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Implementation of Fire Detection in Surveillance Videos and Early Warning System

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Abstract: Nowadays, Natural disasters occurs rapidly in recent years. One of the most dangerous disasters is forest fire. There should be an early warning system to control the fire for not spreading to all over area in the forest region. In order to provide early warning as well as to detect the shape, color, and flames of fire, the project has been designed which it detects the value of a fire(say) and the characteristics using RGB color technique for color correction of a fire and color grading to highlight the color of a fire. Using Gaussian technique, The image can be blurred in order to reduce the image noise and detail. Fire and Gas sensors are used to detect smoke and different types of gases. If the device detects the fire it will allows the fire sensor will send a signal to the alarm system to perform the programmed response for that zone.

Keywords: Fire sensor, Gas sensor, RGB, Gaussian, Color Grading, noise, alarm system.

I. INTRODUCTION

Forest is a large area were it is dominated by trees and animals. Forest covers an area of around four billion hectares or approximately around 30% of world's land area. Forest is one of the huge support for a countries economic.

Forest normally contains various species of trees and Forest also has a huge impact on the environment which prevents the earth from over heatings. The pollution made by the humans are reduced in a greater extent by the forest. So the fire in the forest causes a great impact in the world.

Forest fires are unnoticed and spread very quickly, causing millions of acres in damage and claiming many human lives every year in many countries. These forest fire can lead to a huge disaster in the environment. The losses in the forest fire are huge which affects both animals and trees. Forest fire in the world is increasing in recent times. This fire in the forest is due to natural or man-made disasters

Therefore, this project" Real Time Fire Detection (RTFD)" aim is to develop a better fire detection system that has higher

II. SYSTEM MODEL

A. Review Stage

Fires cause serious damage and disrupts daily life in a devastating manner. Hence preventing them or reducing their effects is a top priority. In our model, the place to be monitored is under constant surveillance by a closed circuit television. Gas sensor plays a vital role in detecting a smoke if it occurs. On top of these sensors, the footage from the camera is also used to detect the fire. If the fire has been detected a mail is sent to the security and the nearest fire department with an attachment of the photo and also indicate through the buzzer. When the fire is detected, sprinkler motor spray the water.

III. HARDWARE COMPONENTS

Arduino is an open-source prototyping platform based on easy-to-use hardware and software.

Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online.

You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing.

Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU.

The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

A webcam is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment.

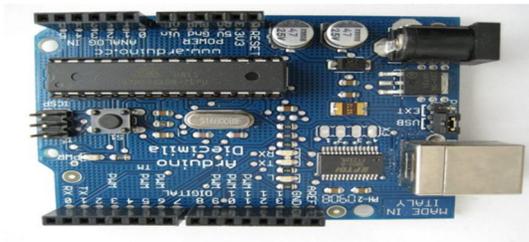
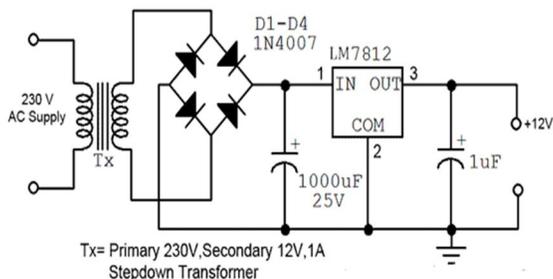


FIG.1 Arduino module

IV. POWER SUPPLY AND OTHER SENSORS



Power supply is a reference to a source of electrical power. A device or system that supplies electrical or other types of energy to an output load or group of loads is called a power supply unit or PSU.

The term is most commonly applied to electrical energy supplies, less often to mechanical ones, and rarely to others.

A webcam is a video camera that feeds or streams its image in real time to or through a computer to computer network. When "captured" by the computer, the video stream may be saved, viewed or sent on to other networks via systems such as the internet, and email as an attachment.

When sent to a remote location, the video stream may be saved, viewed or on sent there.

Unlike an IP camera (which connects using Ethernet or Wi-Fi), a webcam is generally connected by a USB cable, or similar cable, or built into computer hardware, such as laptops

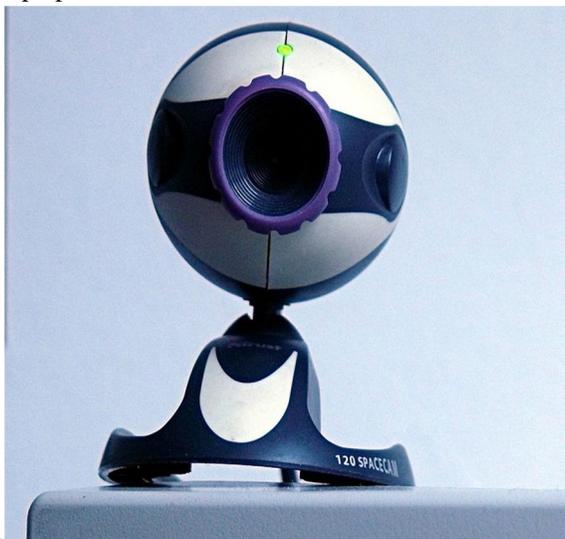


Fig.3. Web camera

The term "webcam" (a clipped compound) may also be used in its original sense of a video camera connected to the Web continuously for an indefinite time, rather than for a particular session, generally supplying a view for anyone who visits its web page over the Internet.

5V DC or AC circuit

Requires heater voltage

Operation Temperature: -10 to 70 degrees C

Heater consumption: less than 750mW

A Fire sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation, but can include sounding an alarm, deactivating a fuel line (such as a propane or a natural gas line), and activating a fire suppression system.

When fire burns it emits a small amount of Infra-red light, this light will be received by the Photodiode (IR receiver) on the sensor module. Then we use an Op-Amp to check for change in voltage across the IR Receiver, so that if a fire is detected the output pin (DO) will give 0V(LOW) and if there is no fire the output pin will be 5V(HIGH).

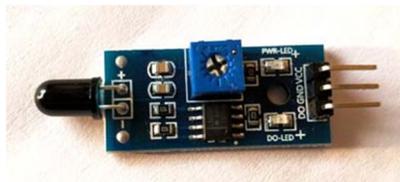


Fig.4 Fire sensor

A gas detector is a device that detects the presence of gases in an area, often as part of a safety system.

This type of equipment is used to detect a gas leak and interface with a control system so a process can be automatically shut down.

A gas detector can sound an alarm to operators in the area where the leak is occurring, giving them the opportunity to leave.



Fig.5.Gas sensor

A pump motor is a DC motor device that moves fluids. A DC motor converts direct current electrical power into mechanical power. DC or direct current motor works on the principle, when a current carrying conductor is placed in a magnetic field, it experiences a torque and has a tendency to move. Pumps operate by some mechanism (typically reciprocating or rotary), and consume energy to perform mechanical work by moving the fluid.



Fig.6.water motor

A liquid-crystal display (LCD) is a flat-panel display or other electronic visual display that uses the light-modulating properties of liquid crystals. Liquid crystals do not emit light directly.



Fig. 7,LCD display

V. SOFTWARE

1) *Software:* Python IDLE

2) *Language:* Python

The Python IDLE coding has been written for all sensor inputs and for transmission of the all data to the cloud with the simulation for three sensors have been verified by obtaining output simulation for given inputs.

The Global Positioning System (GPS) is a space-based navigation system that provides location and time information in all weather conditions, anywhere on or near the Earth where there is an unobstructed line of sight to four or more GPS satellites.

The system provides critical capabilities to military, civil, and commercial users around the world.

The United States government created the system, maintains it, and makes it freely accessible to anyone with a GPS receiver.

The experimental data obtained from this prototype will be modeled and optimized to investigate food production profile as a function of energy and water consumption. It will also attempt to understand the effect of extreme weather conditions on food production.

Instead of the peace-meal approach, a holistic approach will be developed and explore the nexus between water and energy resources, and crop yield for several essential crops in an attempt to design a more sustainable method to meet forecasted surge in demand.

The conventional way of thinking about these intertwined problems focus on "peace-meal approach" where decisions are made in one of the nexus areas of water, energy and food without making an allowance for the consequences on the other areas. In the future work, data collection from this smart farm will be crucial in analyzing the gap between the water, energy and crop data will be used to model the interdependency of these systems.

Image processing is a growth field covering a wide range of techniques for the digital images manipulation. Companies now are able to use image processing software and reliable hardware in their research, production and quality control environments, as well as in their products [5], in imaging science, Image processing refers to methods for the digital processing of a set of images with related content.

Often the image sequence results from the observation of a time-varying scene [6], The output might be either a modified image or a set of parameters related to the image that can be used in decision making, Image processing now is applied in different applications; Human expression recognition, Driver assistance systems, Robotics such as Obstacle avoiding robots, Biometrics (iris, finger print, face recognition) etc. This paper discusses the uses of image processing in detecting any sign of fire features; color, and motion

VI. CONCLUSION

In this work the system is designed with the help of sensors for an effective detection of smoke and various type of gases which helps to identify the nature of a fire and also helps to control which gives the most accurate results and readings to be a successful.

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