**Smart Factory Electrical Safety & Health Monitoring Platform**

### \* Problem Statement

Micro, Small, and Medium Enterprises (MSMEs) often use outdated electrical systems lacking intelligent monitoring, leading to: - Short circuits, overloads, arc flashes - High fire risk, equipment damage - No real-time fault alerts or emergency shutdown - Operational down-times and safety compliance issues

### \* Proposed Solution

A full-stack IoT-based safety platform that integrates sensors into factory electrical systems to: - Monitor health and detect abnormalities - Alert users in real-time via mobile/web - Trigger automated shutdown during faults - Log and report all electrical health data for audits

### \* Key Sensors and Their Functions

| Sensor | Function |
| --- | --- |
| **Current Transformer (CT)** | Measures current, detects overloads, imbalance |
| **Arc Flash Sensor** | Detects arc events via light/pressure changes |
| **Thermal IR Sensor** | Measures surface temp; detects overheating |

### \* System Workflow

1. Sensors are installed at DB panels & machines
2. Data is transmitted securely to IOT Gateway (ESP32/RPi/STM32)
3. Gateway forwards data to Cloud via MQTT + TLS
4. Back-end (Node.js / Python) checks thresholds, uses AI for fault prediction
5. On fault detection:
   * Alert via SMS, App, Dashboard
   * Power shutoff using smart relay
   * Event is logged for reporting

### \* Platform Overview

**Frontend (Web/Mobile)** - Real-time dashboards (React/Flutter) - Charts: load, temperature, fault logs - User notifications & manual override controls

**Back-end & IOT Stack** - Node.js / Python (Flask/Fast-API) - MongoDB / PostgreSQL for logging - MQTT for IOT data - ESP32 / Raspberry Pi / STM32 as controllers

### ✅ Benefits for MSMEs

* Fire and accident prevention
* Equipment longevity and cost savings
* Supports audit and insurance compliance
* Low-cost, scalable, plug-and-play system

### ✅ Optional Add-on’s

* Solar energy integration
* Load forecasting and energy analytics
* Voice assistant or SMS control for power systems

Let me know if you want: - Dashboard UI mockup - Hardware connection diagrams - Estimated costs and BOM - PPT Startup Deck - Government/CSR/MSME Scheme alignment