CODEZEN 2.0

- Project Title: **OmniSense: Energy Optimization and Alert Smart System**
- Team Name : **Sync & Sense**

Team Members :

1. **Kanchan Sharma:** Team Leader, Dashboard Layout & System Flow
2. **Diya Raj:** Circuit Design & Sensor Logic
3. **Trisha Singh**: Product Documentation

- Track Chosen: **Internet of things, Sustainability**

PROBLEM STATEMENT & TARGET AUDIENCE

The Issue

- **Passive Energy Management:** Lack of occupancy-based automation leads to significant carbon footprints and utility overhead.
- **Environmental Cognitive Load:** Poor air quality and thermal discomfort directly impact overall focus and health.
- **Manual System Dependency:** Reliance on human intervention for attendance and safety monitoring slows emergency response times and wastes instructional hours.
- **Energy Waste:** an estimates 20-30% of power is lost to vacant, unmanaged classrooms.

Target Users

- **Educational Institutions**
- **Workplaces**
- **Facility Managers**

OUR UNIQUE SOLUTION

Key Features

- **Temperature Control:** DHT22 monitors room temperature and humidity, automatically activates relay (fan) above 25°C threshold.
- **Occupancy Detection:** PIR sensor identifies human presence to control lighting, preventing energy waste.
- **Smoke Detection:** MQ-2 gas sensor with threshold triggers immediate buzzer alarm for fire safety.

Why It's Different

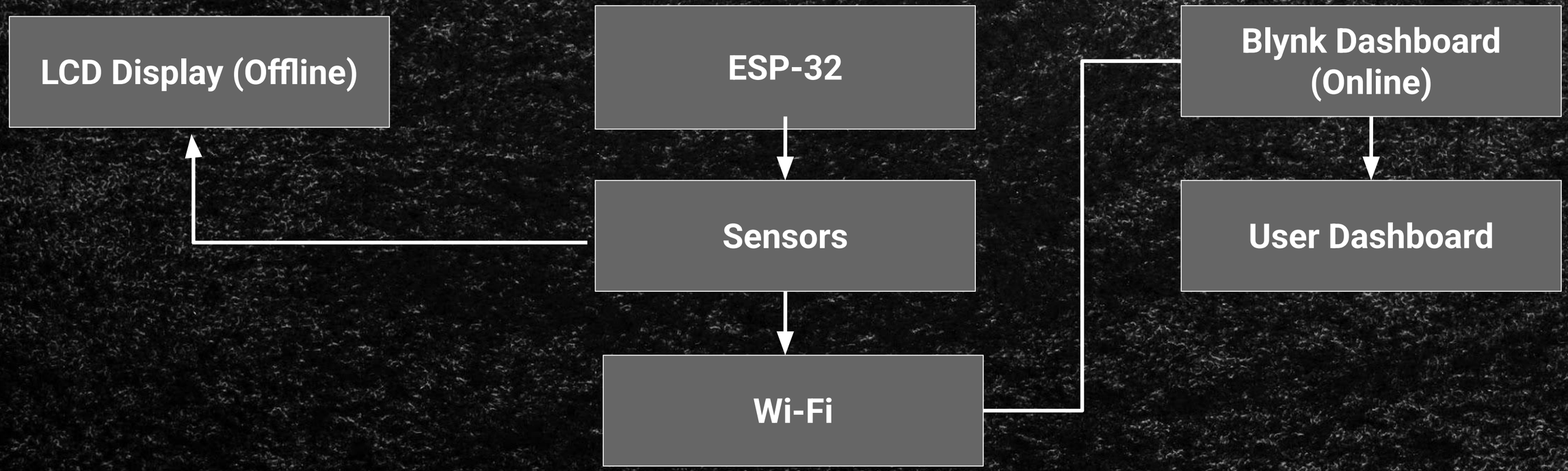
- **Low-cost installation** into existing infrastructure without major rewiring.
- Unlike basic IoT projects, **OmniSense** features a local **I2C LCD interface** for real-time monitoring even during network outages.

TECH STACK & ARCHITECTURE

Tech Stack

- **Hardware**: ESP32, DHT22, HC-SR501 (PIR), MQ-2 (proxy for smoke and combustible gas detection), I2C LCD (16X2), 5V Relay(proxy for Fan), Buzzer.
- **Software**: C++ (Arduino Framework), Blynk IoT Cloud.
- **Simulation**: Wokwi

Architecture



FEASIBILITY & SHOWSTOPPERS

Feasibility

- **Timeline:** Built using standard IoT libraries, achievable within hackathon limits.
- **Prototyping:** Logic verified via high-fidelity Wokwi virtual simulation.

Showstoppers & Mitigation:

- **Connectivity Risk:** Dependency on Wi-Fi for mobile dashboard updates.
- **Mitigation:** Local **I2C LCD interface** acts as a fail-safe, providing real-time alerts even when offline

USP & BUSINESS MODEL

USP Business Model

- A low-cost, all-in-one smart system that reduces energy costs, is sustainable while enhancing safety.

Sustainability/Revenue:

- **Implementation Fee:** One-time setup fee for deployment.
- **Data Analytics:** Subscription model for long-term energy and attendance insights.

Future Scope:

- Predictive cooling based on occupancy patterns.
- Attendance using RFID.
- Predictive light intensity and coloring.
- Transitioning from the MQ-2 prototype to Industrial Grade NDIR CO2 sensors and Optical Smoke Detectors for enhanced accuracy and compliance with fire safety regulation.

THANK YOU