

# Home Fire Detection using Image Processing

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**Abstract:** Fire plays a major role in providing light and heat but it is very dangerous as it spreads rapidly. So we need to be more cautious in monitoring it. Our project deals with monitoring of fire using camera. This mechanism gives out an alert sound and also sends an email to the respective owner.

**Index Terms:** Providing, Monitoring.

## I. INTRODUCTION

Accidents by fire can cause damages to the property. Fire gives no time as it spreads rapidly and destroys all the properties that belong to the people. The fire accidents occur due to the fault in wiring, fire flame left by the smoking people and car fire accidents cause severe damage to the victims. Major issues with fire and smoke are that they cause severe damage to lung by smoke inhalation. Fire and alert systems provide a key aspect called fire detection. There are many different types of fire detection system to warn the people through audio or visual. There are many numeral advantages in using Fire detection system. So, to control the fire these systems are designed to get activated while reaching the threshold. The threshold is set at a particular temperature. They have some disadvantages like false fire alarm. Our project is designed to overcome the issues in the existing system.

## II. RELATED WORKS

The already proposed system is designed to get activated while reaching the threshold. The threshold set with a particular temperature. This too have some disadvantages like false fire alarm. And another disadvantage is it doesn't work well in large infrastructure like stadiums, aircraft hangers due to the vast area covered by those infrastructures. Light that is scattered by the smoke particles and some of scattered light is detected by the sensor. A heat detector is a device that can be detect and can do either electrical or mechanical in operation.

## III. IMAGE PROCESSING

Image processing is a way to perform operations on an image, to get an enhanced image or for extracting some useful information from the image. The input is an image and output may be the image or its characteristics associated with that image. It is a type of signal processing; the image processing is one among the rapidly growing technologies. It forms the core research area within engineering and computer science disciplines.

## IV. DATASET

The dataset consists of over a hundreds of fire images and non-fire images. The hundreds of fire images and non-fire images are imported in an XML file. This is compared with the gray-scale image through the camera. Then it provides an alert when the fire occur which gathers information from the cascade file. Through cascade classifier we can provide object detection method. The negative and positive images are of same size.



.Figure 1: Dataset

## V. IMAGE PRE-PROCESSING

Fire is detected via image processing technique. Our project deals with the detection of fire and gives out an alarm with an email message. Color image is converted into gray-scale image and then checks whether it matches the preprocessed hundreds of image. But using image processing system using fire detection opens many possibilities. The technology can be implemented in hazardous areas where the heat and temperature are very high and there will be chance of getting fire at any time. In image processing monitoring is done continuously in high risk zone. Smoke and fire detectors are commonly powered by batteries that connected directly to the building wirings. So the batteries should be checked periodically to ensure appropriate protection. We use OpenCV and python for fire detection. We have created a HAAR Cascade classifier for fire detection using OpenCV. The HAAR Cascade classifier consists of lot of positive and negative images that is used in fire detection. Fire pixel detection using color information, Detection of moving pixels, Analysis of fire pixels in frames are the three working processes.

## VI. ARCHITECTURE

The first step in our architecture consists of acquisition of real time images where images are been captured. The next step consists of image binarization, in this step the color image is converted into gray-scale image. The next step is analysis of the fire image or a non-fire image. The next step is conditional statement where the results are provided for fire detection system.

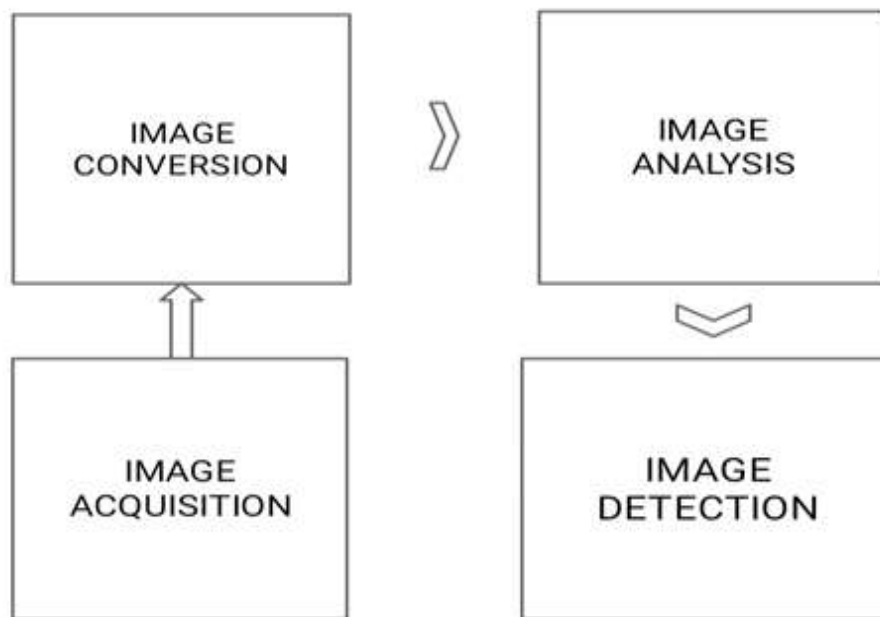


Figure 2: Architecture

## VII. COMPARISON

In our system we have used camera for flame and smoke detection as the initial fire comes out from smoke. We have used preprocessing techniques where hundreds of fire and smoke images are processed. This preprocessing is used to detect fire pixels using its color information, detection of the moving pixels and analysis of fire pixels in frames. Whereas in other methodologies we use sensors for sensing fire which can get easily damaged or defective. The method used must be provided which requires a huge amount of current. The accuracy of fire detection cannot be provided in large places like stadium's etc. in old or existing method.

## VIII. RESULTS AND DISCUSSION

The color images are converted into gray-scale images and testing is done with the object detection technique. The testing is done with

1. Fire pixel detection using its color information.
2. Detection of the moving pixels.
3. Analysis of the fire pixels in frames.

**INPUT:**

Figure 3: Input

**OUTPUT:**

The output obtained is more accurate than other traditional methods as huge amount of fire and non-fire images are preprocessed and put together in an XML file. The images are captured by the video camera and have been converted to gray scale images. When the fire is detected it gives out an alarm with a mail.

**IX. CONCLUSION AND FUTURE EXTRACTION**

In this paper, We have done our project successfully with image processing techniques. By our project the safety has been improved. The accuracy in providing alert has been improved. We have done our project with small number of datasets but it can be made with large number of datasets for future endeavors.

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