

SkillCred

IoT & Embedded Systems Program

Program Microcontrollers. Connect Sensors. Build Cloud-Connected IoT Solutions.

8

Weeks

96

Hours

4

Projects

6

Days/Week

HYBRID MODEL

2 Solo + 1 Pair + 1 Group Capstone

Dual Track

8W Standard + 4W Fast Track

Mentor Verified

Every project reviewed

PAT Certified

Score visible to all HRs

8-Week Syllabus

Mon-Sat | 2 Hrs/Day | 48 Sessions | 96 Contact Hours

01 Embedded Fundamentals

ESP32/Arduino, GPIO, analog/digital I/O, PWM, C/C++, PlatformIO, UART

SOLO 1 START

02 Sensors, Actuators & Protocols

Temp, humidity, ultrasonic, PIR, servo, relay, I2C, SPI, OLED, interrupts

SOLO 1 DELIVERY

03 Wireless Communication

Wi-Fi (ESP32), HTTP on MCU, Bluetooth/BLE, MQTT (Mosquitto), QoS, mesh

SOLO 2 START

04 IoT Cloud Platforms

AWS IoT Core/ThingSpeak, provisioning, telemetry, InfluxDB, Grafana

SOLO 2 DELIVERY

05 Edge Computing & TinyML

TF Lite Micro, on-device inference, anomaly detection, power-aware

PAIR START

06 Automation & Reliability

Node-RED, OTA firmware, fleet management, watchdog, power management

PAIR DELIVERY

07 Security & System Design

IoT security (TLS, certs), PCB basics (KiCad), enclosure design, reliability

CAPSTONE START

08 Capstone Integration & Demo

Full system integration, E2E testing, benchmarking, circuit diagrams, demo

CAPSTONE DELIVERY

DAILY 2-HOUR SESSION

0:00-0:10

Recap

0:10-0:40

Concept

0:40-1:30

Build Sprint

1:30-1:50

Standup

1:50-2:00

Wrap

Your 4 Portfolio Projects

2 Solo (individual) + 1 Pair (collaborative) + 1 Group Capstone (team)

SOLO 1 | INDIVIDUAL | Weeks 1-2

Difficulty:

Intelligent Multi-Sensor Environmental Station

5+ sensor readings (temp, humidity, pressure, light, air quality, motion), OLED display with multi-screen UI, SD card CSV logging with timestamps, serial plotter, configurable alert thresholds (buzzer/LED), power measurement, interrupt-driven motion. All sensors $\pm 5\%$ accuracy, 24hr logging.

Tech: ESP32/Arduino Mega, BME280 (I2C), MQ-135, BH1750, PIR, SSD1306 OLED, SD card (SPI), PlatformIO HR Signal: Junior Embedded/IoT Engineer hire bar

SOLO 2 | INDIVIDUAL | Weeks 3-4

Difficulty:

Cloud-Connected Smart Monitor with MQTT

Wi-Fi auto-connect with captive portal, MQTT publish (QoS 1) with structured JSON, BLE advertisement for mobile readout, cloud storage (ThingSpeak/InfluxDB), Grafana dashboard with 5+ panels, configurable alert rules, OTA firmware update. MQTT <2s latency, BLE 10m range, 48hr continuous run.

Tech: ESP32, MQTT (PubSubClient), BLE (NimBLE), ThingSpeak/InfluxDB, Grafana, Mosquitto, ArduinoOTA HR Signal: IoT Engineer hire bar

PAIR PROJECT | 2-3 STUDENTS | Weeks 5-6

Difficulty:

Edge-Intelligent Automation System

TinyML model on ESP32 (person detection/audio classification/gesture recognition), edge decision making without cloud, Node-RED automation flows, multi-device MQTT coordination (3+ devices), OTA firmware with versioning, power management with deep sleep, watchdog timer. TinyML >5 FPS, edge decisions <500ms, 72hr reliability test.

Tech: ESP32-CAM/ESP32-S3, TensorFlow Lite Micro, Node-RED, MQTT, Docker, Grafana

Student A: TinyML model training + quantization, ESP32 inference, edge logic, sensor hardware | Student B: Node-RED flows, MQTT broker, multi-device coordination, OTA system, cloud dashboard

GROUP CAPSTONE | 5 STUDENTS | Weeks 7-8 | Pick 1 of 3

Difficulty:

Option 1: Smart Building Management System

Distributed sensors across 5+ zones (temp, humidity, light, occupancy, energy), zone-based HVAC/lighting automation, occupancy-based energy optimization, real-time floor plan dashboard, anomaly detection, energy analytics, mobile app, BMS API.

Tech: ESP32 (x5+), MQTT, TinyML, InfluxDB, Grafana, Node-RED, React Native, Docker

Option 2: Agricultural IoT Platform

Soil monitoring (moisture, pH, NPK, temp), weather station, automated drip irrigation, crop disease early warning, mobile app (multi-language), SMS/WhatsApp alerts, yield estimation, water optimization. Tech: ESP32, soil sensors, relay modules, MQTT, ThingSpeak, React Native, Twilio

Option 3: Industrial Safety Monitoring System

Wearable safety badges (fall detection, heart rate, location), environmental sensors (gas, temp, noise), geofenced danger zones, SOS button, PPE detection (edge camera), compliance dashboard, incident logging. Tech: ESP32 + accelerometer + HR sensor, BLE, MQTT, TinyML, React, PostgreSQL, Docker

Module Ownership (all capstones): A: Sensor hardware, calibration | B: Communication, automation rules | C: Edge ML, anomaly detection | D: Dashboard, mobile app | E: PCB design, fleet management, deployment

Two Career Pathways

Both available simultaneously – not mutually exclusive

Employment Track

1. Complete 4 verified projects
2. Take PAT certification exam
3. Portfolio published to HR Portal
4. HRs discover and shortlist you
5. Interview scheduled via platform
6. Offer extended – placement tracked

Startup Track

1. Build investor-grade capstone
2. Mentor verifies for Investor Portal
3. List project with pitch deck & demo
4. Investors discover your project
5. Pitch invitation and presentation
6. Startup mentorship and funding

Project Assessment Test (PAT)

Your certification score – visible to every HR on the platform

MCQs 20% | Coding 25% | Architecture 20% | Viva Defense 25% | Peer Review 10%

- 90–100** **Elite**
Top 5% – senior roles, startup founding
- 75–89** **Pro**
Job-ready with solid fundamentals
- 60–74** **Certified**
Entry-level – core concepts proven

Mentor Verification – The Trust Engine

No project reaches HR or Investor portal without rigorous mentor review.

Code Quality 25% | Functionality 25% | Architecture 20% | Docs 15% | Deployment 15%

Ready to Build Your Future?

4 verified projects | PAT certification | Two career pathways

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