Advancement of traditional smoke detectors to smart: A survey

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ABSTRACT

This paper focuses primarily on the importance of a smoke detectors that can be utilized in house, office and shop, security gas station to detect smoke and fire. Safety becomes an important issue when fire detection is present in the home so that children and the elderly who are unable to fight fire smoke can use it. Prior research shows that are many deaths has occurred due to suffocation caused by causalities like sudden fire, circuit failure, unwanted fire hazards. A survey of various existing techniques of smoke detectors and how the techniques grew from traditional to smart, is given in this paper.

Keywords— *Fire Detectors, SMS Alarm, Safety, Fire Smoke Detectors*

1. INTRODUCTION

The fire has become very dangerous for people's lives these days, but the fire's fumes are more dangerous than the fire. Especially for children and elderly people who die as a result of suffocation or lack of adequate exits. Early detection of an accident involving fire is an effective way to save lives, but extracting the smoke is very important. The most effective way to detect a fire early and avoid losses is to set up a fire system or fume detector. A *detector of smoke* is a device that senses smoke, usually as a fire indicator. Commercials safety devices send a signal to a fire alarm control panel as part of a fire alarm system, while domestic smoke detectors, also known as smoke alarms, typically send a local audible or visual warning from the detector itself or from a number of detectors if several smokes detectors are interlinked. Fire alarms consist of various components and sensors that work together to detect fire and alert people over the internet via SMS when the person is not at home. Typical stand-alone smoke detectors, however, cannot meet the smart firefighting criteria, so there are several new methods that are currently being used. Thanks to the use of wireless communications. The smart smoke detector features low power consumption and longer battery life. According to a 195-nation analysis by Global Diseases Burden recently published in the BMJ Injury Prevention journal, India recorded 1.6 million fires and 27.0 27 deaths. The Indian deaths were 2.5 times China's number, where 10,836 people died in fires in 2017. The report said the biggest fire casualties were children.

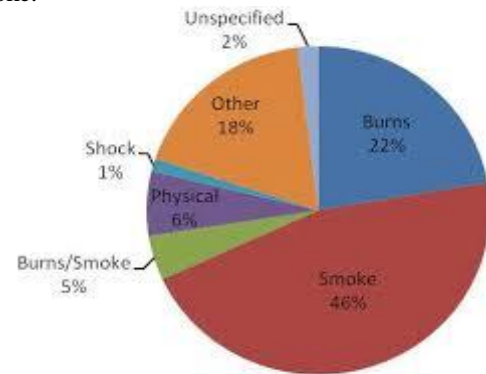Here is the chart shows the percentage of died people due to fire smoke.

Fig. 1: Death percentage due to smoke

2. LITERATURE SURVEY

As mentioned in many fields of industrial area, forest area, etc., fire detection is very crucial parameter. After several years, Work and research on the detection of flames and smoke, some algorithms are designed specifically for this purpose. These algorithms, which have been designed so far for video fire detection, are statistical color model, spatiotemporal flame modelling and dynamic texture. In this survey we observed that the smart smoke detectors are better than traditional one.

3. SMOKE DETECTOR TECHNIQUES

(a) Swiss physicist Walter Jaeger proposed a poison gas sensor (he expected that the gas entering the sensor would bind to ionized air molecules and thus alter the electrical current in the instrument circuit) but his device did not fulfil its purpose: small concentrations of gas did not affect the conductivity of the sensor[Reffrence number }.

(b) Swiss physicist Ernst Meili has developed an ionization chamber system that can detect fuel gasses in mines. He also developed a cold cathode tube capable of amplifying the small signal produced by the detection mechanism to a strength sufficient to trigger an alarm, but this would result in false ICSD alarms. Furthermore, because of toast, bacon and general cooking, ICSD is very sensitive to false alarm because it detects smoke particles ranging from 0.01 to 1.0 microns. To avoid spurious activity, some irritated households have removed the battery from detectors.

(c) Donald Steele and Robert Emmark invent a photoelectric or optical smoke detector However, optical smoke detectors detect smoke particles ranging from 1.0 to 10.0 microns but have difficulty detecting a flaming fire with small smoke particles and creating false alarms through dusty air.

(d) Dual-sensor smoke alarms: You get the most out of both systems with dual sensor alarms. But there are still some drawbacks. Before the alarm goes off, some models require both sensors to be triggered, but this may delay the sounding alert. Some models only allow the tripping of one of the sensors, but this also creates the opportunity for more false alarms.

(e) A.V. Duraivel proposed a machine for the raspberry Pi 3. They designed the system with a wide range of sensors, a video camera, and a sprinkler. It is extremely compact and offers an authentication process. This system has the downside of linking to a WI-FI network.

(f) S. Naveen proposed a device, For Raspberry Pi, gas sensor, flame sensor and temperature sensor, the gas and flame sensor are initially triggered in this system and then checked by the Raspberry Pi. The temperature signal is then switched on to confirm.

(g) R. Dhanujalakshmi designed a system that used image processing techniques to detect the presence of fire. For the measurement, they used a Raspberry pi. The downside was that the algorithm is very complex, requiring perfect working conditions.

(h) Sailaja Vungarala designed a system that used sensor and an Arduino to classify the flames based on their shapes and colours. The downside of this approach is that for effective usage it does not have long range and requires supervision.

(i) E. Saraswathi designed a system by using sensors and an Arduino Uno unit, the sensor networks are designed in this system with different user interfaces appropriate for users with varying abilities and for experienced users so that the device can be easily managed and dealt with very simply. The downside is that there is a high energy consumption and there is no effective authentication mechanism, it can result in many false alarms.

(j) R. Angeline, Adithya S, Abhishek Narayanan designed a system by using Raspberry pi, in which the place to be monitored is under constant surveillance by a closed-circuit television. The main advantage of this system is that it has a very high accuracy. If the fire has been detected a mail is sent to the security and the nearest fire department with an attachment of the photo.

(k) Many smoke alarms rely on sound to alert people to fires, but an audio alarm may not be the best option for homeowners who have difficulty hearing. The National Fire Prevention Association (NFPA) recommends using strobe light alarms for alerting people who are hearing-impaired, and use specialized, high intensity lights to wake up homeowners as they sleep.

4. SMOKE DETECTOR LIMITATIONS

(a) Smoke detectors provide the earliest warning of fire possible that can save lives of thousands.

(b) Special application rules can make up for smoke detector limitations. Smoke detectors may not give early warning of a building fire developing on another level.

(c) Detectors should be on each floor of a house. Detectors on the other side of a closed door may not sense a fire developing. Detectors should be placed on either side of the door in places where doors are usually closed.

(d) Detectors have sensing limitations as already suggested. Ionization detectors detect fast, burning fires better than sluggish, smoldering fires.

(e) Photoelectric smoke detectors have a better sense of smoldering fires than blazing fires. Since fires develop in different ways, and are often unpredictable in their development, there is always no better type of detector.

(f) A provided detector may not always provide sufficient advance warning of fires when fire protection procedures are insufficient, or when fires are triggered by violent explosions, gas escapes, improper storage of flammable liquids such as solvent washing, etc.

5. BENEFITS OF USING SMART SMOKE DETECTORS

As consumers begin to look at home automation and move to a smart home, one often overlooked aspect is the smoke detector. People ask about cameras and security, they want to monitor the temperature from their smartphones inside the house, they want door locks with remotely lockable and unlockable codes, but very rarely ask about smoke detectors. When the user is asked about the smart smoke detectors many questions arises like what is smart detector, why is that important. Why I should use it so it's important to know about it Smoke detectors are a nuisance of necessity. Checking batteries every 6 months, shrill chirping alarms go off every time when you burn some popcorn no matter how frenzied you sweep the towel, you didn't get it to switch off and the random beeping that comes from a dead battery and you can't find it and it won't go away even though you checked every battery in the house. All this is part of having traditional smoke detectors. These problems can be replaced by using the "smart." Smoke detector. Keeping your family in safe had never been more convenient or easier. There are some advantages of using the smart smoke detectors:

1. Detection of low energy fires.
2. Detection is faster than heat
3. These are preferred in life safety applications.
4. Avoid smoke inhalation
5. 24/7 monitoring
6. Easy and affordable

6. CONCLUSION

This paper describes the need for an effective solution for firing safety. Today, the security of data is very important in this internet world. The main concept used was the Internet of Things, and the project is based primarily on existing techniques, and it has also overcome many of the obstacles in previous systems. But some changes and remodeling are still needed to achieve a more efficient and practical layout. The time taken for the practical usage approach must be needed. This paper shows how the advancement from traditional smoke detectors to smart detectors takes place as per need of safety, so the changes in the technology will take place in the future.

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