

Edge vs Cloud using ESP32 + Raspberry Pi

MONTH 1 — Edge Gateway Setup

Week 1: Linux & Raspberry Pi

- OS flashing
- SSH access
- File systems & networking

Week 2: MQTT Broker Setup

- Mosquitto installation
- Topic management
- Security basics

Week 3: Device-to-Edge Communication

- ESP32 → Pi communication
- Two-way control logic

Week 4 – PHASE PROJECT

Edge Data Logger with Real-Time Monitoring

◆ MONTH 2 — Edge Processing & Intelligence

Week 5: Data Filtering & Noise Handling

- Python scripts on Pi
- Data validation

Week 6: Local Alert Systems

- Email/Telegram alerts
- Threshold triggers

Week 7: Node-RED Visualization

- Flow-based programming
- Real-time dashboards

Week 8 – PHASE PROJECT

Smart Industrial Monitoring Edge System

MONTH 3 — Cloud Extension

Week 9: Secure Cloud Communication

- **AWS IoT Core basics**
- **Device authentication**

Week 10: Cloud Storage & Analytics

- **DynamoDB basics**
- **Structured data storage**

Week 11: Edge vs Cloud Benchmarking

- **Latency testing**
- **Cost & bandwidth comparison**

Week 12 – FINAL CAPSTONE

Complete Hybrid Edge-Cloud Architecture System