AN EFFECTIVE FIRE DETECTION SYSTEM USING OPEN SOURCE COMPUTER VISION THROUGH ARDUINO TECHNIQUE

[1]Mr.ABDUL RAHMAN.A,[2]T. BHARATH KUMAR,[3]G. RADHA
[1]Associate Professor, [2]UG student, [3]UG student, Department of Computer Science and Engineering,
Godavari Institute of Engineering & Technology, Rajahmundry, AP

Abstract: Fire detection is a very important problem today due to the economical, ecological and naturalistic value of forests for our world. This paper presents a real-time system for automatic fire detection using colour video input. Such a system has many important military and commercial applications and has significant advantages over traditional ultraviolet and infrared fire detectors. These advantages include improved detection, fewer false alarms, and additional descriptive information about fire location, size, and growth rate. In this paper it is presented a system that detects fire and operates in real-time by using web cameras, suitably placed in the external environment. The Proposed System for Fire Detection based on the video Processing. Existing systems based on smoke sensors in detecting fires cannot be used in open areas because they are restricted to the existence of a ceiling or a wall. To provide more reliable information about fires, the visual-based approach is becoming more and more interesting. The paper presents an early fire-alarm raising method based on video processing with the help of computer vision techniques. The basic idea of the proposed of fire-detection is to adopt a RGB (red, green, blue) model based chromatic measurement for extracting fire-pixels. The extracted fire-pixels will be verified if it is a real fire by both dynamics of growth and disorder. The Alarm Notification system predominantly place a major role in the Project that it helps to have an early warning of the existence of fire and alerts the corresponding station.

Key words: Fire Detection, Web camera, Video Processing, Visual based Approach, Alarm Notification system etc.

1. INTRODUCTION

Generally, fire accidents cause economical and ecological damage as well as endangering people's lives. To avoid the fire's disasters, many early fire-detection techniques have been explored and most of them are based on particle sampling, temperature sampling, relative humidity sampling, air transparency testing, smoke analysis, in addition to the traditional ultraviolet and infrared fire detectors. However, those detectors either must be set in the proximity of a fire or can't provide the additional information about the process of burning, such as fire location, size, growing rate, and so on. Thus, they are not always reliable because energy emission of non-fires. The paper presents an early fire-alarm raising method based on video processing. The basic idea of the proposed of fire-detection is to adopt a new approach for fire detection which is based on some computer vision techniques. Based on the problems, we think that visual sensors such as video data acquired from CCTV or digital camera became an alternative way in conducting fire detection sensor, which was estimated that by using video data, the detection results can be more quickly, accurately, and effectively from the side coverage area and can be applied to monitor the environment in-door and out-door. a RGB (red, green, blue) model based chromatic and disorder measurement for extracting fire-pixels. The decision function of fire-pixel is mainly deduced by the intensity and saturation of R component. The extracted fire-pixels will be verified if it is a real fire by both dynamics of growth and disorder. Conventional mechanisms such as temperature sensors, smoke sensors have weaknesses in the coverage area and response time monitoring in the detection of fire. Suppression efforts became difficult because of the fire which appeared already too large, so we need a mechanism with faster response and can monitor a wide area. The Internet of Things (IoT) is the network of physical objects or “things” embedded with electronics, software, sensors and network connectivity, which enables these objects to collect and exchange data. IoT allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct interactions between the physical world and computer-based systems and resulting in improved efficiency, accuracy and economic benefits.

2. LITERATURE SURVEY

To increase the fire detection capability, [1]Cappellini et al introduce the colour video to recognize the fire flame from smokes. Recent colour-video based researches, such as Yamagishi and Yamaguchi propose some enhanced colour image processing techniques for achieving a real-time detection of fire flame. However, the above methods all focus on recognition of a fire but can't provide any information about whether the flame will burn up or low. This is very important when the commercial cost is considered, since human operators must manually validate each false alarm. Ever process the colour video input to identify a burning jet fuel tire through the spectral, spatial, and temporal properties of fire events. But it requires a complex decision procedure for validating a fires burning and some constraints, such as a stationary camera and specific environment. To reduce false alarm rate in forest-fire detection, [3]Arme develop a complex hybrid system with multiple inputs provided by the visual camera, the infrared camera, meteorological sensors and a geographical information database. Without losing the generality, a hybrid approach always brings a higher cost and maintenance on combination. This motivates that the proposed fire-detection method is aimed at general purpose, high reliable and low cost features. To achieve fully automatic surveillance of fires, this paper presents an intelligent real-time fire detection method with a 2-stage decision strategy based on color video processing. The first decision stage is to check if there is a existing fire by extracting fire-pixels from visual images. In color image processing, the RGB (red, green, blue) color model has less computational complexity than other color models and hence is adopted to describe fire pixels. In contrast to some works from the literature, the goal of this paper is not to identify fire pixels in a given image or video frame, but to determine if fire occurs in the frame. The goal is generic event detection for automatic classification.

3. PROPOSED MODEL

Proposed System consists of two parts. They are Fire Detection and Alarm Notification System. In Fire Detection, we can detect the fire through the computer vision cameras with the help of image processing by using Open Source Computer Vision (openCV) along with Python. In Alarm Notification System, we use Arduino Technology for alerting the station corresponding to the place where the fire detection happens. The buzzer will be control by the Arduino software. This project will lower the false alarm rate. This system uses camera for detecting fires. So we do not need any other sensors to detect fire. System processes the video images as input to camera and then processor processes them to detect fires. The heat signatures and fire illumination patterns are detected in images to determine if it is a fire and take action accordingly. On detecting fire, system goes into emergency mode and sounds an alarm and also displays the status on the screen.

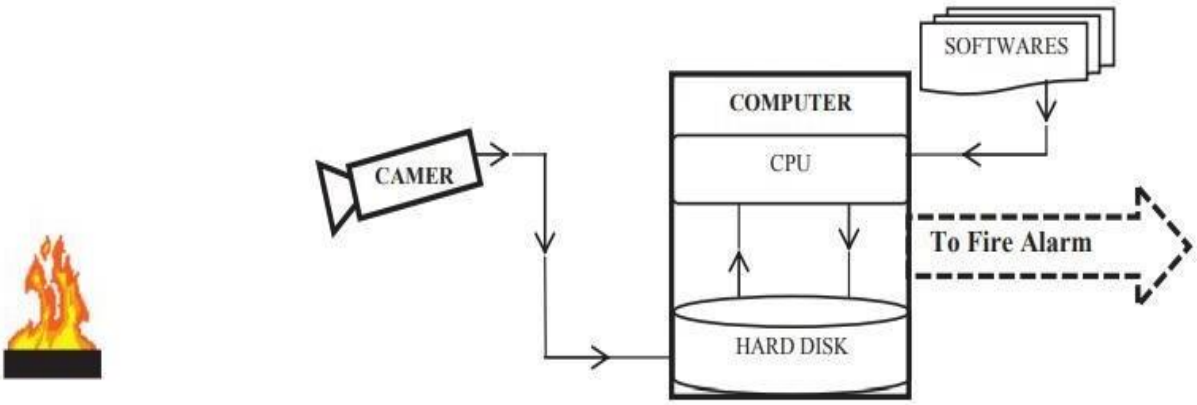

Fig 1 System Architecture

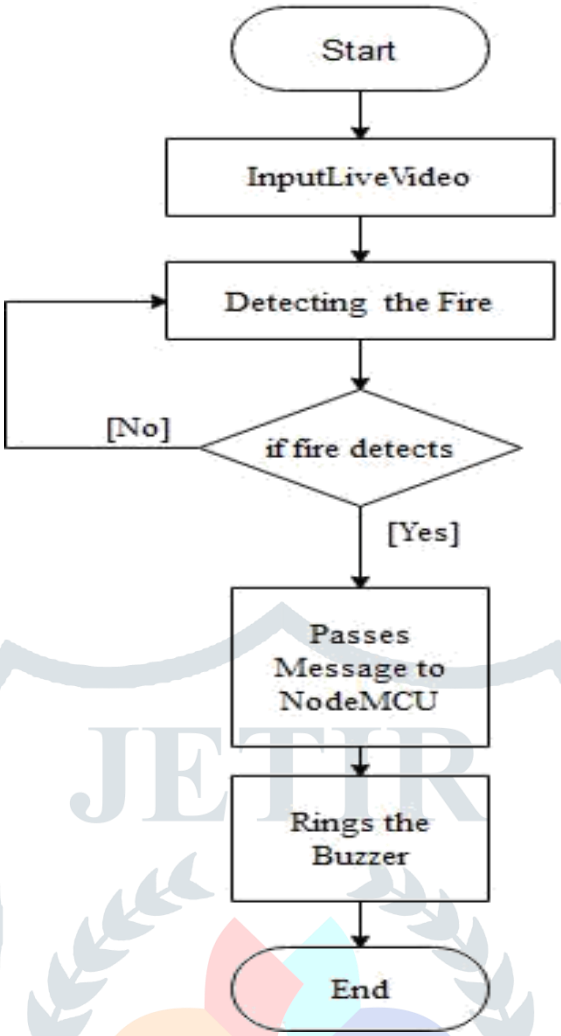

Fig 2 Flowchart

4. RESULTS

Fig 3 Fire Detection Result

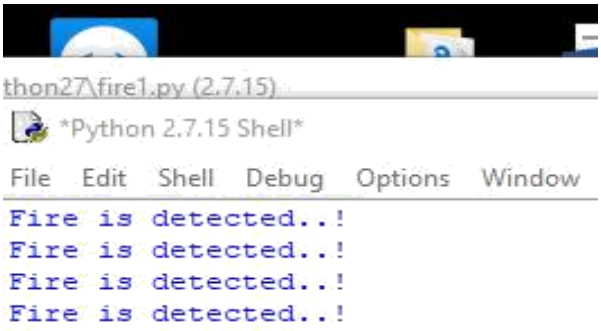

Fig 4 Output Screen

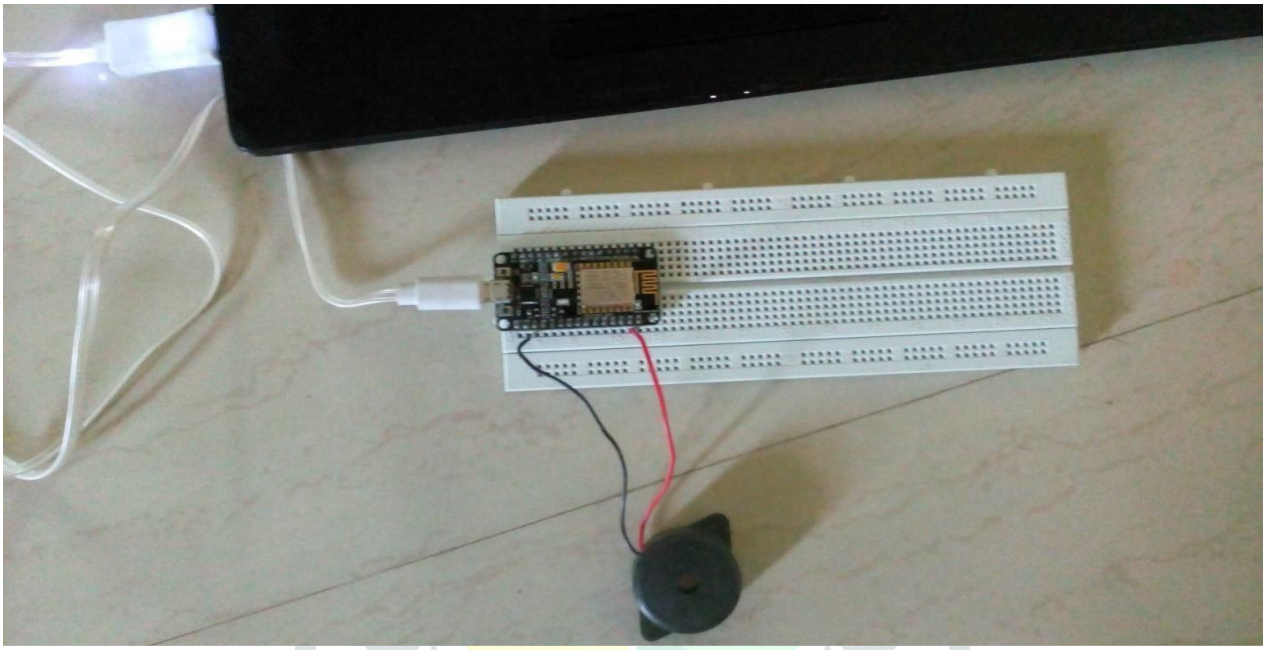

Fig 5 Alarm Notification System

5. CONCLUSION

A fire Detection System is a device that detects the presence of fire. In some cases, a fire Alarm is a part of a complete security system, Fire operates to alert people to evacuate a location in which a fire accumulation is present. When functioning properly, a fire alarm will sound to notify people of people of an immediate fire emergency. Fire Alarms can be found in and Malls, Public places, and function as the catalyst to save lives. For most fire alarm, when sounded, a beep, a bell or horn noise is made. This Distinct sound exists to allow the notification to be hear. The Fire detection system constructed by the proposed project work is reliable at low cost.

REFERENCES

1.Y. Cappellini, L. Mattii, and A. Mecocci, (1989), An Intelligent System For Automatic Fire Detection in Forests - IEEE 3th International Conference on Image Processing and its Application., pp.563-570.

2. G Healey, D. Slater, T. Lin, B. Drda, and A. D. Goedeke (1994), A System for Real-Time Fire Detection – in Proceedings of the IEEE Conference on Computer vision and Pattern Recognition., pp. 605-606.

3. H. Yamagishi and 1. Yamaguchi (1999), Fire Flame Detection Algorithm Using a Color Camera - in Proceedings of the 1999 International Symposium on Micromehcatronics and Human Science., pp.-255-260.

4.W. Phillips 111.M.Shah and N.da Victoria Lobo(2000), Flame Recognition in video. In proceedings of the IE EE Workshop on Applications of Computer vision.,pp. 224-229.

5.Wen-Bing Horng and Jian-Wen Peng(2001), Real-Time Fire Detection from Video: A Preliminary Report-14th IPPR,Computer Vision, Graphics and Image Processing, pp. 1-5.

ACKNOWLEDGEMENT

We have great pleasure in expressing our gratitude to Sri K.V.V.Satyanarayana Raju, Founder & Chairman, Chaitanya Group of Institutions, Sri K. Sasi Kiran Varma, Vice Chairman, GIET Group of Institutions, Smt. Lakshmi Raju Executive Director, GIET, for their kind support in providing us an opportunity to do research in this college.