

## METHODS

# An internet of things enabled smart firefighting system

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A fire accident is a mishap that could be either man-made or natural. Fire accidents occur frequently and can be controlled but may, at times, result in severe loss of life and property. Many a time, firefighters struggle to sort out the exact source of the fire as it is continuously flammable and spreads all over the area. For this concern, we have designed an Internet of things based device which sorts out the exact source of fire through software and hardware devices, and also allows the complete detail of an area to be visualized by firefighters, which is pre-installed in the software itself. Because of our system's intelligence in decision-making during firefighting, the proposed system is claimed as a "smart firefighting system." The implementation of the smart firefighting system can make the firefighters analyze the current situation immediately and make the decision more quickly in an effective manner. Because of this system, fire losses in a building can be greatly reduced and many lives can be rescued immediately. Furthermore, fire spread can also be restricted.

**Keywords:** Internet of things (IoT), firefighting system, NodeMCU, ThinkSpeak, Pyrofighter

## Introduction

The in the world is about > 7 billion, and most of the people try to gather in the same place where wealth is constant. Also, people move from place to place due to modernization and urbanization. Many places in the world are clustered by shops, buildings, and large apartments. Hence, in such places, accidents that occur in the form of fire and in several other forms cause severe loss of human lives and materials. In India, a reputable newspaper, *The Indian Express*, conducted a study in malls, apartments, and all commercial buildings, and found that most malls and apartments lack proper fire safety systems and awareness. There are many advanced firefighting systems and techniques, but most of them are not utilized as the main reason behind it is that they require high initial investment. Implementation of an effective budgetary controlled smart firefighting system will overcome these difficulties. Most technology is automated and controlled through the Internet of things (IoT). To sort out these difficulties in firefighting and make a required solution, this smart firefighting system was introduced. This

makes firefighting simpler and decision-making can be done in a short time.

## Design and methodology

A firefighting system includes both hardware and software design. The hardware design contains the following components:

**K-type thermocouple:** A thermocouple is a sensor used to measure temperature. Thermocouples consist of two wire legs made from different metals. The wire legs are welded together at one end, creating a junction. This junction is where the temperature is measured. When the junction experiences a change in temperature, a voltage is created. The type K is the most common type of thermocouple. It's inexpensive, accurate, reliable, and has been optimized to detect a wide range of temperature fluctuations.

**MQ2 gas sensor:** It is a metal-oxide semiconductor (MOS) type gas sensor, also known as a chemiresistor, as the detection is based upon the change of

