INDUSTRY-SPECIFIC INTELLIGENT FIRE MANAGEMENT SYSTEM

Introduction:

Fire is the rapid oxidation of a material in the exothermic chemical process of combustion, releasing heat, light and various reaction products. Although it's a natural process, it can lead to great destruction. On average, everyday 35 people killed due to Fire-related accidents in the five years between 2016 and 2020, according to a report by Accidental Deaths and Suicides in India (ADSI), maintained by the National Crime Records Bureau. Thus having a good Fire management system in industry is very important.

This Industry-Specific Intelligent Fire Management System has a Gas sensor, Flame sensor and temperature sensors to detect any changes in the environment. Based on the temperature readings and if any Gases are present the exhaust fans are powered ON. If any flame is detected the sprinklers will be switched on automatically. Emergency alerts are notified to the authorities and Fire station.

Literature Survey:

[1] This thesis employs a fire management system that indicates the room in which fire is erupted, indicates the location where the fire is occurred, prevents fire and smoke, sound the alarm if fire occurs, to run the emergency EXIT servo motor and control the fire by supplying water to the remote area by motor pump, to indicate the state of the room as 'Safe' in order to avoid any confusion under normal condition. So the system should never be in any ambiguous state.

Hardware Used: Microcontroller, LM35, MQ-2 Smoke Sensor, BC548 NPN transistor, relay, LCD Display, GSM Modem, Buzzer, DC motor, Servo motor, GPS Module.

Software Used: Arduino IDE, Proteus 8 professional.

Pros: This fire alarm system incorporates the heat and flame detector that are connected in parallel. The microcontroller is used as the heart of this fire alarm system that controls the entire operations involved. The fire alarm system is capable to locate and identified the place that is in fire where by it is monitored using the monitoring system. Capable to display the output from each sensor in the monitoring system

Cons: Detects the fire from one location at a time, if there is fire in other location, the System will not be able to detect, prevention of smoke is not contained in the project. No record keeping is being done in the system. The project has been limited to a desired area of condition which is estimated by small area coverage.

[2] In this paper, the installed Arduino device which was programmed with Android Studio takes received gas, smoke, the temperature, and humidity signals from the sensors. The sensor is connected to the input of the arduino with the help of connecting cables or jumper cables. Further the circuit goes towards output where the buzzer is connected. If we differ the delay value of the buzzer then we get a variation in the buzzer sound. This can be applicable to detect various gases. The LCD shows the status of the system when there is a presence of gas or smoke which may lead to fire outbreak in the environment.

Hardware Used: Arduino UNO, GSM module SIM900. Gas sensor MQ-2, Temperature and Humidity sensor DH-11, Buzzer, and the Liquid Crystal Display LCD.

Software Used: Arduino IDE

Pros: This system can perform different parameter measurements for early detection of building fires. It helps in early reaction, saving lives and property.

Cons : This system doesn't take any necessary action when the fire is detected.

[3] In this paper the sensors transfer data wirelessly with the help of MQTT (message queuing telemetry transport) networking protocol which is designed for constrained with low-bandwidth. MQTT allows us to send commands to control output, read and publish data from sensors nodes and much more. The amount of temperature and humidity is sensed by the sensor and control action is taken automatically to turn off the fire generated.

Hardware Used: DHT11, NodeMCU, Relay.

Software Used: Application program interface

Pros: The system not only gives the real time information about the situation on the monitor but also takes the corrective action as per the need. All data can be stored in server and this data can be access by the Application program interface which can display on the monitor and with the help of software the operator can visualize the condition at the time of fire accident.

Cons: This system cannot perform parameter measurements for early detection of building fires.

References:

[1] Gazi weldesyase, Bahta G/meskel, Mekonen Abreha, Solomon Baynes, *"GSM Based Fire and Smoke Detection and Prevention System",* on 08/10/2010, Adigrat, Tigray, Ethiopia.

[2] May Zaw Tun, Htay Myint, *"Arduino based Fire Detection and Alarm System Using Smoke Sensor",* Volume 6, Issue 4*,* on April – 2020, Myanmar.

[3] Nitin Galugade, Mahesh Jakka, Devika Nair, Madhur Gawas*, "Fire Monitoring and Controlling System based on Iot"*, on 2020, Mumbai, India.