**Name of the paper** : Review of Recent Development in Fire Detection Technologies

**Published year** : 2003

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**Topic**： Industry based Fire Management System

**Disadvantages**：

Fire detection technology still faces challenges related to reducing false alarms, increasing sensitivity and dynamic response, as well as providing protections for highly expensive and complex installations to better safeguard the public and meet evolving regulations.

**Limitations :**

1. The distributed fiber optical temperature sensors have been introduced to provide fire protection for those applications with difficult ambient conditions such as tunnels, underground railways and stations
2. Techniques are available now for measuring almost any stable gaseous species produced prior to or during combustion
3. More than one fire signature detected by a multiple sensor, such as smoke, heat and CO signatures, can be processed at the same time through an intelligent algorithm to intelligently discriminate between fire and non-threatening or deceptive conditions
4. In addition, fire detection systems are integrated with other building service systems to reduce false alarms, speed building evacuation and assist in fire fighting
5. Advances in fire detection technology has effectively reduced the loss of property and life by fire. The National Fire Protection Association (NFPA) data showed that in the USA, a decline in the number of significant "home" fires - from 723,500 in 1977 to 395,500 in 1997, representing a decline of 45.3 percent over 21 years, in part because low-cost fire detectors have been introduced in residential houses

# Overall inference

Many new fire detection technologies developed over the last decade have strong potential to reduce false alarms, increase sensitivity and dynamic response to a fire and improve fire safety. The Brillouin scattering-based distributed fiber optic sensors has a long sensing range, responds quickly to temperature fluctuation and is immune to all kinds of interference emission. It has the potential to provide fire detection in applications where small fires might be encountered (e.g., telecommunication facilities), and areas with restricted access or with difficult ambient conditions (e.g., tunnels, underground railways and stations, nuclear and petrochemical plants). However, further research efforts are needed to improve its spatial resolution, and establish a cost-effective and reliable distributed fiber optic system for fire detection.

Video fire detection systems have also demonstrated great advantages for use in sensing and monitoring a fire as well as on multi-function applications. Cameras and corresponding facilities required in the video sensor system are already standard features of many buildings. With further development in microelectronics and information technologies, video information can be sent out or accessed via Internet or a wireless network. It is expected that the video sensor system will play a more important role in providing cost-effective fire safety and other building management and services.

In recent years, fire detectors tend to be more intelligent in discriminating between fire and non-threatening or deceptive conditions due to the introduction of artificial 16 intelligent techniques as well as the development of microelectronics technology. Multiple sensors that combine smoke and thermal sensors or CO sensor are capable of overcoming the drawbacks of single sensor in fire detection, and provide better fire detection by discriminating many nuisance sources and extend detection capability for many fire sources.

The use of advanced control panels with advanced fire signal processing and sensor-driven fire model would substantially reduce false alarms and provide more accuracy information on fire and smoke spread in the building. This will allow building operators and firefighters to make a more accurate and responsive evaluation of any fire related incident in the building and to control fires and supervise the evacuation from the building more efficiently. The use of real-time control via the Internet or wireless network will extend the monitoring and control of fire safety systems outside of the building. The status of the fire safety system and other building systems can be monitored at anytime and from anywhere via the Internet or wireless network. The fire safety systems located in many buildings will be controlled from one central facility office. This will increase the efficiency and reduce costs for building management operations, more efficiently discriminate between fire and non-fire threats, and increase the time available for property and life protection. However, Internet-based monitoring and control of building service systems will need security protection to prevent false fire information being provided to building owners and fire brigades.

The integration of fire detection and alarm systems with other building systems should increase fire safety in the building. The fire detection system will be able to communicate with other building systems, correctly discriminate between fire and non-fire threats, identify the exact location of a fire in the building and provide continuous estimates on smoke and fire spread in the building. However, the integration technology may also create new risks. Sensor technologies, for example, will need to be robust enough to prevent false alarms, and ensure that vital information such as the location of occupants is not lost due to data overload during a fire. Integrated building systems will need to be designed not only to give fire safety priority over other building activities but also that fire emergencies do not crash the building service system.