

VEHICLE FIRE DETECTION AND PREDICTION SYSTEM USING SENSOR NETWORKS

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ABSTRACT

A Sensor Network is a group of sensors where each sensor monitors data in a different location and sends that data to a central location for storage, viewing, and analysis. The fire accidents have damaged many areas and they are also a major threat to human life. Sensor networks technology is helpful to detect and monitor fire accidents occurring in Vehicles by electrical and electronic faults. In this project, the intention is to build a fire detection system for vehicles. The system extinguishes the fire using Sensor which would detect the fire with Gas Sensors and Temperature Sensor and thus value the fire and alert the authority by sending emergency alerts through an alarm using Sensor networks devices. This project is used for monitoring the hubs to monitor and predict fire using sensors and alerts the authority by the alarm to protect human life. .Here, the Gas Sensor and Temperature Sensor modules are used to predict and detect the heatness and emergency fire in the vehicles.

Keywords: SensorNetwork, Gas, Sensors, Temperature Sensor.

INTRODUCTION

A sensor network is a group of sensors where each sensor monitors data in a different location and sends that data to a central location for storage, viewing, and analysis. It Comprises a group of small, powered devices, and a wireless or wired networked infrastructure. The sensor network connects to the internet or computer networks to transfer data for analysis and use. Sensor network nodes cooperatively sense and control the environment. They enable interaction between persons or computers and the surrounding environment. Sensor networks can be wired or wireless. Wired sensor networks use ethernet cables to connect sensors. Wireless sensor networks (WSNs) use technologies such as Bluetooth, cellular, wifi or near field communication (NFC) to connect sensors. WSNs are easier to deploy and maintain and offer better flexibility of devices. With the rapid development of

sensors and wireless technologies, WSNs have become a key technology of the IoT. WSNs don't need the physical network infrastructure to be modified. Sensor networks typically include sensor nodes, actuator nodes, gateways, and clients. Sensor nodes group inside the sensor field and form networks of different topologies. The following process describes how sensor networks operate. A sensor node monitors the data collected by the sensor and transmits this to other sensor nodes. During the transmission process, data may be handled by multiple nodes as it reaches a gateway node. The data is then transferred to the management node. The management node is managed by the user and determines the monitoring required and collects the monitored data. There are many nodes in a sensor network. These nodes are the detection stations. There is a sensor/transducer, microcontroller, transceiver, and power source: A sensor senses the physical condition, and if there is any change, it generates electrical signals. The signals go to the microcontroller for processing.

A central processor sends commands to the transceiver and data is transmitted to a computer. Currently, fire is one of the deadliest risks of human lives. A lack of fire safety measures may result in material and financial losses, as well as loss of life. So it is too important to find a predicting and detecting system. The Sensor network is a solution. The Sensor network is collection of sensors that work together in order to serve human tasks in an efficient manner. This paper presents a low cost fire predicting and detecting system, which is a solution for saving human lives and properties from fire accidents. Micro controllers and sensors are used for that system. The system gives an early warning of the threats and allows enough fire to evaluate the passengers from the car to save their life before the fire gets out of control.

LITERATURE REVIEW

Rishika Yadav et al (2020), proposed a sensor based smart fire detection and fire alarm system for early detection of fire accidents in home before fire gets out of control and to save human life from fire accidents. This model detects fire at an early stage and send notification to fire station about fire outbreak. This system also extinguish fire using water sprayers.

Wiame benzekri et al (2020), proposed a early forest fire detection system using wireless sensor network and deep learning for early detection of forest fire using artificial intelligence can detect relations and models that can escape us. This model present a novel forest fire approach, and enables monitoring and control of different operations that increase productivity and efficiency.

Nicoleta cristina gaitina et al(2020), proposed the forest fire detection system using lora technology. In older days, manually fire detection approach is used. In current days, satellite-based surveillance system is used to detect forest fire but this works when fire is spread in the large area. So these techniques are not efficient. According to a survey, approximately 80% losses are occurred in the forest due to the late detection of fire.

Ravinder pal Singh (2021), proposed a advance fire control and detection system for early detection of fire accidents in home to alert the people to escape from fire accidents and it also send notification to fire department to save human life and also remove the smoke from the room by using automatic windows.

Dr. c. k. Gomathy et al (2021) proposed the fire alarm system based on IOT for early detection of fire accidents in factories to alert the people to escape from fire

accidents when any smoke or flame detected by the sensor it immediately sends the notification to fire station to rescue human life and it spray co2 gas or water to reduce fire. Sengul dogan et al (2022) proposed fires have been commonly seen worldwide and especially forest fires are big disasters for humanity. The prime objective of this work is to develop an accurate fire warning model by using images. In this work, two new deep feature engineering models are proposed to detect the fire accurately using images. These developed models are ready to be tested with higher databases before actual real-world application.

METHODOLOGY

Monitor the vehicles engine heat

When the engine overheats in the vehicle. It can be monitored and detected through a temperature sensor. Monitor the fire accidents vehicles, the fire accidents can be occurred by following reasons, 1. Overheating engines

2. Spilled fluids (fuel system leaks)
3. Electrical system failures.

Detect the engine heat based on

Temperature Sensor

The increase of temperature threshold value of a car engine can be detected through a temperature sensor.

- A) Low level < 25 If the temperature threshold value of the car engine is less than 25, then the led is turned off.
- B) Normal level $= 50$ If the temperature threshold value of the car engine is equal to 50, then the engine is in normal state.
- C) High level > 80 If the temperature threshold value of the car engine is greater than 80, then it indicates high temperature, then led turned on.

Detect the fire based on Gas Sensor

The increase of smoke smell and smoke threshold value of vehicles engine can be detected through Gas Sensors.

- A) Low level < 50 If the smoke threshold value of the car engine is less than 50, then the buzzer turns off.
- B) Normal level $= 70$ If the smoke threshold value of a car engine is equal 70, then the engine is in normal state.
- C) High level > 80 If the smoke threshold value of a car engine is greater than 80, then it indicates high smoke, then the buzzer is turned on.



FUTURE WORK

We conclude that the system processes of monitoring and controlling are working in real time. No man power required to operate as fully automatic. In further expansion of the system also can be done in the future if needed. The system can be further developed with added features like messages and calls to alert the passenger in the car and this system helpful for automated vehicles that are without a driver to save vehicles from fire accidents.

CONCLUSION

This project helps to predict and detect the presence of fire and smoke. This system operates to alert people to evacuate allocation in which a fire or smoke is present. A fire alarm and led light will notify people of an immediate fire emergency situation. This project implemented An efficient vehicle fire detection and prediction System. It helps to save human life from fire accidents. This prototype model helps the mechanical engineer to make original Motor parts for the car engine to protect passengers from fire accidents.

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