

An Automatic Fire Detection and Warning System under Home Video Surveillance

Mandar P. Deshpande¹, Dr. S. D. Lokhande²

¹Student, Department of Electronics & Tele Communication, Sinhgad College of Engineering Pune, Maharashtra

²Principal, Sinhgad College of Engineering Pune, Maharashtra India

Abstract - Dangerous fire is an important topic in home safety system. Fire detection; and its information utilization using image processing and IT can be a good hope to reduce the danger of fire mishaps. However, there are many ways with new art for fire detection, but unknown signal is still a challenge to avoid. In this project, an automatic fire detection and warning system under home video surveillance is presented in order to identify fire from video camera data and inform the concerned people. The planned system works on a low computational time taking fire detection process using RGB color system, and it warns the people regularly than general alarming unit. The designed project will be able to identify the present conventional fire detection process under security system. The used fire detection approach has been tested under different scenarios is also presented to substantiate the efficiency of the system.

Key Words: RASPBERRY PI, CAMERA, FIRE SENSOR, PIR SENSOR, SMOKE SENSOR, LPG SENSOR

1. INTRODUCTION

In recent times, video surveillance system or home monitoring system is being widely adopted. The key device of this arrangement is the video camera. People use this camera for several purposes, but mostly, to find an intruder in the house and have the record of surroundings for later viewing.

Fire is a great invention to human civilization. It helps human life a lot and without proper management, it can cause a colossal loss as well. If we could have scalability in detecting friendly or devastating fire then people could be free of panic.

A lot of fire alarm systems comprised of different kind of sensors like- smoke detector, ionization detector and so on, are already in use for avoiding fire mishaps. But the systems which include conventional detection processes face different types of problems such as, fire in a kitchen is an obvious matter, but smoke detector or temperature sensor face great challenge to overcome the situation like, devastating fire or friendly fire.

2. LITERATURE SURVEY

Image-Processing i.e. Capture image through web based camera and compare with segmented moving object if unequal send to authorized person that fire is occurred. Use of Artificial intelligence technique.

This work shows a low-rate wireless personal area network-which depend on sensor network for early easy detection and monitoring of jungle fires. The system has been designed to identify different parameter measurements at different tree heights, depending on the forest relief. Thereby, it is easy to know how fire affects the soil mantle, stems and treetops, as well as to detect underground fires. Measures of power consumption used the feasibility of the implementation of this sensor network. By proper using a duty cycle of 0.33% and with the selected low-voltage-low-power compliant sensors, the network operating life is greater than one year.

3. PROPOSED MODEL

Devastating fire is a strong interest in home monitoring system. Fire detection; and its information utilization using image processing and information technology can be a great hope to reduce the devastation of fire mishaps.

However, there are many systems with state-of-the-art for fire detection, but false signal is still a challenge to avoid. In this, an automatic fire detection and warning

System under home video surveillance is presented in order to identify fire from video camera data and warn the concerned people accordingly.

The designed system will be able to cope up with the present conventional fire detection approach under security surveillance system.

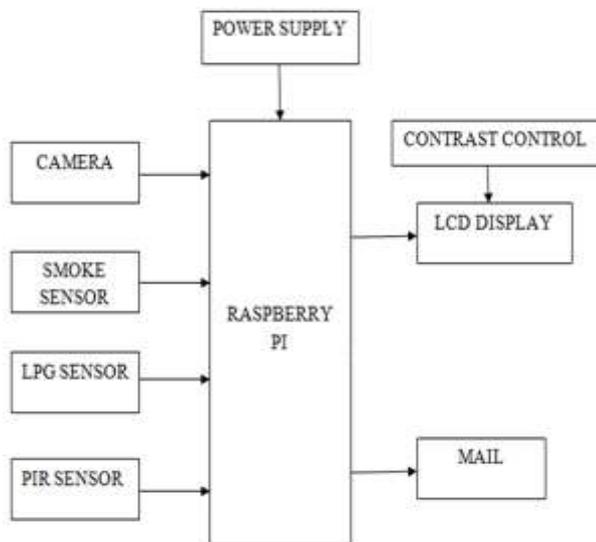


Fig -1: Block Diagram

The main advantage of this system is that the fire can be detected early so that the necessary steps can be taken to prevent any further hazards.

Capture image through web based camera and compare with segmented moving object if unequal then send image to authorized person that fire is occurred.

The WIFI module of raspberry Pi(rpi) will then send messages to the email id specified about the accident specifying the latitude and longitude values.

Smoke sensor, LPG sensor, PIR sensor with buzzer are connect to rpi model this are also supports to detects unwanted fire in home surveillance.

3.1. Raspberry PI

Raspberry Pi Model, 512 Mb with a nice black plastic case : The Raspberry Pi is a low cost processor, ATM-card sized computer that plugs into a any computer monitor or TV, and supports a standard keyboard and mouse. It has the ability to communicate with the outside world, and has been used in real time applications. This board is the central important part of the whole embedded image capturing and processing system as given in figure. Its main parts include: main processing chip, memory, power supply HDMI Out, Ethernet port, USB ports and global interfaces.



Fig -2: RPI Board

3.2 USB Web Camera

- Quantum brand 46 Megapixel QHM500-8LM USB PC Webcam
- Image Sensor High Quality CMOS Sensor
- Frame Rate: 30 fps (MAX) Lens : f=6.0 F=2.0 Focus range 4cm



Fig -3: USB Camera

3.3 LPG Sensor

- 5V operation,
- Analog+Digital Output,
- threshold preset adjustable
- Detects smoke liquefied flammable gas sensor module methane gas

3.4 PIR Sensor

The PIR Sensor module allows you to sense motion. It is almost always used to detect the motion of a human body within the sensor's range. It is often referred to used "PIR", "Pyro electric", "Passive Infrared" and "IR Motion" sensor. The module has an on-board pyro electric sensor,

conditioning circuitry and a dome shaped Fresnel lens. The PIR sensor module provides an output "HIGH" when a human body is detected within its range and an automatic Delay "LOW" when the body leaves its range. The delay time is adjustable using the potentiometer on-board. The minimum delay time that can be set is 5 seconds and maximum of 200seconds.



Fig -4: PIR Sensor

4. BLOCK DIAGRAM

Steps

- RASPBERRY PI as a controller.
- Controller check the signal from sensor
- If sensor activates then camera capture image.
- Send Email using IOT.
- Sensor value displayed on LCD.
- Three sensor are used fire, LPG, PIR.

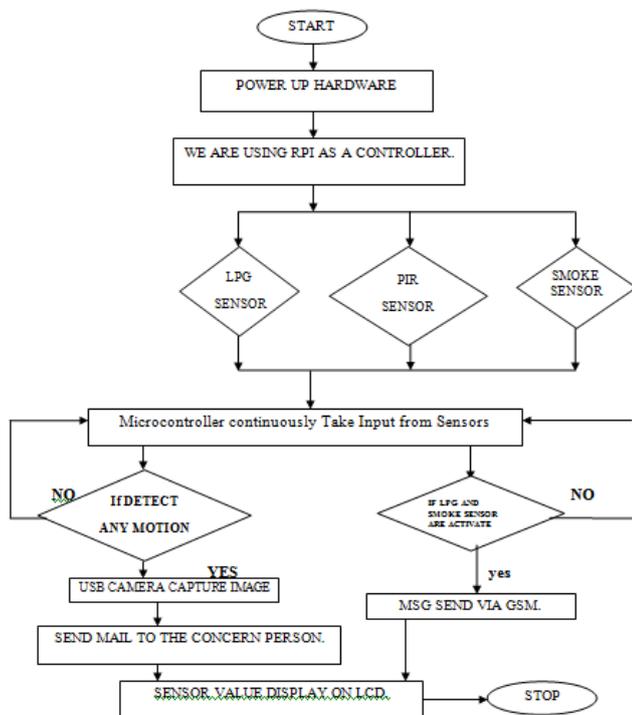


Fig -5: Flow Chart

5. EXPERIMENTAL SETUP

The Raspberry PI controller fulfills the requirements of cost-sensitive, high volume of consumer electronic applications. The advance controller consists of 512 MB with nine black plastic case, also 46 megapixel camera is used to capture an fire image. RPI KIT and camera to USB as shown below:

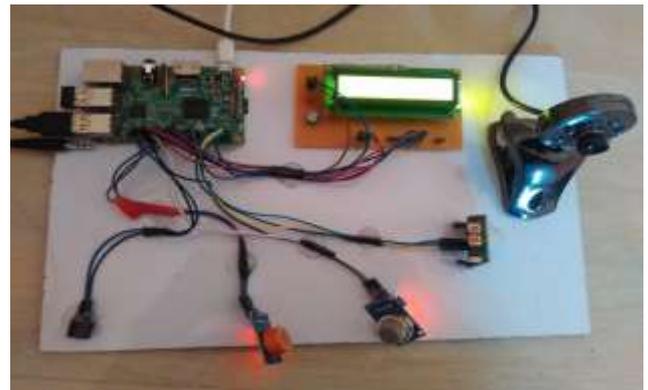


Fig -6: Experimental Setup

In this setup there are many sensors along with camera is get interface with RPI controller to control and detection of fire. All are the sensors are used to detects an fire in different conditions, smoke sensor is used to detects and unwanted smoke that created by fire also LPG sensor is used to detects an unwanted gas.

The principle Task is associated with the camera, when an unwanted fire is detects with the help of camera according to the threshold that we mention in the program also with help of other sensors it will help to detects an unwanted fire and detects quick as per level of fire RPI controller send an message to the fire base station so we can detects an fire in that place.

6. RESULTS

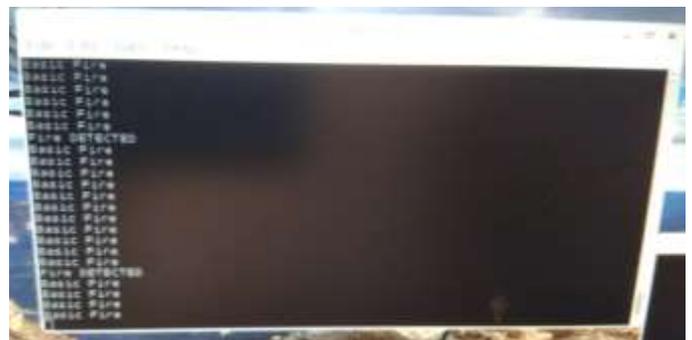


Fig -7: Fire Detects on Monitor Screen

The above figure shows the output on the monitor Basic fire is for small fire. the counter is ON, whenever fire is larger than threshold then fire detects Email send to the operator.



Fig -8:Fire Detects Message on Email

The second figure shows the Email that sent from system which is automatically generate whenever continuous fire is detect.

7. CONCLUSIONS

In this project I design a proper device which is used to detection of unwanted dangerous fire that can harmful to living things. Camera and other sensing elements are used to help detection of fire. IOT or GSM is used for communication purpose to inform the base station.

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