

KARNATAKA STATE COUNCIL FOR SCIENCE AND TECHNOLOGY

Indian Institute of Science Campus, Bengaluru -560 012

- 1. TITLE OF THE PROJECT:** A COMPREHENSIVE SMART FIRE EXTINGUISHING SYSTEM POWERED BY IOT
- 2. NAME OF COLLEGE AND DEPARTMENT:** HKBK COLLEGE OF ENGINEERING, INFORMATION SCIENCE ENGINEERING
- 3. NAME OF THE STUDENTS AND GUIDE:**

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4. KEYWORDS:

Fire Hazard, Android Mobile Application, IOT, Sensors,

5. INTRODUCTION:

In the modern world, the electronic gadgets which we use in regular day to day existence is at an unsurpassed ascent. In such a situation the danger of flame risks is likewise high. To ensure the safety of our near and dear, the comprehensive smart fire extinguishing system has been designed. The present methods of safeguarding one's surrounding from fire is very tedious, expensive and requires professional consultation. The basic devices required for safeguarding one's surrounding from fire are camera, portable fire extinguisher, fire alarm, etc. All these devices need to be bought, installed and maintained separately

It is a known fact that there are various aspects to a fire hazard, we have devised a system which handles these various aspects, such as, in a fire hazard the most dangerous and life-threatening aspect of the fire hazard is not always the fire, but the smoke and gases created by the burning and smouldering of the various household materials. So in anticipation of this, we have equipped our system with gas sensor and smoke sensors to keep tabs on the level of gases and the presence of smoke in our immediate surroundings. There can be various different types of gases present during a fire hazard, therefore, in anticipation of this, we have configured our sensors to detect some of these gases. For example, CO₂, methane, etc. In addition to the gas and smoke sensors, we have implemented temperature sensor and fire sensor. The data from these sensors will be used to notify the user through mobile sms and a notification in the app in case of an incident. Along with these sensors we have also installed a camera. This camera will be useful in a variety of manners. It will provide a around the clock video feed which the user will be able to use to monitor the device's immediate surroundings. The user can also use the video feed in case of a fire hazard to gauge the situation and take the appropriate steps. The device will come equipped with a fire extinguisher which will be remotely controlled by the user from the mobile application. The fire extinguisher will have limited range. It will be able to handle small fires which occur within the fire extinguishers range.

6. OBJECTIVES:

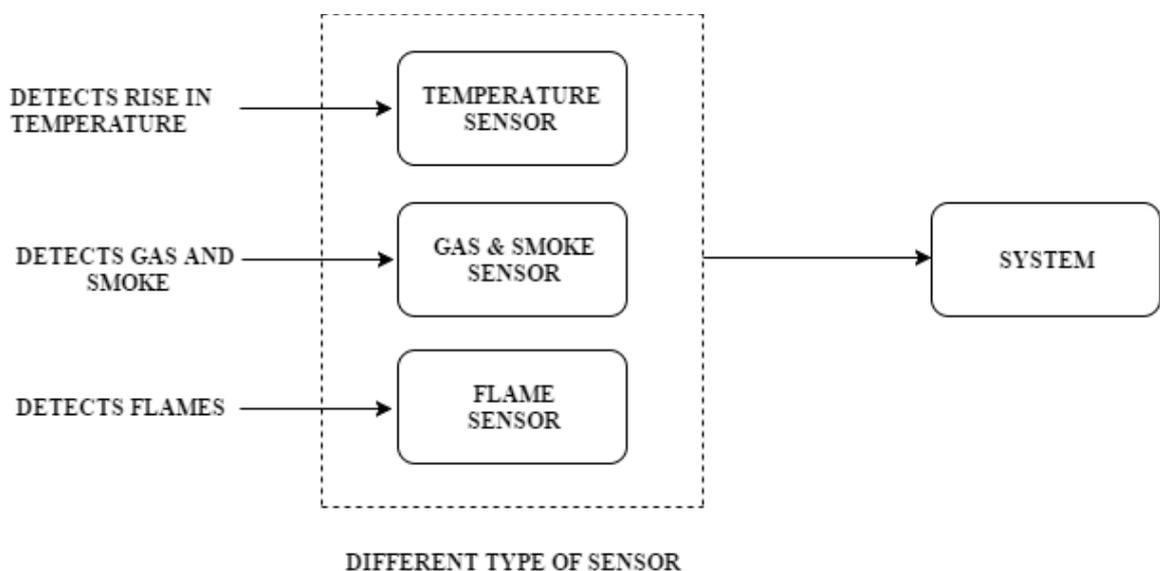
1. To safeguard the users against toxic gases.
2. To tackle all aspects of a fire accident, it consists of all the components it requires.
3. Notifies to the user in case of an accident in real time.
4. To handle small fires on its own without human intervention.
5. The user is not required to be present on the scene for the appropriate action to be taken; he can use the onboard camera and IOT, to gauge the situation.
6. To continue functioning due to its inbuilt battery in case of unavailability of power.

7. METHODOLOGY

Analytical Methods

The default value, of the visible flame tips of a fire, is at an average temperature of 450°C, but the range is large, covering 300~600°C. Knowing this we configure the flame and temperature sensor to detect a fire before it gets unmanageable. The maximum amount of CO (Carbon Monoxide) that a person can be continuously exposed to in any 8-hour period is 25 ppm (part per million).

At this level, no toxic symptoms are developed. Therefore the sensor is configured to notify the system when excess level of gases are detected. Figure gives different types of sensors used in the device.

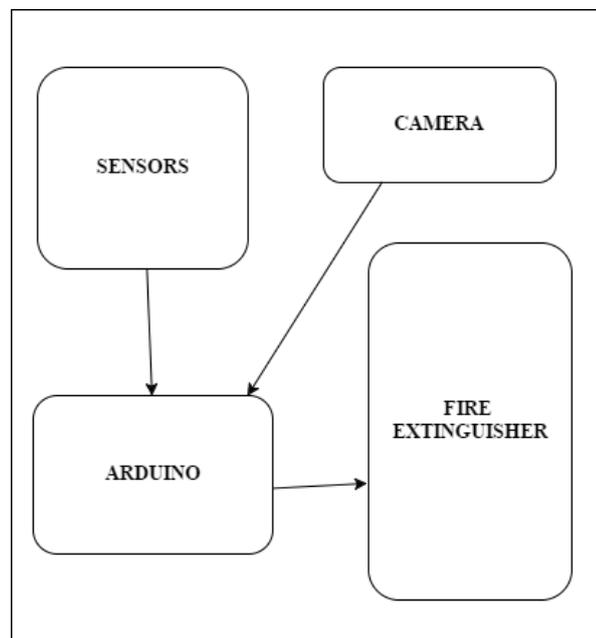


Applied

A known fact is the omnipresent risk of fire hazard. Our project works towards finding a solution for an immediate problem facing society in industrial/business organizations, schools, offices etc..

The present market does not have a comprehensive and easy method to use the system which can be deployed in such areas. This problem is tackled by the CSFES system. Each component of the CSFES system has been carefully chosen to tackle the different aspects of a fire hazard. The figure gives different types of components which can handled different aspects of the fire hazards.

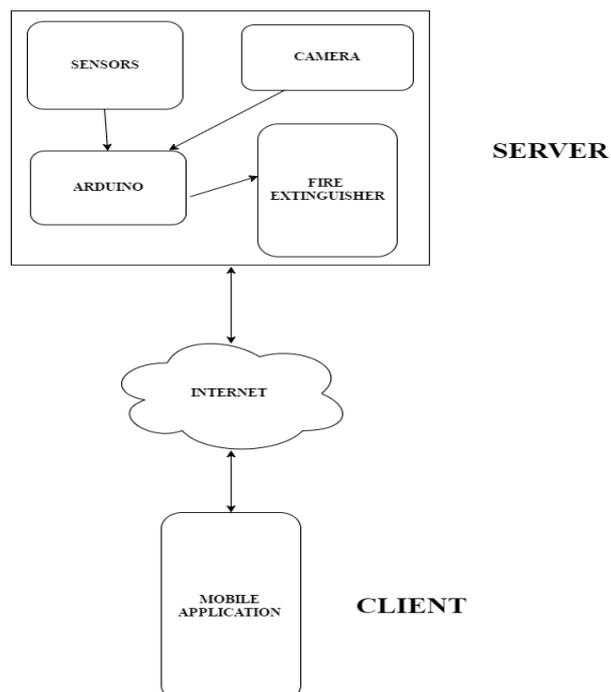
The CSFES system is equipped with various sensors, camera, and fire extinguisher. All the components in the CSFES system work in tandem to tackle this prominent problem which is faced by society on an everyday basis.



Two Tier Architecture

Refers to client/server architectures in which the user interface runs on the client and the database is stored on the server. The actual application logic can run on either the client or the server.

The mobile application of the CSFES system is the client and the device of the CSFES system plays the role of the server. The device (server) stores all the data of various sensors and camera feed and the local micro-computer which can be accessed by the mobile application (client).



8. RESULTS AND CONCLUSION:

After we have successfully implemented all the modules, the end device will be capable of handling all of our expectations with which we commenced our project. Some of our intentions, which we have implemented in our project are; notifying the user in case of an emergency through various means, such as android mobile application, mobile message, and alarm, detecting the presence of various toxic gasses in our immediate surroundings. Some of the gasses which the device will be capable of detecting are CO₂, methane etc. The inbuilt battery will make sure that the device functions even during unavailability of power.

The device will be capable of keeping watch on a designated area, and the device will consist of an inbuilt fire extinguisher which can be controlled by the user through the mobile application in case of a fire hazard, therefore the user need not be present physically at the location, the device will work towards the prevention of monetary and property loss as well as the prevention of the loss of human life. In the off case of a fire accident, the device will take the required steps of alerting the user and the nearby humans of the fire hazard.

9. SCOPE FOR FUTURE WORK:

1. It can be made into a device which can be sold as a product and it can be deployed in various environments such as homes, colleges, offices etc.
2. If multiple devices are deployed in the vicinity they should be able to communicate with each other and coordinate their actions.
3. The fire extinguisher can be made fully automatic.
4. Different sensors can be used depending on the location the device is been deployed at.
5. Mobile application can be developed for IOS also.