PROJECT NAME:

Intelligent Engine Room Monitoring System (IERMS)

TEAM MEMBERS:

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DESCRIPTION:

1. Overview

The **Intelligent Engine Room Monitoring System (IERMS)** is a real-time safety and automation system designed to enhance the operational efficiency and safety of engine rooms by continuously monitoring **temperature, humidity, and fire hazards**. The system integrates **multiple sensors and actuators** to ensure that environmental conditions remain within optimal limits and to prevent potential hazards such as overheating and fire outbreaks.

Key Features:

- Automatic temperature regulation
- Humidity control through dehumidifiers or humidifiers
- Fire detection and suppression
- Alert mechanisms for manual intervention
- Real-time monitoring and response system

2. System Functionality:

The **IERMS** follows a structured decision-making process, as outlined in the **flowchart**, to regulate engine room conditions and respond to fire hazards.

Step 1: Temperature Monitoring & Control

1. The system reads temperature sensor data.
2. If the temperature exceeds **45°C**, the system:
    - Turns on an indicator light to signal high temperature.
    - Calculates the temperature offset to determine how much cooling adjustment is needed.
    - Changes the cooling water flow rate to bring the temperature back to normal.
3. If the temperature is within limits, no corrective action is taken.

Step 2: Humidity Monitoring & Control

1. The system reads data from the relative humidity (RH) sensor.
2. Based on RH values:
    - If RH > 70% (too high), the system activates a **dehumidifier or ventilation** to reduce humidity.
    - If RH < 30% (too low), the system activates a **humidifier or water spray** to increase humidity.
    - If RH reaches 50%, the system stops adjustments and considers conditions optimal.

Step 3: Fire Detection & Suppression

1. The system collects data from the flame sensor.
2. If an open flame is detected:
    - The buzzer is activated to signal an emergency.
    - The fire suppression system is triggered to extinguish the fire.
3. If the fire is successfully extinguished, the system stops further action.
4. If the fire is not extinguished, a manual intervention alert is triggered for immediate human response.

3. <u>System Components</u>

Sensors:

1. **Temperature Sensor** – Monitors overheating and regulates cooling.
2. **Flame Sensor** – Detects fire and activates suppression mechanisms.
3. **Relative Humidity Sensor** – Measures moisture levels for humidity control.

Actuators & Alert Mechanisms:

4. **Flashing LED** – Provides a visual warning for high temperature or fire detection.
5. **Buzzer** – Sounds an alarm when a fire hazard is detected.
6. **Relay Module** – Controls external cooling systems, dehumidifiers, humidifiers, and fire suppression mechanisms.
7. **Push Button** – Allows manual intervention if automatic fire suppression fails.

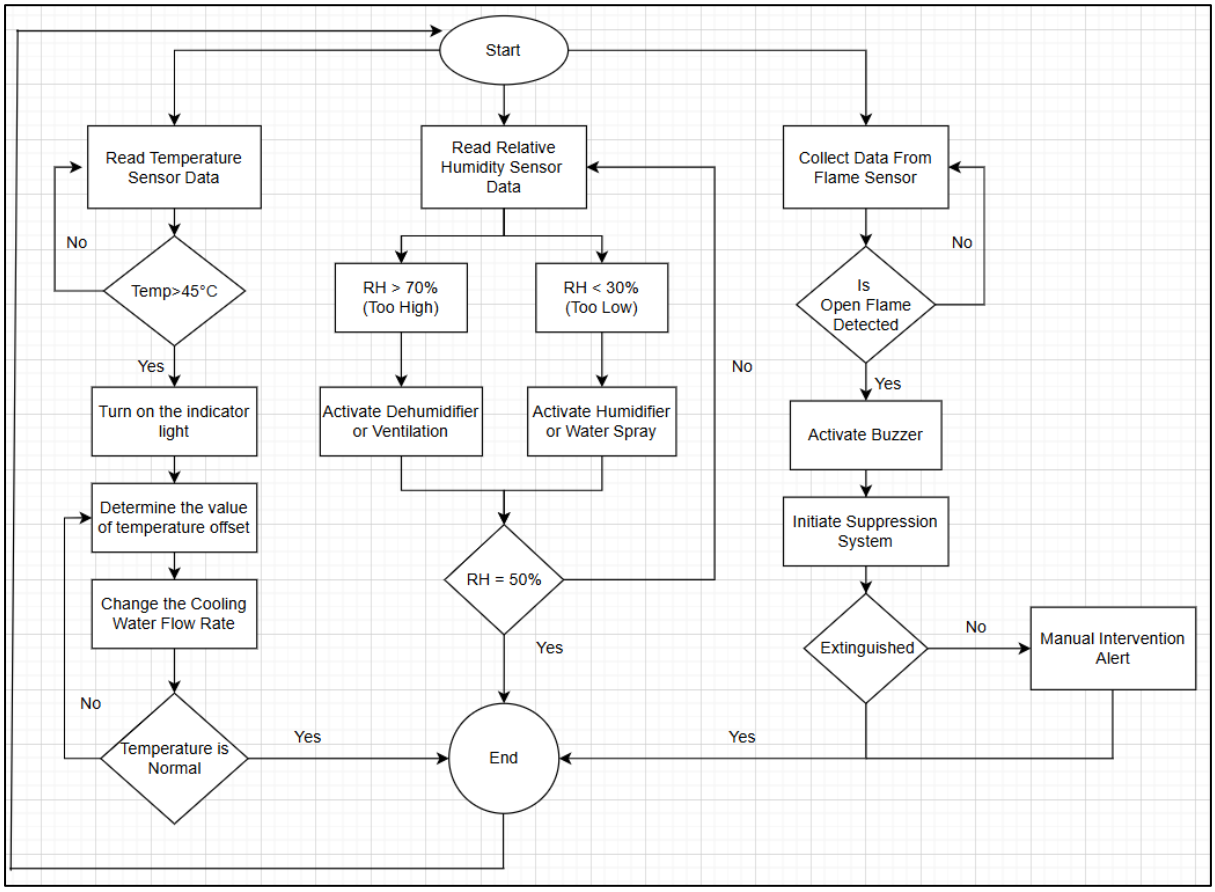
<u>4. System Benefits</u>

- Fire prevention and rapid suppression
- Temperature optimization to prevent overheating
- Humidity control for better engine performance
- Immediate alerts and manual override for emergencies
- Continuous real-time monitoring of environmental conditions

REQUIRED SENSORS/ACTUATORS:

1. Temperature Sensor
2. Flame Sensor
3. Relative Humidity Sensor
4. Flashing LED
5. Buzzer
6. Relay Module
7. Push Button

FLOWCHART:


Start
Read Temperature Sensor Data
Temp>45°C
No
Yes
Turn on the indicator light
Determine the value of temperature offset
Change the Cooling Water Flow Rate
Temperature is Normal
No
Yes
Read Relative Humidity Sensor Data
RH > 70% (Too High)
RH < 30% (Too Low)
Activate Dehumidifier or Ventilation
Activate Humidifier or Water Spray
RH = 50%
Yes
No
Collect Data From Flame Sensor
Is Open Flame Detected
No
Yes
Activate Buzzer
Initiate Suppression System
Extinguished
No
Manual Intervention Alert
Yes
End