#1 Real-Time Industrial Safety Monitoring

Objective

Create a system for real-time safety monitoring in industrial environments.

Description

Use sensors to detect hazardous conditions (e.g., gas leaks, fire) and implement a real-time alert system.

Hardware Required

1. CORTEX M4-STM32F405 Board
2. Switch #1 – Simulates MQ2 Sensor for Smoke Detection
3. Pot #1 – Simulates MQ-2 Sensor for Gas Detection
4. Switch #2 – Simulates Flame Sensor for Flame/Fire Detection
5. Analog Temp Sensor (Thermistor)
6. LCD & Buzzer
7. Keypad
8. 5V DC Motor
9. Motor Driver - Dual TB6612FNG
10. Standard 5V 2A Power Supply with Dual Pin DC Plug
11. DC Power Module DC Power Adapter Plate
12. Mini Water Pump
13. LEDs – Red, Blue & Green
14. LED Bar Graph Indicator

Software Required

1. STM32 CUBE IDE

Expected Result & Test Cases

Security:

- The LCD will show "**Welcome"** message after Power On.
- When the user Press the * key, it will prompt **"Input Your Passkey"**.
- The passkey must be entered followed by # key to Confirm.
- If the Passkey matches with the prefixed Passkey in the Source Code, then
- "Please Come In" must be Displayed and GREED LED must TURN ON, else **"Wrong Passkey. Try Again!"** must be Displayed and RED LED must TURN ON.

Test Conditions

1. When there is no fire, no smoke or no gas (<20%)

   a. LCD should display msg “SAFE”
   b. Green LED indicating safe.

2. When Fire or Smoke is Sensed

   a. The Buzzer must be Activated

   b. Fast Blink RED LED for Fire and BLUE LED for Smoke

   c. TURN ON DC Motor connected with FAN Only for Smoke

   d. Turn ON Mini Water Pump only for Fire

3. When Any GAS is sensed

   a. Provide Alert Messages (Gas name & percentage) on LCD

   b. Glow the LED Bar Graph Indicator as per the % of GAS.

Messaging

Every 3 Secs Send the Following Safety Monitoring Data to UART

FIRE DETECTED – YES/NO

SMOKE DETECTED – YES/NO

GAS %

TEMP: < Value in Degree Celsius >

Project Deliverables

1. Project Report containing
    i. Flowchart
    ii. H/w Circuit - Photos
    iii. Code
    iv. Output Screenshots/Photos
    v. Live Expressions - Screenshots

2. Project Report to be Uploaded into LMS

Project Assessment

Project Activities	Weightage (%)
Architecture, Design & H/w Setup	25%
Development	25%
Testing & Debugging	25%
Documentation	25%