Fire Detection System

Embedded Systems Architecture - CSEN701

German University in Cairo
الجامعة الألمانية بالقاهرة

Employing Gas and Temperature Sensors for Fire Alarm.

Brief Abstract

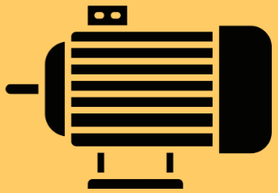
This fire detection system project integrates temperature and gas sensors to enhance early fire detection. The system employs two LEDs for visual alerts, a buzzer for audible warnings, and a DC motor for potential automated response mechanisms. Through real-time monitoring and sensor feedback, the system aims to provide a comprehensive and swift response to fire incidents, contributing to improved safety measures.

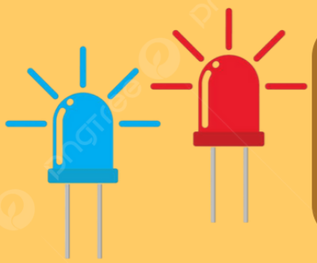
Introduction

In the realm of safety and security, the integration of advanced technologies plays a pivotal role in mitigating potential risks. This project embarks on the development of a sophisticated fire detection system, fusing the capabilities of temperature sensor and gas sensor. Complemented by 4 actuators, this system strives to redefine early fire detection.

Hardware Components

Input Devices	Output Devices	Other
• Temperature Sensor • Gas Sensor • 8V Power Supply	• DC Motor • Buzzer • Two LED lights	• Microcontroller: Raspberry Pi Pico • H-Bridge





Conclusion

In conclusion, the development of this system with Raspberry Pi Pico offers a robust solution for effective fire detection. The integration of the sesnors coupled with visual, audible, and automated alerts, ensures a comprehensive safety approach. This project signifies the fusion of hardware and software to address crucial safety challenges, promising to contribute significantly to timely fire prevention.

Team Members

Team 25

- Karim Magdy 52-3397
- Joy Emad Kamel 52-1230
- Mireille Ragy Bishay 52-1143
- Sama El-Harras 52-0479
- Peter Ashraf 52-12778
- Khaled Magdy 52-13641

Surpervised by: Dr. Eng. Catherine M. Elias,
Eng. Abdalla Mohamed, Eng. Maysarah Eltamalawy, Eng. Mohamed Elshafie

Methodology

- **Hardware Setup:**

Activating the on-board temperature sensor, link one LED to signify high temperature (blue) and another for smoke detection (red). Integrate the smoke sensor, buzzer, and DC motor into the system.

- **Raspberry Pi Pico Programming:**

Utilize the C programming language to code the Raspberry Pi Pico. Implement code to continuously monitor the temperature sensor readings.

- **Temperature-based Activation and Smoke Sensor Integration:**

Set a threshold (e.g., 50 degrees Celsius) for temperature detection. When the temperature rises above the threshold, activate the blue LED. Implement code to monitor the smoke sensor's output. When smoke is detected, activate the red LED. If both temperature and smoke sensors are triggered simultaneously, activate the buzzer and DC motor for an immediate and robust alert system.

- **Feedback Mechanism:**

Establish a feedback loop to continuously monitor sensor outputs. Integrate a delay mechanism to avoid false positives and enhance system stability.

- **Testing and Calibration:**

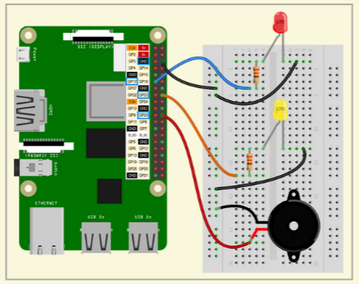
Conduct rigorous testing under various conditions to ensure accurate sensor readings. Calibrate the system for optimal performance and responsiveness.

- **Documentation:**

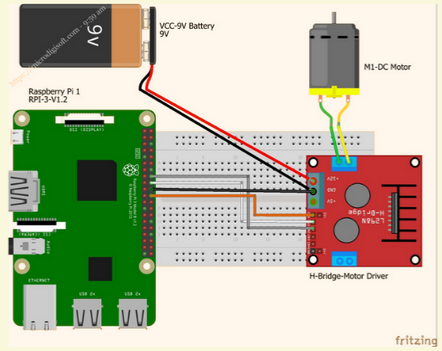
Document the code thoroughly, providing comments for better understanding and future modifications. Also, providing a report with the flow implemented in the system.

Wiring

Buzzer and LEDs



DC Motor and Power Spply



Smoke Sensor