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IOT BASED SMOKE AND FLAME DETECTOR

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ABSTRACT:

Internet of things is an interconnection of physical devices embedded with electronics, software, sensor which is capable of collecting data from the surrounding and sending data over internet is called IOT. The fire detection gathers all of the techniques and processes that contribute to early detection of a fire. We identify three main categories: Smoke detection, Flame detection and Temperature detection.

Automatic fire alarm system provides real-time surveillance, monitoring and automatic alarm. An automatic fire alarm system based on wireless sensor networks is developed, which is designed for high-rise buildings.

To provide early extinguishing of a fire disaster, large numbers of detectors which periodically measure smoke concentration or temperature are deployed in buildings. In this paper will we present the different techniques we had been already used to detect fire.

1. INTRODUCTION

In this project, we will build an IoT based fire detection project using an Infrared flame sensor, Smoke detector, temperature and humidity sensor and ESP32 with an email alert feature. Our fire detection project will be linked with the IFTTT web service to generate an email alert to notify users whenever a fire is detected. The user will get an update whenever a fire or flame will be detected, specifying the exact date and time of the detection. Additionally, we will configure a digital pin of the ESP32 board as output and connect an LED with it. The LED will turn ON when the fire is detected. You can also use a buzzer or bell instead of an LED as an indicator as well.

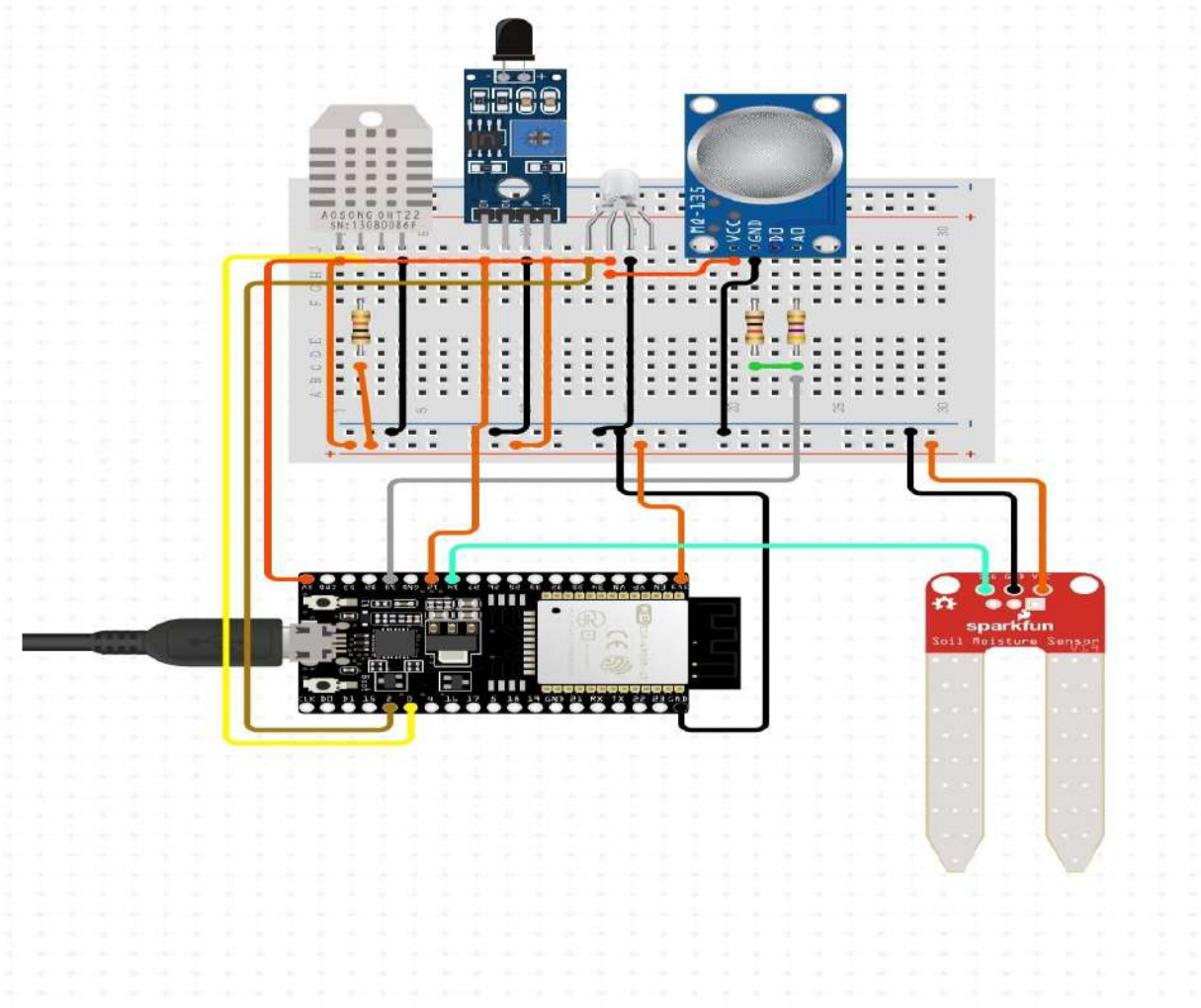
The flame sensor is used to detect the fire or other light sources which are in the range of wavelength from 760nm to 1100nm. The module consists of an IR sensor, potentiometer, OP-Amp circuitry, and a led indicator. When a flame will be detected, the module will turn on its red led. This module is sensitive to flame but it can also detect ordinary light. The detection point is 60 degrees. The sensitivity of this sensor is adjustable and it also has stable performance.

We can use the flame sensor to make an alarm when detecting the fire, for safety purposes in many projects and in many more ways.

COMPONENTS:

1. MQ135 - Smoke Detector
2 . DHT11 - Temperature & Humidity sensor
3 . ESP32 - Controller
4 . JUMPER WIRES
5 . INFRARED FLAME DETECTOR
6 . SERVO MOTOR
7 . LED
8 . BREADBOARD

CIRCUIT DIAGRAM:



2. WORKING

2.1 FLAME SENSOR

Whenever, a flame emits or a fire burns in the surrounding, it emits small amounts of infrared lights, these infrared light are used to detect flame or fire by this IR based flame sensor. Flame sensor IR receiver collects these IR waves which are emitted due to the fire burning. This IR receiver is connected with operation amplifier which provides the output in the form of voltage at the output of this sensor. We will simply connect this output with our ESP32 and process this information to turn on an LED which we will connect with our board as a output. So whenever fire or flame is detected around the flame sensor, the digital output pin DO goes high and when no fire is detected the output pin D0 will give logic low or zero volt.

2.2 ESP32:

The chip supports 4 x 16 MBytes of external QSPI flash and SRAM with hardware encryption based on AES. ESP32 accesses the external QSPI flash and SRAM through high-speed caches. Up to 16 MBytes of external flash are memory-mapped onto the CPU code space, supporting 8, 16 and 32-bit access. Code execution is supported.

2.3 MQ-135:

The MQ-135 gas sensor senses gases like ammonia nitrogen, oxygen, alcohols, aromatic compounds, sulfide, and smoke. The boost converter of the chip MQ-3 gas sensor is PT1301. The operating voltage of this gas sensor is from 2.5V to 5.0V. ... It

has the potential to detect different harmful gases.

2.4. DHT11

The humidity sensing capacitor has two electrodes with a moisture holding substrate as a dielectric between them. Change in the capacitance value occurs with the change in humidity levels. The IC measure, process this changed resistance values and change them into digital form.

2.5 JUMPER WIRES

Jumper wires are simply wires that have connector pins at each end, allowing them to be used to connect two points to each other without soldering. Jumper wires are typically used with breadboards and other prototyping tools in order to make it easy to change a circuit as needed. Fairly simple.

2.6. BREAD BOARD

Breadboards are designed to work with through-hole electronic components. These components have long metal leads that are designed to be inserted through holes in a printed circuit board (PCB) that are plated with a thin copper coating, which allows the components' leads to be soldered to the board.

2.7. SERVO MOTOR

A servo motor is an electromechanical device that produces torque and velocity based on the supplied current and voltage. A servo motor works as part of a closed loop system providing torque and velocity as commanded from a servo controller utilizing a feedback device to close the loop.

CONCLUSION

From this paper we conclude that the Fire is detected by the IR sensor, Temperature and humidity is detected by the DHT11, and gas is detected by MQ135, and all are under the control of ESP32. Hence if fire is detected, immediately the LED will start glowing and the fire alert is sent to the database and then the fire extinguishers starts working.

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