Emerging Methods for Early Detection of Forest Fire

Project Description:

This Project is to detect the Forest Fire using IoT concept. This AI will help us to detect forest fire at the early stage by sending us Alarm signals. We will use Fire sensor which will detect the presence of fire or flame. It uses the infrared flame flash technique to detect the Fire. The Fire Sensor has IR Receiver which will transmit IR rays to detect the fire and this will even detect the sun light. An IR sensor consists of an emitter, detector, and associated circuitry. The circuit required to make an IR sensor consists of two parts - emitter circuit and receiver circuit.

Methodology:

Iot must be self-contained for search operation, decision making based on the real-time data or current condition object detection), intelligent decision (software program) for the immediate surrounding environment or condition is to perform the task or mission. We have used Object Oriented programming language C++ to achieve the functionality.

Design of Iot:

IoT systems combine physical and digital components that collect data from physical devices and deliver actionable, operational insights. These components include physical devices, sensors, data extraction and secured communication, gateways, cloud servers, analytics, and dashboards.

Technology Used: Language - C++

**System Architecture Diagram:**
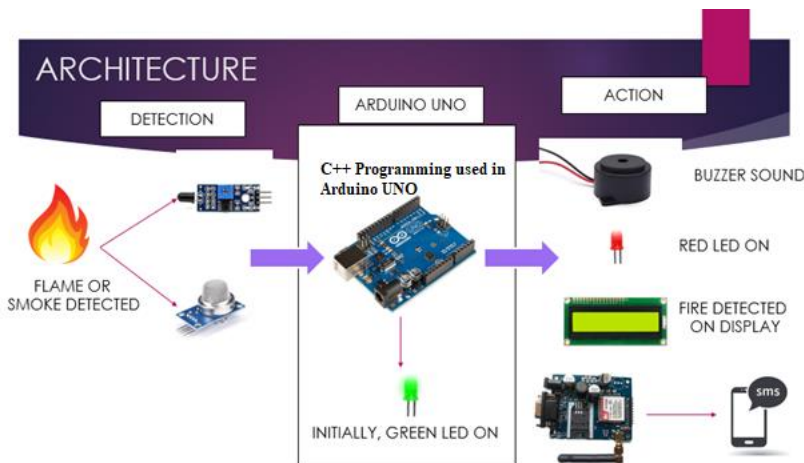
Components Required:

- Arduino UNO
- Flame Sensor
- 2N2222 NPN Transistor (or BC548)
- 5V Buzzer

- 1N4007 PN Junction Diode
- 1KΩ Resistor
- Connecting Wires
- Mini Breadboard
- Power Supply

IR Sensor:

There are different types of infrared transmitters depending on their wavelengths, output power and response time. An IR sensor consists of an IR LED and an IR Photodiode, together they are called as PhotoCoupler or OptoCoupler.
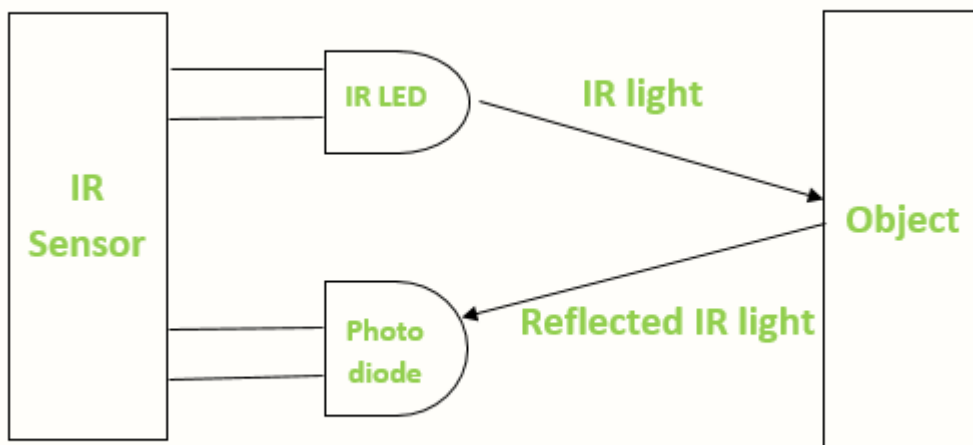

Circuit Design:

Flame Sensor has three pins (some may have four pins): VCC, GND and DO. Connect VCC and GND to +5V and GND of the power supply (can be connected to Arduino's +5V). the DO (short for Digital Output) is connected to Digital I/O Pin 11 of Arduino.

In order to indicate the detection of a flame or fire, a Buzzer is used. The Buzzer circuit consists of a 1KΩ Resistor, an NPN Transistor (like 2N2222 or BC548), a 5V Buzzer and a PN Junction Diode.

The Buzzer is driven through Digital I/O 12 pin of Arduino UNO.
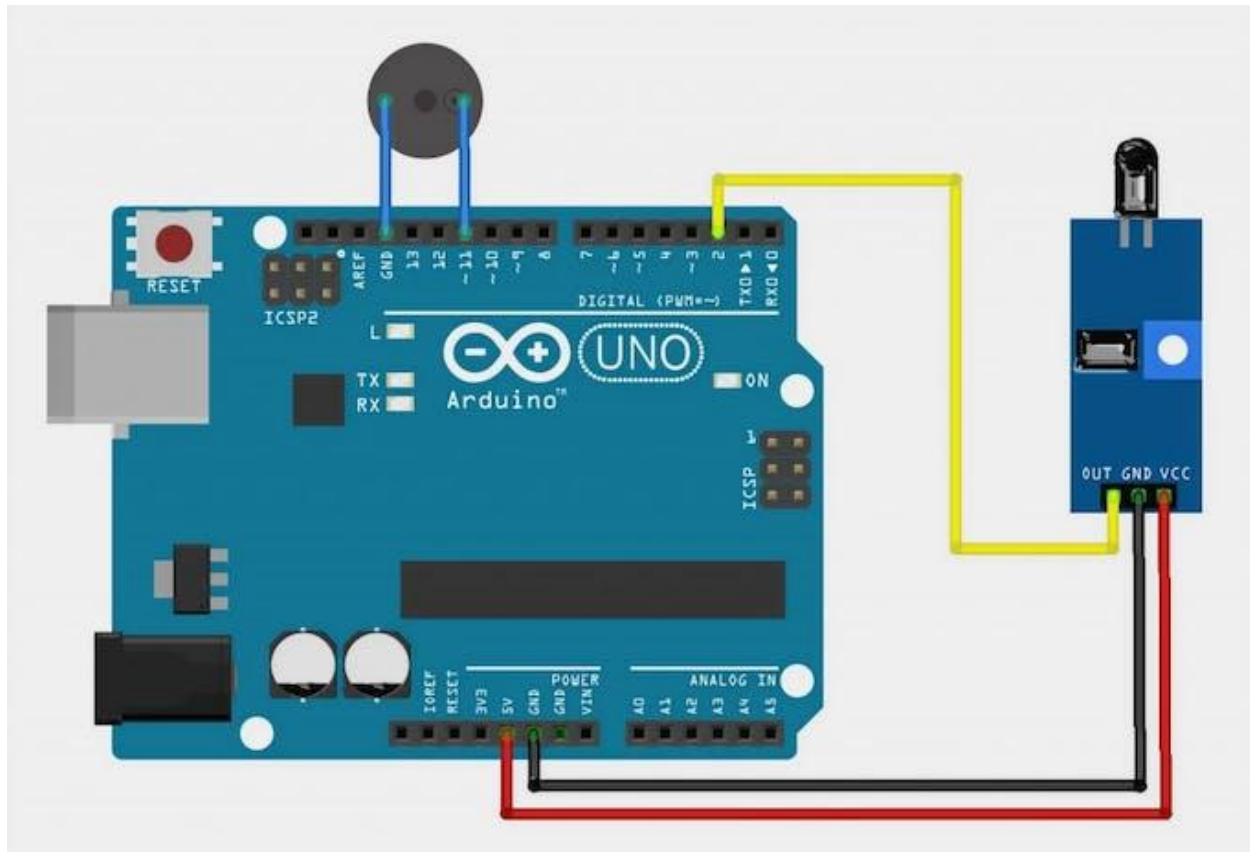
Arduino Uno Board:

An open-source stage Arduino which is effectively programmable utilizing scripting languages is most generally utilized and favored for ventures. It involves microcontroller a genuinely programmable gadget IDE (Integrated Development Environment) that performs on the PC, used to compose the program and transfer predefined PC code to microcontroller.

Arduino Software:

Arduino software is the most prominent in view of accessibility of all microcontrollers within it. Then it is easily programmable and can be understood the program very simply. The Programming language used is C++. The modification is done to the program done at an ease. The port command is used to allow for the lower-level and faster manipulation of the i/o pins of the microcontroller on an Arduino board. The Arduino program is developed for the fire alarm system by using computer programming language to detect the fire accident in the industries and send the alert signal to the authorized person.

Working:

Make the necessary connections and upload the code to Arduino UNO. To test the functionality of the flame sensor, place a fired lighter or a matchstick in front of the sensor.

Under normal conditions, the output from the Flame Sensor is HIGH. When the sensor detects any fire, its output becomes LOW.

Arduino detects this LOW signal on its input pin and activates the Buzzer.

Conclusion:

In this project an attempt has been made for making IOT based fire alarm system to identify fire accident and pass on the alert message to the authenticated user in the industry. By analyzing the literature review of various authors, this system is efficient to prevent from the fire accidents in the industries and other hazardous places. The fire can be monitored in various places such as, industries, offices and homes. Prevention is better than cure, as the way by using the IOT based fire alarm system is suitable for detect the fire accident and save the human life.