A Comprehensive Smart Fire Extinguishing System Powered by IOT

Biboshan Banerjee¹, Praveen Kumar K², Sameera Sarvath³, Sabah Zakir⁴  
¹²³⁴Dept. of ISE, HKBK Collage Of Engineering, Bengaluru, Karnataka, India  

Abstract—In the contemporary world, the number of electronic devices which we use in everyday life is at an all-time rise. In such a scenario the risk of fire hazards is also high. Fire risk is omnipresent. In the present market, the availability of a comprehensive solution remains elusive. So the present project proposes to create a comprehensive system, which is totally beneficial during fire accidents. CSFES(Comprehensive Smart Fire Extinguishing System) will include multiple sensors, camera, fire extinguisher and IOT. It will be capable of handling small fires due to the inbuilt fire extinguisher. This system will contact the owner/user using IOT technology during a fire emergency. The seriousness of the situation can be gauged with the help of the camera and appropriate steps can be taken. The project contributes towards saving the loss of human life and property, by following the proverb, prevention is better than cure.

I. INTRODUCTION

To ensure the safety of our near and dear, we have decided to come up with a comprehensive smart fire extinguishing system. The more we get surrounded by electronic devices, the fire risk increases in tandem. The present methods of safeguarding one's surrounding from a fire is very tedious, expensive and require professional consultation. The basic devices required for safeguarding one's surrounding from fire and camera, portable fire extinguisher, fire alarm, etc. All these devices need to be bought, installed and maintained separately.

As we know 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 of the fire hazard is not always the fire, but the smoke and gases created by the burning 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 and fire sensors. 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.

II. MODULES

1. SENSORS

Temperature Sensor: The temperature sensor alerts the system in case the ambient temperature crosses the safety threshold. A pre-defined threshold value is set, if the temperature exceeds that value then the user gets notified through the mobile application and message.

Gas Sensor and Smoke Sensor: During the onset of a fire hazard, certain harmful gases are produced. The normal human being can tolerate only a certain level of these harmful gasses, when this level is exceeded, the sensor detects these harmful gasses(carbon monoxide and carbon-di-oxide) and alerts the system.

In addition to this, whenever there is a presence of smoke in the environment the sensor alerts the system.

Flame Sensor: The system is alerted when a fire is detected in the nearby surroundings.
2. CAMERA
The video feed captured by the camera is sent to the system for monitoring purposes. The user can use the app to view the video feed. The video feed can be used to gauge the situation. The video feed can also be used for security purpose.

3. FIRE EXTINGUISHER
The fire extinguisher present in the device is used to extinguish or control small fires, in emergency situations.

4. ANDROID APPLICATION
The mobile application will be used to keep tabs on the device. This application will be used to notify the user in case of any event and/or fire accident. The user will be able to use the application to check the current status of the device alongside all the readings of the various sensors available in the device. The user will also be able to see the video feed of the camera present in the device.

5. ALARM
The alarm produces the high pitched and attention grabbing noise which is used to notify the nearby humans of a fire hazard.

III. 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). Therefore the sensor is configured to notify the system when the CO level crosses the safety limit. 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).

**IV. 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 were; 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 device will be capable of keeping watch on a designated area and will work towards the prevention of monetary and property loss as well as the prevention of the loss of human life. In 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.

**V. FUTURE SCOPE**

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.

**REFERENCES**

2. www.doctorfire.com/flametmp.html