Fire detection & Extinguishing System using Raspberry Pi

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Abstract *- **The project aims to detect fire where burn and set out an alarm(buzzer) along with starting the extinguishing system(to stop the burning fire) using Raspberry Pi. Fire detection and Extinguisher is a Hardware based model used to extinguish the fire during fire accidents. It is an Internet of Things (IOT) based system which allows to detect and extinguish fire by using sensors. These data give a clear-cut methodology for a controlled environment. The flame sensor, jumper wire and digital buzzer module are connected to the Raspberry pi.***

Keywords— Internet of Things (IOT), Raspberry pi, Flame sensor, Digital buzzer module, Jumper wire and Breadboard.

Introduction :

Fire detection and Extinguisher is a Hardware based model used to extinguish the fire during fire accidents. A key aspect of fire protection is to identify a developing fire emergency in a timely manner, and to alert the building's occupants and fire emergency organizations. This is the role of fire detection and alarm systems. Depending on the anticipated fire scenario, this system can provide several main functions. First it provide a means to identify a developing fire through either manual or automatic methods and second, it alert building occupants to a fire condition and the need to evacuate. The common function is the transmission of an alarm notification signal to the fire department or other emergency response organization.

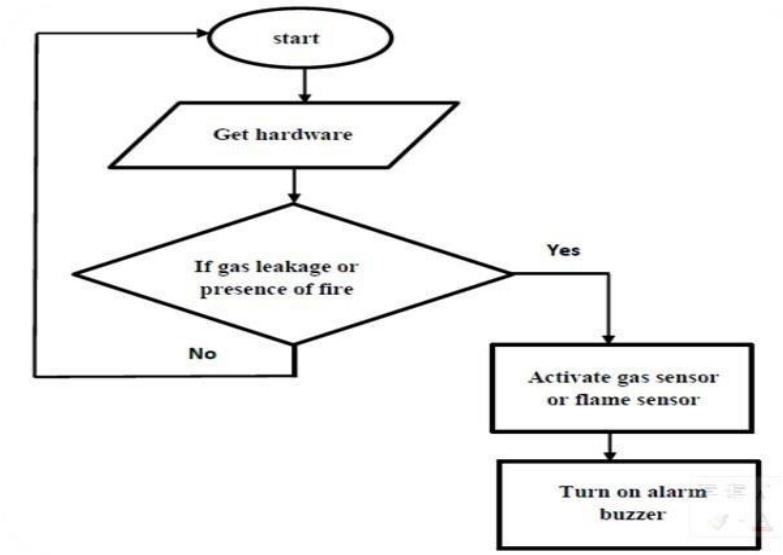
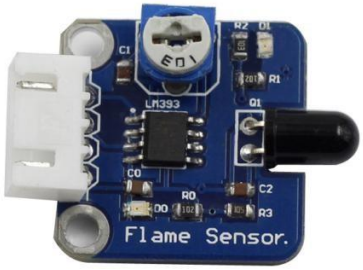


Fig : Fire detection and extinguishon block diagram

Working Pinciple : A flame sensor (as shown below) performs detection by capturing infrared rays with specific wavelengths from flame. It can be used to detect and warn of flames. In this experiment, we have used a far-infrared flame sensor. It can detect infrared rays with wavelength ranging from 700nm to 1000nm. A far-infrared flame probem converts the strength changes of external infrared light into current changes. And then it convert analog quantities into digital ones. In this experiment, connect pin DO of the Flame Sensor module to boardpin of Raspberry Pi to detect by programming whether any flame exists.



Requirements:

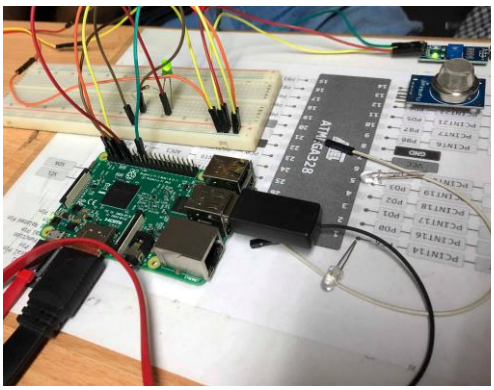
- Breadboard
- Raspberry Pi
- Flame sensor
- LED
- (100-200) Ohm resistor
- Buzzer module
- Jumper wires

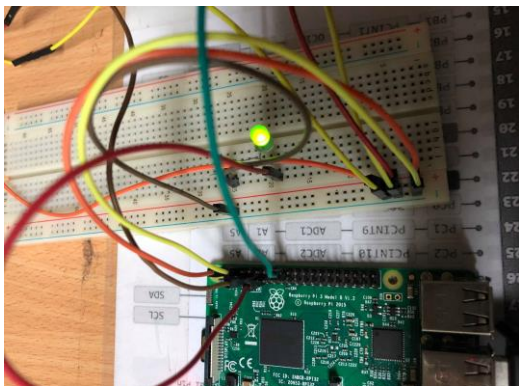
Flame Sensor Interface:

VCC :- 5V voltage
GND :- GND
DO :- board digital output interface (0 and 1)
AO :- board analog output interface

Connection Steps:

1) Connect Ground on sensor to ground on Raspberry Pi.
2) Supply + 5V to power(+ symbol on sensor).
3)Connect Digital out pin of sensor to input using a resistor. 4) Connect LED to baoardpin.





Now, we ignite a lighter near the sensor within a proper range, buzzer module will produce alarm and it's "Fire!". If we put out the lighter or just move the flames away from the flame sensor, there will be no sound in buzzer.

EXPERIMENTED RESULT :

After assembling our system, the reading of the sensors has been checked. The main program (python language) is executed with the command python project into the Terminal. The program begins to execute each statement in the code and reads the signals from sensors and produce the outputs depending upon the conditions provided in the code.

The given two figures depict the output of the project at stage 1 when the fire is not detected and also depict the output of the project at stage-2 when the fire is detected.

CONCLUSION :

In this paper, we discussed the latest technology that can help to reduce catastrophic accidents caused by fire. We designed the whole system and evaluated its effectiveness as well as scalability. With the improvement of sensor technology, the system will become more efficient and useful. If this system can be successfully integrated in every factories, then it is hoped that the loss of life and property due to the fire accidents will reduce remarkably and the countrys economy will not be stumbled by such tragic accidents.

It can further extend this project by adding some more features which can make it more efficient and security oriented. The camcorder can also be used to track all the activities of the unknown person or intruders.