

# Automatic Fire Detecting System: FLAMES (Fire Location and Management E-System)

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## Abstract

Fire safety is the set of practices intended to reduce the destruction caused by fire. Threats to fire safety are commonly referred to as fire hazards. The major advantage of having a well versed fire safety plan is that it enables the fire-fighters to know more about the location of the fire and the possible reasons can be figured out, as per these reasons fire safety and fire rescue methods can be efficiently applied. The advent of technology in every aspect of life, modernization involves from providing real time fire alarming smart signals to a variety of related activities that come along with the various day to day fire station activities that are considered under “pre-plan” before any emergency occurs.

**Keywords:** Automatic fire detection; Fire safety; Fire location detection; Combination of various sensors

## Introduction

After observing most of the day to day activities that happen around us, the most alert and vigilant of all activities are that of emergency services that get to work when there is a sudden negative change in normal ongoing human tasks. Emergency services being a very huge domain, it was decided to bifurcate it into subdivisions and hit the most valued and important of all emergency service which is the most essential component when a city layout is planned - The Fire Emergency Services.

Not only modernization was the objective of this domain but also providing smart solutions to the unusual fire situations that can occur at any time any moment!! This initiative can be helpful in saving many innocent lives and thus making India a safe country to live in Identify, Research and Collect Idea.

Various research papers had been viewed and studies thoroughly. Various firefighting practices were developed over time but very few actually posed the idea of automatic detection of fire and sending the location. Many countries around the globe agreed to adopt a single fire safety standard but this was not implemented at a very basic level. Resulting in huge failure of the plan. When it comes to safety of the masses, even the slightest mistake can result in huge epidemics.

Understanding the nature of the fire is utmost important aspect. This aspect is not being detected by the fire systems that are currently installed worldwide. A very systematic approach of research was deployed when it came to understanding the nature of the fire along with detecting it.

Various environmental and biological changes happen in the surroundings when a fire from a particular source is ignited. The sudden spike in temperature and presence of no humidity around the fire affected location clearly states that it is been ignited via an electricity source and not a kitchen accident.

“United we stand, divided we fall”, not a single integrated sensor but a combination of sensors which help calculating the statistics from the surroundings, is the main driving aspect of this project. A research paper published by Youn Yong Lee from Korea Institute of Science and technology, Seoul states in his 9-page report that the major safety has been an issue in high rise buildings and underground facilities which

have a comparatively less connectivity to the outside world once the fire is triggered from the bottom levels.

Fire protection experts generally agree that automatic sprinklers represent one of the single, most significant aspects of a fire management program. Properly designed, installed, and maintained, these systems can overcome deficiencies in risk management, building construction, and emergency response. They may also provide enhanced flexibility of building design and increase the overall level of fire safety (Figure 1).

## Studies and Findings

Now it is the time to articulate the research work with ideas gathered in above steps by adopting a suitable approach:

Not much of software was used in implementation of the idea, although ARDUINO's software was installed and thoroughly used for the program execution. The program in turn was used to connect

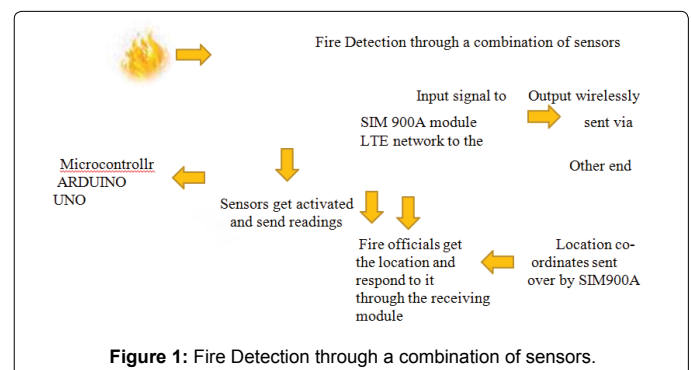


Figure 1: Fire Detection through a combination of sensors.

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the sensors to the microcontroller which is the heart of the whole implementation.

## Working of the System

The working module (the actual hardware model which has already been prototyped) gets triggered when there is a fire in the surrounding as well as when a constant rate of change is seen in the parameters that get affected by the fire (for instance humidity, temperature, flame, etc.).

When the flame has been ignited the IR Flame sensing module which has been implemented sends signals to the microcontroller. The change is also seen in the readings of humidity sensor when the fire is too dense. The intensity of the fire is judged by the readings of the sensors. The humidity ceases to minimum when the fire is ignited.

Such combination of sensors, according to their readings send their data to the microcontroller which in turn senses all the incoming signals and sends a collective reading to the SIM 900 module. Which displays the reading and also sends the location to the receiver person (SIM900A is just used in the prototyping model) [1-5].

## Conclusions

The automated fire location detection system is capable of handling situations and fire at certain places where human reach is not possible but the place being of much importance to living beings.

The purpose behind the project is to create a healthy environment where the rescue operations are so efficient that they do not let the disaster to replicate itself and thus prevents hazards related.

The futuristic generations, would be much affected by the globalization and modernization of the ever growing world. There will be a need for efficient fire rescuing and alarming systems. As our Honorable Prime Minister Shri Narendra Modi has showed us a vision of digitalized india and modernized India it is time to spread the awakening among every aspect of our governing system. FLAMES is just one step on the road of miles.

## Appendix

### Arduino UNO

Arduino is an open-source electronics platform based on easy-to-

use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

### Various sensors

**MQ7 gas sensor:** A gas detector is a device that detects the presence of gases in an area, often as part of a safety system.

**MQ2 smoke sensor:** Senses the fumes of the smoke in and around itself.

**SIM900A module:** The SIM900 is a complete Quad band GSM/GPRS solution in a SMT module which can be embedded in the customer applications. Featuring an industry standard interface, the SIM900 delivers GSM/GPRS 850/900/1800/1900 MHz performance for voice, SMS, Data, and Fax in a small form factor and with low power consumption.

**LTE network:** In telecommunication, Long-Term Evolution (LTE) is a standard for high-speed wireless communication for mobile phones and data terminals, based on the GSM/EDGE and UMTS/HSPA technologies.

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