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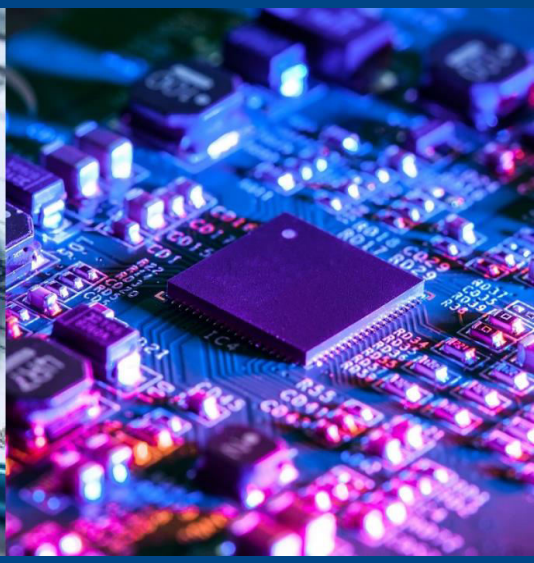

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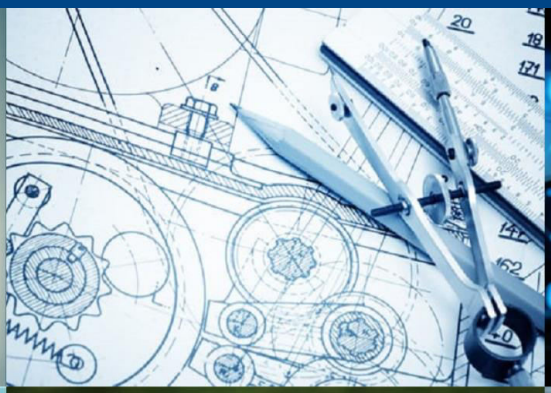

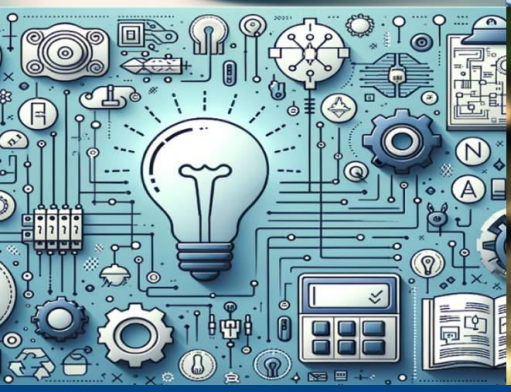

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IOT Based Industry Safety Monitoring System

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ABSTRACT: The major problem identified is that there are numerous accidents occurring in the firing inside the building due to improper maintenance and inadequate monitoring of the mining activities. These led to numerous life losses and immeasurable resource losses. There is no proper early detection of the uncertainty in the firing systems. It has been a very dangerous activity.

KEYWORDS: Safety Tracking, Fire, Sprinklers, System and Detection.

I. INTRODUCTION

Nowadays, fire incidents have become a critical issue, which must be dealt with on time without any unnecessary delay to avoid the loss in lives and belongings. It is considered a fire situation when the monitored temperature exceeds 50o C. In critical places such as hospitals, schools, and banks, personnel's arrival time to come for help in fire hazards is around 15 minutes.

Smoke alarms will more likely detect fires before it really starts. Smoke comes when the energy of an object is consumed due to the loss of Carbon Dioxide (CO2) from heat. Smoke detectors are classified into three types: ionization, photoelectric, and combination. All these types can be studied further in instruments and measurement books. In this study, we will highlight a brief description of ionization. In brief, ionization is a radioactive material that receives radiation from the fire. It enters the ionization chamber, which is an air-filled space between two electrodes and permits a small, constant current between the electrodes. This type is the best for fast fires or fires caused by bombs or accidents.

Many regions around the world are moving towards a future in which all new residential builds are mandated with installing automatic fire sprinklers. Their life-saving ability is undeniable, but numerous studies estimate the effectiveness of fire sprinkler systems ranges from approximately 70 percent to 93 percent. An admiral figure, but with significant room for improvement when you compare them to another life safety device, say an airbag, which has an effectiveness of 99.9 percent. But those success rates for sprinklers plummet in households, where they fail 1 in 10times, primarily because they are largely ignored and are designed to blend in and be forgotten.64 percent of failures are due to the system being shut off, with another leading cause being lack of maintenance. Today, the winners in the industry have the best rates.

Digital technologies allow insurers to set themselves apart from the pack; however, these technologies weren't easily adopted. Spreadsheets and manual data input between systems reluctantly gave way to automated software to improve accuracy and reduce bottlenecks in insurance processes. It was a surprisingly difficult transition to make because, as often happens in legacy industries, only a finite group of people understood the legacy knowledge behind the established models, whilst others feared the risk of losing data, functionality, and customer satisfaction whilst newer products were being introduced.

II. LITERATURE REVIEW

Previous studies explored IoT technologies for industrial safety, Common limitations across these projects include short-range communication (e.g., Bluetooth, ZigBee), limited water or power capacity, and low autonomy in dynamic environments. Additionally, many rely on manual control or lack scalability for industrial-level applications.

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III. PROPOSED METHODOLOGY

Industrial monitoring and control integrate architectures, mechanisms, and algorithms to track and manage industrial processes using sensor modules. These sensors gather data to check if operations remain within set thresholds. A microcontroller processes this data and relays it to a central server, enabling remote access and monitoring via TCP/IP and GSM.

IV. RISK ASSESSMENT

A comprehensive risk assessment matrix was developed to address technical, data security, operational, regulatory, user acceptance, budget, scalability, and environmental risks. Mitigation strategies include compatibility testing, encryption, user training, and hardware upgrades.

V. ADVANTAGES AND APPLICATIONS

The project enables real-time monitoring and remote access to industrial systems, enhancing operational efficiency and safety. It allows early fault detection by tracking sensor data against threshold values. The system reduces human error and is scalable for various industrial applications.

VI. RESULT AND DISCUSSION

The Device was assembled and through daily use and testing it is found that it has more benefits that not using them at all. We will discuss about the parts that has been used.

A. **Arduino Pro Mini 328**

Arduino is an open-source hardware and software company, project and user community that designs and manufactures single-board microcontrollers and microcontroller kits for building digital devices. Its products are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL), permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form or as do-it-yourself (DIY) kits. Arduino board designs use a variety of microprocessors and controllers. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards ('shields') or breadboards (For prototyping) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers can be programmed using C and C++ programming languages. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project. The Arduino project started in 2005 as a program for students at the Interaction Design Institute Ivrea in Ivrea, Italy, aiming to provide a low-cost and easy way for novices and professionals to create devices that interact with their environment using sensors and actuators. Common examples of such devices intended for beginner hobbyists include simple robots, thermostats and motion detectors.

B.Temperature Sensor

Temperature sensors are devices used to measure the temperature of a medium. There are 2 kinds on temperature sensors: 1) contact sensors and 2) noncontact sensors. However, the 3 main types are thermometers, resistance temperature detectors, and thermocouples. All three of these sensors measure a physical property (i.e. volume of a liquid, current through a wire), which changes as a function of temperature. In addition to the 3 main types of temperature

C.Gas Sensor

Gas sensor measures the concentration of gas in its vicinity. Gas sensor interacts with a gas to measure its concentration. Each gas has a unique breakdown voltage i.e. the electric field at which it is ionized. Sensor identifies gases by measuring these voltages. The concentration of the gas can be determined by measuring the current discharge in the device.

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D.Contact Sensor

Contact temperature sensors measure the temperature of the object to which the sensor is in contact by assuming or knowing that the two (sensor and the object) are in thermal equilibrium, in other words, there is no heat flow between them

Examples (further description of each example provide below)

- Thermocouples
- Resistance Temperature Detectors (RTDs)
- Full System Thermometers
- Bimetallic Thermometer

Sample Program

```
#include "ESP8266WiFi.h"
#include "DHT.h"
#include <OneWire.h>
#include <DallasTemperature.h>
#define DHTPIN 5     // Digital pin connected to the DHT sensor
int PulseSensorPurplePin = 14;
PIN 0
      // Pulse Sensor PURPLE WIRE connected to ANALOG
int LED13 = 13;   //  The on-board Arduion LED
String pre="";
#define ONE_WIRE_BUS 4
OneWire oneWire(ONE_WIRE_BUS);
DallasTemperature sensors(&oneWire);
DeviceAddress insideThermometer;
const char* ssid = "iot" ;
const char* password = "12345678";
const char* host = "www.iotwebdata.com";
String line;
int hb,t;
#define DHTTYPE DHT11   // DHT 11
57
DHT dht(DHTPIN, DHTTYPE);
int Signal;
  // holds the incoming raw data. Signal value can range from 0-1024
int Threshold = 550;
ingore.
void setup() {
Serial.begin(9600);
Serial.println();
      // Determine which Signal to "count as a beat", and which to
Serial.print("Connecting to ");
Serial.println(ssid);
WiFi.begin(ssid, password);
while (WiFi.status() != WL_CONNECTED) {
delay(500);
Serial.print(".");
}
Serial.println("");
Serial.println("WiFi connected");
Serial.println("IP address: ");
Serial.println(WiFi.localIP());
dht.begin();
sensors.begin();
```

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```
Serial.print("Found ");
58
Serial.print(sensors.getDeviceCount(), DEC);
Serial.println(" devices.");
// report parasite power requirements
Serial.print("Parasite power is: ");
if (sensors.isParasitePowerMode()) Serial.println("ON");
else Serial.println("OFF");
// Assign address manually. The addresses below will beed to be changed
// to valid device addresses on your bus. Device address can be retrieved
// by using either oneWire.search(deviceAddress) or individually via
// sensors.getAddress(deviceAddress, index)
// Note that you will need to use your specific address here
//insideThermometer = { 0x28, 0x1D, 0x39, 0x31, 0x2, 0x0, 0x0, 0xF0 };
// Method 1:
// Search for devices on the bus and assign based on an index. Ideally,
// you would do this to initially discover addresses on the bus and then
// use those addresses and manually assign them (see above) once you know
// the devices on your bus (and assuming they don't change).
if (!sensors.getAddress(insideThermometer, 0)) Serial.println("Unable to find address for
Device 0");
59
// method 2: search()
// search() looks for the next device. Returns 1 if a new address has been
// returned. A zero might mean that the bus is shorted, there are no devices,
// or you have already retrieved all of them. It might be a good idea to
// check the CRC to make sure you didn't get garbage. The order is
// deterministic. You will always get the same devices in the same order
//
// Must be called before search()
//oneWire.reset_search();
// assigns the first address found to insideThermometer
//if (!oneWire.search(insideThermometer)) Serial.println("Unable to find address for
insideThermometer");
// show the addresses we found on the bus
Serial.print("Device 0 Address: ");
printAddress(insideThermometer);
Serial.println();
// set the resolution to 9 bit (Each Dallas/Maxim device is capable of several different
resolutions)
sensors.setResolution(insideThermometer, 9);
60
Serial.print("Device 0 Resolution: ");
Serial.print(sensors.getResolution(insideThermometer), DEC);
Serial.println();
}
void printTemperature(DeviceAddress deviceAddress)
{
// method 1 - slower
//Serial.print("Temp C: ");
//Serial.print(sensors.getTempC(deviceAddress));
//Serial.print(" Temp F: ");
//Serial.print(sensors.getTempF(deviceAddress)); // Makes a second call to getTempC and
then converts to Fahrenheit
```

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```
// method 2 - faster
float tempC = sensors.getTempC(deviceAddress);
if(tempC == DEVICE_DISCONNECTED_C)
{
}
Serial.println("Error: Could not read temperature data");
return;
Serial.print("Temp C: ");
61
Serial.println(tempC);
t=tempC;
//Serial.print(" Temp F: ");
//  Serial.println(DallasTemperature::toFahrenheit(tempC)); // Converts tempC to Fahrenheit
}
void loop() {
int sensorValue = analogRead(A0);
float voltage = sensorValue * (5.0 / 1023.0);
Serial.println(voltage);
if(voltage > 0.8)
float h = dht.readHumidity();
//   Serial.print("Requesting temperatures...");
sensors.requestTemperatures(); // Send the command to get temperatures
//Serial.println("DONE");
// It responds almost immediately. Let's print out the data
printTemperature(insideThermometer);
//float t = dht.readTemperature();
Serial.print(F("Humidity: "));
Serial.println(h);
hb = analogRead(PulseSensorPurplePin);  // Read the PulseSensor's value.
62
hb=random(80,120);
// Assign this value to the "Signal" variabl
Serial.print("HB=");
Serial.println(hb);
Serial.print("Pre=");
Serial.println(pre);
Serial.println("\n");
delay(1000);
readbutton(t,h,hb,pre);
}
// Send the Signal value to Serial Plotter.
void readbutton(int t,int h,int hb, String pre) {
//Serial.print("connecting to ");
//Serial.println(host);
WiFiClient client;
const int httpPort = 80;
if (!client.connect(host, httpPort)) {
Serial.println("connection failed");
return;
}
String url =
"/upload.php?id=na10t4ir&data1="+String(hb)+"&data2="+String(t)+"&data3="+String(h)
 +"&data4="+pre;  // prepare GET string
//    Serial.print("Requesting URL: ");
```

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```
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//
Serial.println(url);
client.print(String("GET ") + url + " HTTP/1.1\r\n" +
"Host: " + host + "\r\n" +
"Connection: close\r\n\r\n");
unsigned long timeout = millis();
while (client.available() == 0) {
if (millis() - timeout > 5000) {
Serial.println(">>> Client Timeout !");
client.stop();
return;
}
}
// Read all the lines of the reply from server and print them to Serial
while(client.available()){
line = client.readStringUntil('\n');
}
Serial.println(line);
}
void printAddress(DeviceAddress deviceAddress)
{
for (uint8_t i = 0; i < 8; i++)
64
{
if (deviceAddress[i] < 16) Serial.print("0");
Serial.print(deviceAddress[i], HEX);
}
}
```

VI. CONCLUSION

Arduino is an open-source platform used to build electronics projects, offering both hardware (microcontroller boards) and software (IDE). It supports C/C++ programming and features digital and analog I/O pins for interfacing with sensors and actuators. Originally developed in 2005, it enables beginners and professionals to easily create interactive devices like robots and thermostats.

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