doesn't open, poor airflow through the radiator, a slipping fan clutch, an inoperative electric cooling fan, a collapsed lower radiator hose, an eroded or loose water pump impeller, or even a defective radiator cap. Ultimately, the vehicle can't run further with the overheated condition.[4]

The proposed system automatically detects and extinguishes the fire condition and it stops the vehicle running. It avoids further enhance in fire condition. This will save the life of vehicle occupants. In most of the vehicles, this provision is not available. Excessive heat won't allow the vehicle to run further. The vehicle stopping condition due to engine over heat condition somewhere in remote areas while travelling with family members become difficult and getting help is not possible in some areas. By implementing the proposed work, continuous running is assured even during engine over heat condition .Fire alert sensor is used for engine fire protection process Small fire extinguisher unit is needed to remove the engine fire Temperature sensor with Arduino control is used Arduino based control circuit for overheat/engine fire conditions.[4]

V. Conclusion

This project describes a design of effective protecting system and alarm system that can monitor a vehicle/ car condition in travelling. The project shows that system is designed to prevent the accident by taking some type of measures and to inform emergency about an accident that has occurred to predefined number. [5]As the system includes, detection of actual location of accident will help to save lives. This system uses a pressure sensor that detects occurrence of accidents and heat sensor that detects any high variations in temperature due to fire in the vehicles. All these sensors send a signal to Arduino. Temperature sensor and fire alert sensor are connected to arduino along with fire extinguisher and seat belt control, door control informs that total the system is aimed to provide a total protection to the vehicle.

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