SMART FIRE ALARM & DETECTION SYSTEM

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ABSTRACT- *Safety is significant in this day and age and it is vital that acceptable wellbeing framework be executed in spots of Structural Health Monitoring of structures. This system is used in building and home dwellings for the fire detection and prevention purpose. And it should be implemented in all the establishments where the risk of fire accidents is very high .The sensor nodes are placed in important areas of the building, which we create a network and the monitored data is transmitted to control unit through wireless sensor network and if the temperature or pressure reach above the threshold value and building damage is detected automatically, alerts the surroundings and take necessary precautions to prevent the disaster. This, safet,y system that can be used in any Constructing and constructed environments. The sensor nodes detects the maximum level that it can withhold, in the mean time it calculates where the damage is occurring and remaining time that the building can offer further resistance to damage.*

Key Words- Structural Health Monitoring wellbeing framework, home dwellings, Sensor node.

INTRODUCTION

Since the fire causes serious damages, fire detection has been an important study to protect human life and surroundings. If fire happens in these buildings then there will be a bad social impact, major property damage and heavy casualties will be easily caused. So fire should get detected early for can hardly detect fire characteristic parameters like temperature, vapour and flame in the early time. First step to prevent the serious damages from fire is to detect the event properly. Various methods are there to detect fire which uses different properties of fire. An- other difficulty is to properly identify the characteristics of fire. The fires properties like color, shape, temporal energy, spatial characteristics are identified in different methods. The traditional methods use sensors to detect the fire which cannot be used for early detection. So video based or computer vision based methods are more appropriate for analysis. The fire properties can be identified effectively while analyzing videos. One of the most common problems found in the area of video technology for fire detection is that early identification of fire and its properties. The main causes of fire may be burning things, wildfire, and accidents so on. To detect these fires

an efficient methodology is needed as early fire detection system.

Fire detection is a key point in security systems. As the system performs, it must detect the fire as early as possible. Early detection of fire in a large area is a difficult task. To identify the properties of fire is also one of the important steps. The fire and fire coloured objects are to be distinguished properly. Thus, the identification may face some difficulties like; it is sensitive to the changes in brightness, presence of shadows or to different tonalities of the red. Another important fact is that smoke identification can be included as early warning system. Smoke is an indication of fire and the proper smoke identification can prevent fire. To differentiate smoke from smoke coloured objects (like fog, cloud, etc.,) is a difficult task.

In this paper different method for fire identification is studied. Initially the candidate region is to be identified to reduce the computation. From the analysis candidate region identification can be done based on background subtraction. The background subtraction gives a better result for identifying the moving object in the scene. Then the next step is to identify the fire region based on the candidate image block. From different methods studied color analysis gives almost true result for identification of fire region.

LITERATURE SURVEY

(1) Ahmed Imteaj et.al. Studied the problems faced by factory workers in times when fire breaks out. They proposed a system using Raspberry Pi 3 which is capable of detecting fire and providing information about area of fire. The Raspberry Pi controls multiple Arduino boards which are connected with several motors and cameras to capture the fire incident.In this, they discussed about the modern technology that can be used to reduce extremely unfortunate accidents caused by fire. We designed the whole system and calculated its effectiveness.

(2) Ondrej Krejcar proposed a model for location enhancement and personnel tracking using Wi-Fi networks. In this, he has represented the control system concept that is used in handling information of location and control unit operations. The location of the user present in the building, is obtained through Wi-Fi access points [3]. We have studied this to understand the

usability of the Wi-Fi networks in live tracking and then have utilized this functionality to track fire and give information about location of fire to various devices intimating people about the mishap.

(3) Authors in have studied the safety features in home and industrial areas. They have designed new model using WSN. Not only have they incorporated temperature and humidity sensors but also included fire and smoke sensors while developing the model. They present a preceding study of WSN is able to detect fire alarm. It is for setting up a wireless sensor network with three sensors. An application was developed for getting home information

(4) Azka Ihsan Nurrahman, Kusprasapta Mutijarsa have proposed a prototype for a centralized management system for homes or offices which helps better in managing the safety features. In this, home management system is required. This system controls the room lights by turning on and off automatically, it keeps the record of use of electronic device status, turning on and off the ac regulator automatically, it displays the room temperature in home. If fire is detected   in the house, it turn on sprinkler at home, it supervises at home via surveillance cameras, take photos and store them including recordings of surveillance at home, it detects the movements of people at home, and provide notification when someone enters the house.

(5) Building Fire Emergency Detection and Response Using Wireless Sensor Networks Yuanyuan Zeng, Seán Óg Murphy, Lanny Sitanayah, Tatiana Maria Tabirca, Thuy Truong, Ken Brown, Cormac J. Sreenan Department of Computer Science, University College Cork :

Wireless sensor networks (WSNs) provide a low cost solution with respect maintenance and installation and in particular, building refurbishment and retrofitting are easily accomplished via wireless technologies. Fire emergency detection and response for building environments is a novel application area for the deployment of wireless sensor networks. In such a critical environment, timely data acquisition, detection and response are needed for successful building automation. This paper presents an overview of our recent research activity in this area. Firstly we explain research on communication protocols that are suitable for this problem. Then we describe work on the use of WSNs to improve fire evacuation and navigation

(6) Avoidance of Fire Accident on Running Train Using ZigBee Wireless Sensor Network R. Pitchai Ramasamy1 , M. Praveen Kumar1 , S. Sarath Kumar2 and R. Raghu Raman3:-

The main objective of our proposed system is to safe guard people's life and government property. This paper

will focus on the system that will detect and control the fire accidents on running train. In-house parameters such as temperature and humidity in the each coach can be monitored in real time. From the information collected by the sensor system, decisions for firefighting, alarming, and automatic water sprinkler system can be made more quickly by the relevant system or engine driver. After receiving the signal, the engine driver will stop the train and take necessary action. Key Terms: Fire alarm system, Fire protection systems, Wireless sensor network, Automatic sprinklers, Signal transmission.

The trains are moderate vehicles used for transporting people and goods. Mostly, the people prefer the train journey for longer distance as it is cheaper. Since induction of train for public transportation, the fire accidents are not catered seriously by the Indian Railways. The notices showing "Do not smoke", "Do not carry inflammable material" are the only precautionary warnings about the fire in each compartment. However, because of failure in routine maintenance system or by the activities of illegal social elements, the fire accidents in train occur frequently

EXISTING SYSTEM

After doing the literature survey we have listed some of the features that are existing in the now used fire alarm systems. In the next section of the paper we will propose a new model taking into account what features are being presently used and how they need to improve. The features of the existing system are as under. ⮚ Identify status periodically - The system checks for a fire at particular intervals and not continuously or not in real time. This is a drawback as there will possibly be a time lag between the actual fire incident and when the fire will be reported due to periodic identification.

⮚ Manual operation for transferring information- Automatic operation is not facilitated in the present systems.

⮚ Not able to find the pressure point of the building which are likely to catch fire easily.

⮚ Difficult to sense structural damage

⮚ MEMS are used to get axis of the building block.
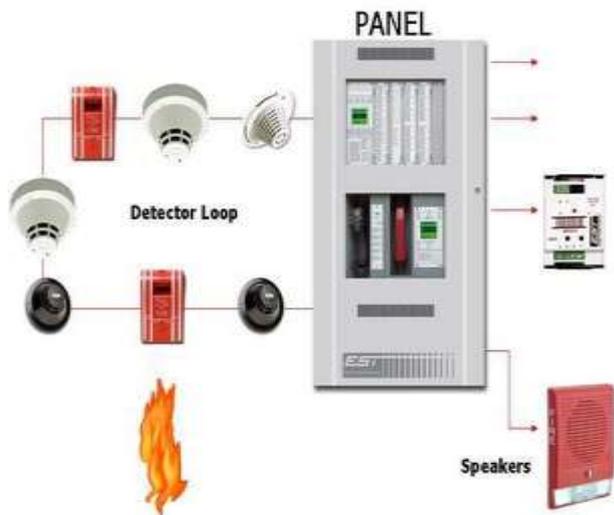
PROPOSED SYSTEM

The proposed system will detect the fire using Arduino Uno which is interfaced with a temperature sensor, a smoke sensor and buzzer. The temperature sensor senses the heat and smoke sensor senses any smoke generated due to burning or fire. Buzzer connected to Arduino gives us an alarm indication .Whenever the density of smoke and the temperature goes higher than a predetermined range, the device will send a signal to the nearby fire department and activate the buzzer. This would activate the sprinklers so that it can extinguish the fire .Underground tanks are built which is used to store the rain water. Sprinklers are connected to the tanks. In addition to the sprinklers, CO2 bombs will also be installed which would extinguish the fire completely. During this process, the ducts will provide a path for the smoke to escape so as to prevent suffocation.

(A) Features of Proposed model taking into account all the features available in the present model we propose a new model for monitoring fire incidences and reporting them. The features of the proposed model are:

▪ Effective safety system

▪ Systematic approach for monitoring and control   ▪ Transferring messages through wireless technologies

▪ Easy way of sensing structural damage and Health monitoring of buildings

▪ Vibration, pressure and temperature are added with MEMS to the network to improve accuracy

(B) Hardware Components The hardware requirements for building the proposed model is listed under.

▪ Power Supply

▪ Microcontroller (PIC16F877A)

▪ MEMS sensor

▪ ZigBee Module

▪ Temperature Sensor

▪ Pressure Sensor

▪ Alarm

▪ RS232 serial communication

▪ Computer

(C)Software Components the Software required for the prototype is listed as under.

▪ MPLAB IDE

▪ Flash Programmer

▪ Proteus Design

▪ Language: Embedded C, VC++
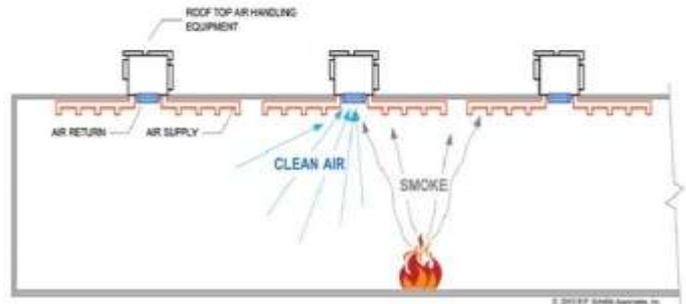
▪ Visual Basic

▪ Language: Embedded C, Visual Basic

Fig: architecture diagram

ADVANTAGE

❖ Low-cost,

❖ less complex Circuitry

❖ Simple and efficient.

❖ easy to install

Another great advantage of a wireless fire alarm system is it operates off of a battery. This frees up a wall outlet and you can feel safe knowing the system will still work in the event of a power outage. And adding a second or subsequent wireless device is easy if you add on to your home or office

It has wide range of Applications

- ❖ home security,

- ❖ theatres ,

- ❖ all electric departments,

RESULT

Fire alarms are prime necessity in modern buildings and architecture, especially in banks data centres and gas Stations. They detects the fire in ambience at very early stage By sensing smoke or slash and heat and raise an alarm which warns people About the fire and furnish sufficient time to take preventive measures it not only prevents a big losses caused by deadly fire but sometime proves to be live savers. Fire alarm is a device that detects the presence of fire and atmospheric changes relating to smoke. The fire alarm operates to alert people to evacuate a location in which a fire or smoke accumulation is present. When functioning properly, if fire alarm will sound too naughty five people on and immediate fire emergency. The distinct sound exist to allow the notification to be hard the fire alarm constructed by this project Is reliable at low-cost

CONCLUSION

There is a general agreement over the fire and protection segments that at 220,000 for every annum the degrees of bogus and undesirable alarms radiating from fire alarm and discovery frameworks is excessively high. Bogus and undesirable alarms squander fire and salvage administration assets; cause superfluous and costly interruption to end-clients which can bring about the loss of trust in frameworks and has seen a few frameworks turned off. As fire alarm and identifications frameworks are so firmly inserted into the clearing systems and strategies created to meet the necessities of Building Regulations and Fire Safety Law their utilization is far reaching and there are entrenched outsider accreditation plans for producers and installers. The item measures and testing systems anyway stay quiet on the reasons for bogus alarms.