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Automatic Fire Extinguishing System for E-Vehicle

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ABSTRACT: The goal of this study is to develop and build an Advanced Fire Extinguishing System (AFES) that uses state-of-the-art technology to quickly and effectively detect and put out flames. The AFES incorporates a network about sensors, including heat, flame, and smoke detectors, to continually monitor the surroundings for signs of an impending fire. These sensors are linked to a central control device, which uses advanced algorithms to analyse data in real time and detect fires with accuracy. The system automatically starts deploying a fire extinguishing material, including bubbles, gas, or chemical suppression, as soon as it detects a fire. The vital significance that early detection and fast reaction play in fire prevention is highlighted by this study, which makes a substantial contribution to the evolution of fire suppression technology.

KEYWORDS*:* Fire safety , Electric vehicles, Accident prevention , Automation etc.

I.INTRODUCTION

This technology is intended to automatically put out a fire by activating the fire extinguisher when it detects flames and smoke in a vehicle's fire-prone zones. Electric cars are vulnerable to a number of conditions that might result in fires. The purpose of installing an automated fire extinguishing system is to reduce the possibility of monetary losses due to fires and to improve the general safety of the car, its occupants, and other drivers. Using an advanced firefighting system, the main objective of this work is to describe the creation of an Autonomous Fire Extinguisher System of Electric Vehicles (EVs). By integrating a network of monitors and detectors, the system keeps track of important variables including the EV's temperature, current, voltage, and smoke. The system automatically initiates when it detects a possible fire threat. It then releases gases or fire-extinguishing chemicals that are tailored to the individual site in order to suppress or lessen the intensity of the fire. In order to avoid the spread of fires caused by electricity, the project also includes elements like power management, battery isolation for electric vehicles, and seamless interaction with the vehicle's current systems for a coordinated response. Following EV-specific safety guidelines and rules is essential to guaranteeing the dependability and efficiency of this life-saving device, which tackles the unique problems related to electric vehicle fires.

Figure 1: Automatic Fire Extinguishing System for E-Vehicle

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II.PROBLEM IDENTIFICATION

The growing number of electric vehicle (EV) adoptions raises the possibility of fire-related mishaps, which presents serious safety risks as well as practical and financial difficulties. The issue statement about EV fires might be stated as follows:
Problem: Electric vehicles (EVs) are susceptible to flames from a number of sources, including exterior accidents, electrical malfunctions, and overheated batteries. These accidents may result in serious safety risks, harm to vehicles, and environmental repercussions. Emergency response teams, regulatory agencies, and the automobile industry all have major issues when it comes to addressing and reducing these dangers.

III.PROPOSED SYSTEM

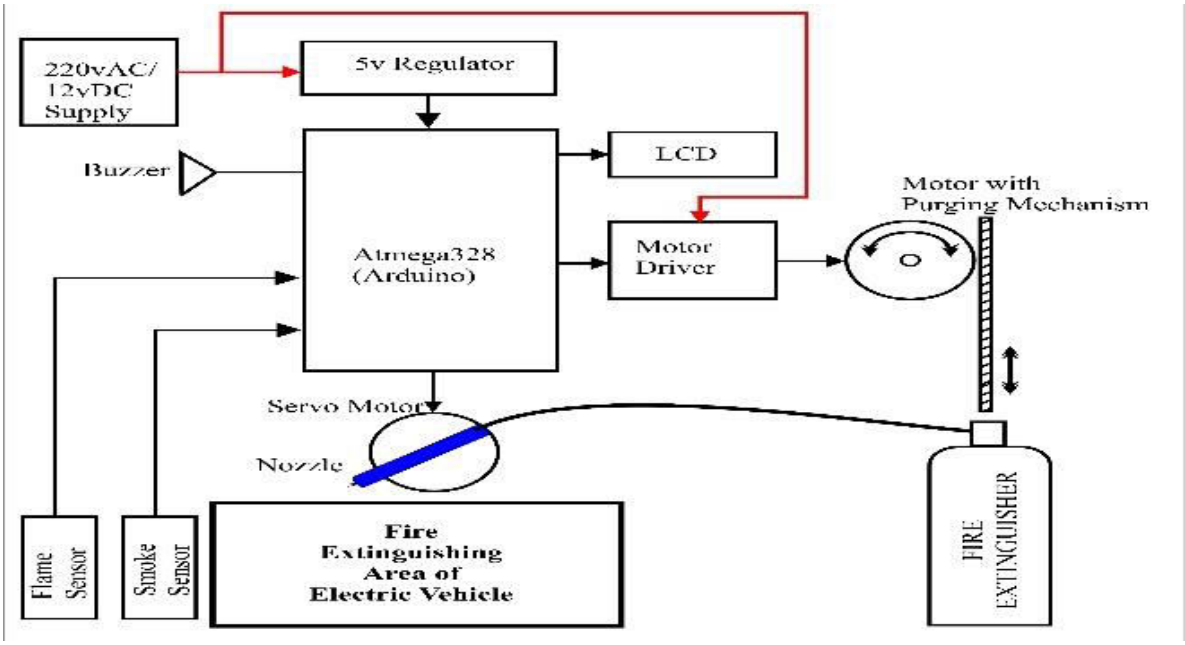

Figure.2: Block Diagram of Automatic Fire Extinguishing System for E-Vehicle

The flame sensor measures the ambient temperature, while the smoke and flame sensors identify the presence of fire and smoke, respectively. These sensors then send signals through the Arduino microcontroller. After the computer processes the data from the sensors, the touch screen and buzzer are turned on as outputs. Furthermore, the extinguisher system is turned on by starting the DC motor. The operation of smart fire safety measures in electric cars (EVs) is ensured by this integrated approach.

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IV. COMPONENT USED

The Arduino Uno, smoke, flame, liquid crystal show, DC motor drive, and servo motor were employed in the Automatic Fire Fighting System for E-Vehicle. Their specifications are as follows,

 **Fig 1.1 Arduino Uno**	Constructed around the ATmega328 a microcontroller the Arduino Uno has six analogue inputs, six digital input/output pins (six of which are used as PWM outputs), a crystal oscillator with a frequency of 16 MHz, a USB port, a power connector, an ICSP header, and a button to reset it. Complete with everything needed to operate the microcontroller, users may connect it to a computer via a USB cable, or they can power it with a battery or an AC-to-DC converter.
 **1.2 Smoke Sensor**	An electrical device called a smoke sensor is used to measure the concentration of chemicals in the air, such as carbon monoxide, smoke, alcohol, hydrogen, LPG, propane, and methane. By using a sensing material, the resistance of the material varies when it comes into contact with gas; this change in resistance is the basis for gas identification.

 **Fig 1.3 Flame Sensor**	In addition to being sensitive to flames, the detection sensor module can also pick up regular light. usually employed as a flame detector. It can identify a flame or light source with a wavelength between 760 and 1100 nm. 60-degree detection points that are especially sensitive to the flame's spectrum. Sensitivity has consistent performance and is customizable. Working voltage: 3.2-2.5 volts.
 **Fig 1.4 Liquid Crystal Display**	Liquid Crystal Display is what LCD stands for. The following factors have led to the widespread use of LCD in place of LEDs, including multi-segment LEDs and seven-segment LEDs: • The falling cost of LCDs. • • The capacity to show characters, numbers, and images. LEDs, on the other hand, are restricted to a few letters and numbers.

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 **Fig 1.5 DC Motor Drive**	A DC motor is a type of electrical motor that generates mechanical force by use of direct current (DC). The most popular kinds rely on the magnetism generated by coil currents. Almost every kind of DC motor has an internal mechanism.
 **Fig 1.6 Servo Motor**	One kind of motor that has extremely precise rotation is a servo motor. Typically, this kind of motor is made up of a control system that gives feedback on the motor shaft's present location. This feedback enables the servomotors to rotate extremely precisely. A servo motor is used when you wish to rotate a thing at a certain angle or distance. It consists only of a basic motor that is driven by a servo mechanism. A motor is referred to be a DC servo motor if it is supplied by a power source that runs on DC.

V. RESULT AND CONCLUSION

increased safety for both drivers and passengers, reducing the chance of fire and possible property damage. Minimise the chance of a fire-related occurrence, protecting the occupants of electric vehicles and averting extensive damage. The system can be easily connected with the safety system of many electric vehicle types, since it is designed to be friendly with them. The technology complies with applicable safety standards and laws pertaining to electric cars.

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