

LITREATURE SURVEY

“AUTOMATIC FIRE DETECTION: A SURVEYFROM WIRELESS
SENSOR NETWORK PERSPECTIVE”

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Automatic fire detection is important for early detection and promptly extinguishing fire. There are ample studies investigating the best sensor combinations and appropriate techniques for early fire detection. In the previous studies fire detection has either been considered as an application of a certain field or the main concern for which techniques have been specifically designed (e.g., fire detection using remote sensing techniques). These different approaches stem from different backgrounds of researchers dealing with fire, such as computer science, geography and earth observation, and fire safety. In this report we survey previous studies from three perspectives: Fire detection techniques for residential areas, techniques for forests, and Contributions of sensor networks to early fire detection.

“SURVEY ON VARIOUS FIRE DETECTIONMETHODS”

AUTHOR: Minu Sunny

Every year a large number of fires in the world burn forest, buildings which causes economic and social impacts. There are different methods for detecting fire using sensors, which are not sufficient to detect fire as early as possible. Hence video based fire detection has importance in security systems. This paper refers the fire detection methods based on the analysis of videos. There is different method which focuses on various properties of fire like, color, shape, movement, spatio-temporal features etc. For real-time identification of fire from videos simple and accurate method is proposed as multiexpert system, which uses color, shape and movement evaluation for detecting fire. The study refers different methods for fire detection and prefers integration of smoke analysis for early identification of fire.

“A SMART REAL TIME AND SMOKE DETECTION SYSTEM”

AUTHOR:

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Fire plays an important role in our daily life, but it is also a serious threat to human life and properties. Along with the growing science and technology, fire prevention technologies are also constantly innovating. This system is designed to detect the fire and smoke at the early stage and notify the nearest fire station through a push notification. The notification contains the fire or smoke warning and the location information. Whenever a fire occurs, the fire sensor senses the fire at very early stage itself. In case of a smoke, the smoke sensor detects it and sends a notification saying there is a chance of fire which helps the fighters to subdue it before the fire causes damage at a greater extend. Tensilica ESP 8266 processor is used as the brain of the system. This processor contains a built in Wi-Fi and is available at a cheap cost.

“REVIEW OF RECENT DEVELOPMENTS IN FIRE DETECTION TECHNOLOGIES”

AUTHOR: Zhigang Liu, Andrew Kim

The progress on fire detection technologies has been substantial over the last decade due to advance in sensor, microelectronics and information technologies, as well as a greater understanding of fire physics. This paper provides a review of progress in fire detection technologies over the last decade, including various emerging sensor technologies (e.g., computer vision system, distributed fiber optic temperature sensor, and intelligent multiple sensor), signal processing and monitoring technology (e.g., real- time control via Internet) and integrated fire detection systems. Some problems and future research efforts related to current fire detection technologies are discussed.

A SURVEY ON IMPLEMENTATION OF FIRE DETECTION SYSTEM BASED ON ZIGBEE WI-FI NETWORKS

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Safety is important in today's world and it is necessary that good safety system be implemented in places of structural health monitoring of buildings. This paper presents a design based structural damage, through some sensors as a single node. 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, safety 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. Then it will send an interrupt signal through wsn from arduino micro controller. The advantage of this device is that, it automatically detects the fire and offer faster response time, accurate detection where the problem has occurred. These are the reasons that justify the following safety system compared to manual methods.

“A SURVEY ON FOREST FIRE DETECTION”

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Fire detection at an early stage is important for the safety of the people. Lack of information due to manual detection is the main cause of failure of fire detection. Fire can be detected by using smoke at an early stage as it is the fire indicator. Generally automatic fire detection using image processing techniques represents one of the significant aspects of forest fire avoidance earlier. Detection using image and video is effective than using sensors. In image processing the inputs for the fire detection may be an image or a video but the input as a video is quite complex process but provides good result. The techniques such as Wavelet decomposition, spatial and temporal analysis, Multi-Feature fusion detect fire in an accurate manner.

“Survey on Fire detection using smoke sensor”

Author:

Surapong Surit, Watchara Chatwiriya

Surapong Surit, Watchara Chatwiriya proposed a method to detect fire by smoke detection in video. This approach is based on digital image processing approach with static and dynamic characteristic analysis. The proposed method is composed of following steps, the first is to detect the area of change in the current input frame in

comparison with the background image, the second step is to locate regions of interest (ROIs) by connected component algorithm, the area of ROI is calculated by convex hull algorithm and segments the area of change from image, the third step is to calculate static and dynamic characteristics, using this result we decide whether the object detected is the smoke or not. The result shows that this method accurately detects

fire smoke.

P. Piccinini, S. Calderara, and R. Cucchiara proposed a method based on the wavelet model and a color model of the smoke. The proposed method exploits two features: the variation of energy in wavelet model and a color model of the smoke. Smoke is detected based on the decrease of energy ratio in wavelet domain between background and current. The deviation of the current pixel color is measured by the color model. Bayesian classifier is used to combine these two features to detect smoke.

R.Gonzalez proposed a method to detect fire based on Wavelet Transform. Stationary Wavelet Transform is used to detect Region of Interest. This method involves three steps preprocessing, SWT, histogram analysis. In preprocessing unwanted distortions are removed and image is resized and transformation of resized image is performed. High frequencies of an image are eliminated using SWT and the reconstruction of image is done by inverse SWT. Image indexation is performed to group the intensity colors that are closed to each other. Histogramanalysis is used to determine the various levels of indexation. After analysis a comparison is

made with non-smoke frame and non-smoke images are eliminated. These three are combined and fire is detected. **Osman Gunay** and **Habiboglu** proposed a system based on Covariance Descriptors, Color Models, and SVM Classifier. This system uses video data. Spatio-temporal Covariance Matrix (2011) [13] is used in this system which divides the video data into temporal blocks and computes covariance features. The fire is detected using this feature. SVM Classifier is used to filter fire and fire-like regions. This system supports only for clear data not for blur data.

Conclusion :

Different fire detection techniques have been proposed for safety and protection of the people and environment. It is very crucial to develop an appropriate detection system to avoid dangerous situation caused due to fire. Though fire detection using image produce satisfying result we now go for fire detection to produce accurate result. Wavelet based smoke detection is used for smoke detection in video sequences of outdoor environment. Covariance method is for flame detection. This method use temporally

extended covariance matrices representing all the information together. The method works only well when the fire is clearly visible. If the fire is small and if it is far away from the camera or covered by dense smoke the method fails. Wavelet and Color model combined together and detect smoke earlier. Neural Network produces accurate result as it uses temperature, smoke density and CO concentration. Fuzzy based approach uses YCbCr and HSV model and detects fire at an early stage. By these approaches we cannot completely protect the forest from fire but we reduce the level of damage. Perception Neural Network along with Multi Threshold algorithm classified image pixels of cloud, land, smoke, and background and produced accurate result of smoke