HACK KRMU 5.0

- **PROBLEM STATEMENT ID :** HK-SAFETY-012
- **TEAM NAME :** Error 404
- **TEAM ID :** HK-84
- **TEAM MEMBERS :**
  - Ashish Yadav (2301010413)
  - Kundan Singh (2301010404)
  - Ritik Kumar (2401730227)
  - Harshit Jaiswal (2301010397)

# PROBLEM & SOLUTION

- **The Problem:** Manual safety dependency kills. Madurai & Surat tragedies prove smoke asphyxiation occurs before any human response.
- **The Gap:** 90% of buildings lack **Autonomous Life-Support** during fire emergencies.
- **The Solution:** A PAC-SCADA system that detects danger and executes **Reverse Suction** to clear smoke in under 2 seconds.
- **Outcome:** Proactive safety for hostels, auditoriums, and community zones.

# FLOW OF SOLUTION

**SENSING**

IoT Sensors monitor Heat, Smoke, and Screams.

→

**PAC LOGIC**

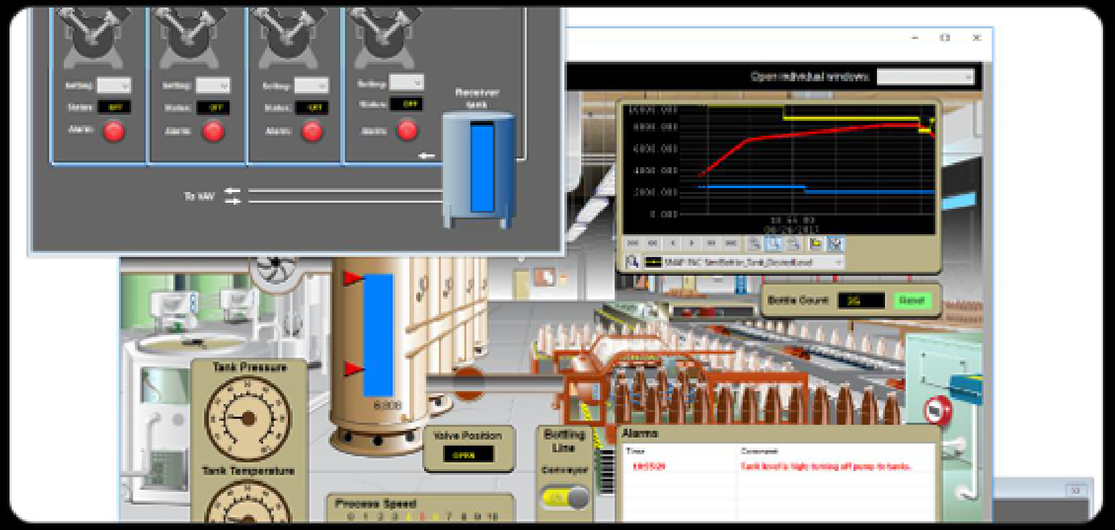
Local Controller confirms threat & triggers action.

→

**ACTUATION**

HVAC Reverses to pull out smoke instantly.

Unified Monitoring via Real-time **SCADA Dashboard**.



# TECH STACK & APPROACH

## The Tech Stack

- PAC CONTROLLER
- SCADA DASHBOARD
- IoT SENSORS
- LADDER LOGIC
- ZIGBEE/LoRa
- IoT CLOUD

## Our Approach

- **Edge Priority:** Safety logic is hardcoded into hardware. Zero dependency on cloud for life-saving actions.
- **Retrofit Model:** Designed to work with existing building HVAC ductwork.

## UNIQUENESS & INNOVATION FACTOR

- **Reverse Suction Suction:** Unlike basic alarms, we turn building infrastructure into a life-support tool by actively clearing smoke.
- **Scream Recognition:** High-decibel pattern analysis to detect panic in women's hostels or common areas proactively.
- **Fault-Tolerant:** System operates locally even if external internet or main power fails (via backup PAC power).

# FEASIBILITY & CHALLENGES

### Feasibility

Low CAPEX implementation using existing ventilation. High scalability for hostels, colleges, and SHG centers.

**30% Energy Savings** via smart HVAC cycles.

### Challenges

- **Sensor Noise:** Solved via multi-modal fusion (Smoke + Heat).
- **Signal Strength:** Solved via Industrial Mesh networking (Zigbee).

# RESEARCH & REFERENCE


- **Case Study:** Madurai Women's Hostel (2024 Refrigerator Blast Analysis).
- **Tragedy Research:** Surat Takshashila Fire (2019 Smoke Accumulation Report).
- **Standards:** NFPA (National Fire Protection Association) automation protocols.
- **Hardware:** Parker/Siemens Industrial Control Documentation.