Track 5: Junior Engineer – AIoT

Level 3 to Level 5 · 720 Hours Total

At EduBlends, we don't just train—we create future industry leaders!

Program Summary

A hands-on engineering pathway that combines artificial intelligence with connected hardware — from sensors, microcontrollers and PCB design to edge AI, IoT security and full stack solution delivery.

Program Duration
6 modules × 120 hours
(720 hours, approx. 48-60 weeks)

Weekly effort
12-15 hours a week

Learning Mode: Online and Offline Classes, including Pre-Recorded Videos, Live Sessions, and Interactive Q&A Sessions.

Hardware Lab & Cloud Integration with device kits, bench instruments and IoT cloud sandboxes

Industry-Sponsored Internship Facilitation

Certificate Upon successful completion of each module, participants will be awarded a verified digital certificate by EduBlends and Industry

A Progressive Learning Pathway from AIoT Foundations to Full Stack Delivery

At EduBlends Academy, we provide a structured learning pathway that allows students to build applied AIoT engineering skills across hardware, data, connectivity and security during their graduation journey. Each of the six modules is a substantial 120-hour programme in its own right and may be taken as a standalone qualification or as part of the full track.

1. **Start with Foundation of AIoT and IoT Hardware Analyst:** Learners build the AIoT systems view and the hardware skills behind it — Python for embedded work, sensors, signals and electronics, microcontroller and Arduino programming, circuit measurement and PCB design.
2. **Progress through Data Analytics for IoT and IoT Solution Engineer:** Learners move into MQTT telemetry pipelines, time-series management, machine learning on sensor data and edge AI deployment, then Wi-Fi, Bluetooth and LoRa connectivity, cloud device management, digital twins and solution costing.
3. **Advance to IoT Security Analyst and Embedded & Full Stack IoT:** In the final phase, learners harden devices, firmware and communications and test them offensively, then build embedded firmware on an RTOS and a full stack IoT application, closing with a panel-assessed capstone.

By following this structured pathway, students complete the full track within their graduation period, emerging as industry-ready professionals with a working, secured and documented AIoT device and application to their name.

Track 5 – Junior Engineer – AIoT

Level 3 → Level 5 · 720 hours total · 6 modules × 120 hours · 58 practical lab sessions and one panel-assessed capstone

Program Modules

No.	Module	Hours	Indicative Level	Focus
01	Foundation of AIoT	120 hrs	Level 3	AIoT architecture, Python, sensors, electronics and networking
02	IoT Hardware Analyst	120 hrs	Level 3	Microcontrollers, Arduino, circuit measurement, PCB design, prototyping
03	Data Analytics for IoT	120 hrs	Level 4	MQTT pipelines, time-series data, anomaly detection, edge AI
04	IoT Solution Engineer	120 hrs	Level 4	Wi-Fi, Bluetooth and LoRa, cloud platforms, digital twins, solution design
05	IoT Security Analyst	120 hrs	Level 5	OWASP IoT, firmware hardening, secure comms, device penetration testing
06	Embedded & Full Stack IoT	120 hrs	Level 5	Embedded C, RTOS, device APIs, dashboards, capstone project

Job Roles

Role	Modules	Primary Capability
IoT Support Engineer	01, 02	AIoT architecture, sensors, microcontrollers, device troubleshooting
IoT Analyst	03	Telemetry pipelines, time-series analysis, IoT dashboards, edge AI
IoT Security Analyst	05	IoT threat modelling, firmware hardening, device penetration testing
Embedded Engineer	02, 06	Microcontroller programming, PCB design, embedded firmware and RTOS
Industrial IoT Specialist	04, 06	Connectivity, digital twins, fleet operations, end-to-end solution delivery

Certifications

NIELIT · Cisco IoT · Intel Edge AI · AWS IoT · Azure IoT · IIT Kanpur (E&ICT) · CompTIA

Vendor and institutional certification examinations are sat separately and are not included in programme fees. Preparation coverage is indicative and does not guarantee an examination pass.

Entry Requirements

Modules 01 and 02 are open entry; no prior programming or electronics experience is assumed. Modules 03 and 04 require completion of Modules 01 and 02 or equivalent Python and hardware familiarity. Modules 05 and 06 require completion of Modules 01 to 04 or demonstrable applied IoT experience. Each module may also be taken standalone where the entry conditions are met.

Program Frameworks – Module 01: Foundation of AIoT

120 hours · AIoT architecture, Python, sensors and electronics · 10 practical lab sessions

1.1 | AIoT Landscape & System Architecture 20 hrs

Module / Topic

- Device, edge, gateway and cloud layers, AIoT use cases across industry, data flow, power and cost constraints

Practical Lab Sessions

Lab 1: Map a live AIoT product into its device, edge, network and cloud layers.
Lab 2: Draft a system architecture brief for a proposed AIoT deployment

1.2 | Python for Embedded & IoT 28 hrs

Module / Topic

- Python fundamentals, data structures, file handling, serial communication, MicroPython, scripting device control

Practical Lab Sessions

Lab 3: Write a Python script to read and log data from a serial-connected device.
Lab 4: Control an output device from Python with structured error and timeout handling

1.3 | Sensors, Actuators & Signal Fundamentals 24 hrs

Module / Topic

- Sensor types and characteristics, analogue versus digital signals, sampling and resolution, calibration, actuator control

Practical Lab Sessions

Lab 5: Wire and calibrate temperature, motion and light sensors; verify the readings.
Lab 6: Drive an actuator from sensor input and tune the response threshold

1.4 | Electronics & Circuit Fundamentals 24 hrs

Module / Topic

- Voltage, current and resistance, passive and active components, power supplies and regulation, breadboarding, safety

Practical Lab Sessions

Lab 7: Build and measure a regulated power supply circuit on breadboard.
Lab 8: Design a sensor interface circuit and verify it against the specification

1.5 | Networking & Communication Basics 24 hrs

Module / Topic

- IP fundamentals, serial protocols (UART, I2C, SPI), client-server model, APIs and payload formats for device data

Practical Lab Sessions

Lab 9: Connect two devices over I2C and SPI; capture and decode the traffic.
Lab 10: Send device readings to a REST endpoint and validate the payload format

Program Frameworks – Module 02: IoT Hardware Analyst

120 hours · Microcontrollers, circuit measurement and PCB design · 10 practical lab sessions

2.1 | Microcontroller Architecture & Programming 26 hrs

Module / Topic

- MCU architecture, memory and registers, GPIO, ADC and PWM, interrupts, timers, clock configuration

Practical Lab Sessions

Lab 1: Configure GPIO, ADC and PWM on a microcontroller and verify each output.
Lab 2: Implement interrupt-driven event handling and measure the timing behaviour

2.2 | Arduino Development & Peripheral Interfacing 26 hrs

Module / Topic

- Arduino IDE and toolchain, libraries, interfacing displays, motors and sensor modules, serial debugging

Practical Lab Sessions

Lab 3: Build a multi-sensor Arduino node with display output and serial logging.
Lab 4: Interface a motor driver and implement closed-loop control from sensor input

2.3 | Circuit Analysis & Oscilloscope Measurement 24 hrs

Module / Topic

- Signal integrity, noise and grounding, oscilloscope and multimeter technique, probing, logic analysis, fault diagnosis

Practical Lab Sessions

Lab 5: Capture and interpret digital and analogue waveforms on an oscilloscope.
Lab 6: Diagnose a faulty circuit by systematic measurement and document the fix

2.4 | PCB Design with Altium / KiCad 26 hrs

Module / Topic

- Schematic capture, component libraries and footprints, board layout and routing, design rule checks, manufacturing output

Practical Lab Sessions

Lab 7: Draw a schematic for a sensor node and assign footprints in KiCad or Altium.
Lab 8: Lay out and route the board, pass design rule checks and export Gerber files

2.5 | Prototyping, Testing & Hardware Debugging 18 hrs

Module / Topic

- Soldering and assembly, bring-up procedure, test planning, design for manufacture, bill of materials and sourcing

Practical Lab Sessions

Lab 9: Assemble and bring up a populated board against a written test plan.
Lab 10: Produce a bill of materials with sourcing options and unit cost at two volumes

Program Frameworks – Module 03: Data Analytics for IoT

120 hours · Telemetry pipelines, time-series analysis and edge AI · 10 practical lab sessions

3.1 | Telemetry Ingestion & MQTT Pipelines 24 hrs

Module / Topic	Practical Lab Sessions
• MQTT brokers, topics and quality of service, payload design, gateway buffering, ingestion at scale	**Lab 1:** Publish device telemetry over MQTT and subscribe from a processing service. **Lab 2:** Add buffering and quality-of-service handling for intermittent connectivity

3.2 | Time-Series Data Management 22 hrs

Module / Topic	Practical Lab Sessions
• Time-series databases, retention and downsampling, resampling and aggregation, handling gaps, duplicates and drift	**Lab 3:** Store a telemetry stream in a time-series database with a retention policy. **Lab 4:** Clean the stream — handle dropouts, duplicates and sensor drift

3.3 | IoT Data Analysis & Anomaly Detection 26 hrs

Module / Topic	Practical Lab Sessions
• Trend and seasonality, statistical process control, anomaly detection methods, threshold and alert design, dashboards	**Lab 5:** Detect anomalies in a sensor dataset and tune the alert threshold for precision. **Lab 6:** Build a live device monitoring dashboard from the telemetry store

3.4 | Machine Learning for Sensor Data 26 hrs

Module / Topic	Practical Lab Sessions
• Feature engineering from signals, classification and regression on sensor data, neural networks in TensorFlow, evaluation	**Lab 7:** Engineer features from raw signal data and train a classifier in TensorFlow. **Lab 8:** Build a predictive maintenance model and evaluate it against a held-out set

3.5 | Edge AI Deployment & Optimisation 22 hrs

Module / Topic	Practical Lab Sessions
• TensorFlow Lite conversion, quantisation and pruning, on-device inference, latency, memory and accuracy trade-offs	**Lab 9:** Convert and quantise a trained model to TensorFlow Lite for a constrained device. **Lab 10:** Deploy to the device and measure inference latency, memory use and accuracy loss

Program Frameworks – Module 04: IoT Solution Engineer

120 hours · Connectivity, cloud platforms and solution design · 10 practical lab sessions

4.1 | Wireless Connectivity — Wi-Fi & Bluetooth 24 hrs

Module / Topic

- Wi-Fi standards and provisioning, Bluetooth and BLE profiles, pairing and bonding, throughput and power trade-offs

Practical Lab Sessions

Lab 1: Provision a device over Wi-Fi and BLE; compare throughput and power draw.
Lab 2: Build a BLE service exposing sensor characteristics to a mobile client

4.2 | Long-Range Networks — LoRa & LoRaWAN 22 hrs

Module / Topic

- LoRa modulation, spreading factors and duty cycle, LoRaWAN classes and gateways, network servers, range planning

Practical Lab Sessions

Lab 3: Deploy a LoRa link between two nodes and measure range and packet loss.
Lab 4: Join a device to a LoRaWAN network server and route uplinks to an application

4.3 | IoT Cloud Platforms & Device Management 26 hrs

Module / Topic

- Device registry and provisioning, identity and certificates, over-the-air updates, cloud ingestion pipelines, rules engines

Practical Lab Sessions

Lab 5: Register and provision a device fleet on an IoT cloud platform.
Lab 6: Push an over-the-air firmware update and verify rollout across the fleet

4.4 | Digital Twins & Fleet Operations 22 hrs

Module / Topic

- Digital twin modelling, device shadows and state sync, fleet health monitoring, remote diagnostics, operational alerting

Practical Lab Sessions

Lab 7: Model a digital twin for a device class and keep it in sync with live state.
Lab 8: Build a fleet health view with remote diagnostics and operational alerts

4.5 | End-to-End Solution Design & Costing 26 hrs

Module / Topic

- Requirements capture, architecture selection, bill of materials, connectivity and cloud cost modelling, scalability and rollout planning

Practical Lab Sessions

Lab 9: Produce an end-to-end architecture and bill of materials for an industrial use case.
Lab 10: Cost the solution at pilot and fleet scale and present the trade-offs to a panel

Program Frameworks – Module 05: IoT Security Analyst

120 hours · Threat modelling, hardening and device penetration testing · 10 practical lab sessions

5.1 | IoT Threat Landscape & OWASP IoT Top 10 22 hrs

Module / Topic	Practical Lab Sessions
• Device, network and cloud attack surfaces, OWASP IoT Top 10, threat modelling for connected products, supply chain risk	**Lab 1:** Build a threat model for a connected product against the OWASP IoT Top 10. **Lab 2:** Enumerate and document the full attack surface of a lab device

5.2 | Device & Firmware Hardening 26 hrs

Module / Topic	Practical Lab Sessions
• Secure boot and firmware signing, credential and key storage, disabling debug interfaces, physical tamper resistance	**Lab 3:** Harden a device — secure credentials, close debug ports and sign the firmware. **Lab 4:** Extract and analyse a firmware image, then remediate the weaknesses found

5.3 | Secure Communications & Key Management 24 hrs

Module / Topic	Practical Lab Sessions
• Transport encryption, certificate issuance and rotation, mutual authentication, key provisioning at manufacture	**Lab 5:** Configure encrypted transport with mutual certificate authentication. **Lab 6:** Attempt interception against the hardened link and document the result

5.4 | Penetration Testing for IoT Devices 26 hrs

Module / Topic	Practical Lab Sessions
• Rules of engagement, hardware interface probing, radio and protocol analysis, exploitation, reporting and remediation advice	**Lab 7:** Assess a lab device end to end and exploit an identified weakness under agreed rules. **Lab 8:** Write a device penetration test report with findings, evidence and remediation

5.5 | Monitoring, Incident Response & Compliance 22 hrs

Module / Topic	Practical Lab Sessions
• Fleet telemetry for security, anomaly and tamper detection, incident response for device estates, regulatory obligations	**Lab 9:** Build detection rules for anomalous device behaviour and test them against attacks. **Lab 10:** Run a tabletop incident response exercise for a compromised device fleet

Program Frameworks – Module 06: Embedded & Full Stack IoT

120 hours · Firmware, RTOS, full stack delivery and capstone · 8 lab sessions and a panel-assessed capstone

6.1 | Embedded C & Firmware Development 26 hrs

Module / Topic

- Embedded C fundamentals, peripheral drivers, state machines, memory constraints, debugging, flashing and version control

Practical Lab Sessions

Lab 1: Write firmware implementing a state machine over sensor and actuator peripherals.
Lab 2: Debug a faulty firmware build using a hardware debugger and fix the defect

6.2 | RTOS & Power Management 22 hrs

Module / Topic

- Real-time operating system concepts, tasks and scheduling, queues and semaphores, sleep modes, battery life budgeting

Practical Lab Sessions

Lab 3: Port the firmware onto an RTOS with separate sensing and communication tasks.
Lab 4: Add low-power sleep modes and measure the resulting battery life improvement

6.3 | Backend Services & Device APIs 24 hrs

Module / Topic

- API design for device data, database schema, authentication and access control, deployment and scaling

Practical Lab Sessions

Lab 5: Build a backend API that receives, stores and serves device telemetry.
Lab 6: Add authentication and role-based access control, then deploy the service

6.4 | Front-End Dashboards & Visualisation 20 hrs

Module / Topic

- Dashboard architecture, live data updates, chart selection for telemetry, device control interfaces, usability

Practical Lab Sessions

Lab 7: Build a web dashboard with live device views and historical charts.
Lab 8: Add a device control interface with confirmation and audit logging

6.5 | Capstone: End-to-End AIoT Solution 28 hrs

Module / Topic

- Design, build, secure, deploy and present a complete AIoT solution

Capstone Lab: Full project

Design and build a sensor device on custom or prototype hardware, run an edge AI model on it, connect it over a chosen wireless protocol, harden it against the OWASP IoT Top 10, deliver a live dashboard and device API, document the architecture, test plan and bill of materials, and present to panel

Track 5 Toolkit – Core Tools & Technologies

Students graduate fluent across the AIoT stack — from bench instruments and PCB design to edge AI, wireless connectivity and full stack delivery.

Category	Tools / Platforms
Hardware & Prototyping	Arduino · Microcontrollers
Design & Instrumentation	PCB Design (Altium / KiCad) · Oscilloscopes
Software & AI	Python · TensorFlow
Connectivity	Wi-Fi · Bluetooth · LoRa

Where Each Tool Is Taught

Module	Tools Introduced	Sub-Modules
01 — Foundation of AIoT	Python, MicroPython, sensors and actuators	1.2 Python for Embedded & IoT; 1.3 Sensors & Signals; 1.4 Electronics Fundamentals; 1.5 Networking Basics
02 — IoT Hardware Analyst	Microcontrollers, Arduino, Oscilloscopes, Altium / KiCad	2.1 Microcontroller Programming; 2.2 Arduino Development; 2.3 Oscilloscope Measurement; 2.4 PCB Design; 2.5 Prototyping & Testing
03 — Data Analytics for IoT	MQTT, time-series databases, TensorFlow, TensorFlow Lite	3.1 MQTT Pipelines; 3.2 Time-Series Management; 3.4 ML for Sensor Data; 3.5 Edge AI Deployment
04 — IoT Solution Engineer	Wi-Fi, Bluetooth / BLE, LoRa & LoRaWAN, IoT cloud platforms	4.1 Wi-Fi & Bluetooth; 4.2 LoRa & LoRaWAN; 4.3 Cloud Platforms; 4.4 Digital Twins
05 — IoT Security Analyst	OWASP IoT Top 10, firmware signing, certificates, protocol analysis	5.1 Threat Landscape; 5.2 Firmware Hardening; 5.3 Secure Communications; 5.4 Device Penetration Testing
06 — Embedded & Full Stack IoT	Embedded C, RTOS, Python, web stack	6.1 Embedded Firmware; 6.2 RTOS & Power; 6.3 Device APIs; 6.4 Dashboards; 6.5 Capstone

Lab Environments

This track combines a physical hardware bench with cloud lab access. Learners receive a device kit containing an Arduino-compatible microcontroller, sensor and actuator modules and wireless radios, and work with bench oscilloscopes, logic analysers, hardware debuggers and soldering stations in the EduBlends lab. PCB design, IoT cloud platform and edge AI exercises run in licensed cloud environments, and offensive security work in Module 05 is delivered on isolated device ranges under defined rules of engagement.

Program Experience

AIoT Foundations

Architecture · Python · Sensors · Electronics

Hardware Engineering

Arduino · Oscilloscopes · PCB Design

IoT Data & Edge AI

MQTT · Time Series · TensorFlow Lite

Connectivity

Wi-Fi · Bluetooth · LoRa · Digital Twins

IoT Security

OWASP IoT · Firmware · Pen Testing

Embedded & Full Stack

Embedded C · RTOS · APIs · Dashboards

The Junior Engineer – AIoT track spans six 120-hour modules, delivered through 58 structured lab sessions and a panel-assessed capstone project. Learners progress from AIoT architecture, Python, sensors and electronics in Module 01, through microcontroller programming, circuit measurement and PCB design in Module 02, MQTT telemetry, time-series analysis and edge AI in Module 03, wireless connectivity, cloud device management and digital twins in Module 04, device hardening and penetration testing in Module 05, and embedded firmware, RTOS and full stack delivery in Module 06. Every topic is reinforced on real hardware and live telemetry that mirror industry workflows, so that graduates leave with a working, secured and documented AIoT solution.

Expected outcomes

Advanced Industrial Internship Certifications

Differentiate yourself from your peers by earning the industrially recognized Advanced industrial internship Certification

Students Blending Team

EduBlends blends the students for the industry-ready

For the Industrial, By the Industry

Learn and apply concepts on industry projects from industry, along with personalized industry mentorship

Industry Integration Layer

This program is designed with integrated industry collaboration, where enterprise partners contribute to curriculum alignment, real-world problem statements, and internship pathways.

Hardware Lab & Cloud Facilities

Device kits, bench instruments, hardware debuggers and IoT cloud sandboxes for real industrial problems

360 Degree Career Support — Entrepreneurial Program

Idea-to-Enterprise Catalyst by EduBlends Academy is a structured entrepreneurial program that guides innovators from ideation to execution, helping them build and scale tech-driven businesses such as connected devices, industrial IoT platforms and SaaS solutions.

Personalized Mentorship

Get unparalleled personalized mentorship and doubt resolution from industrialists and academicians.

Sample Weekly Program Planner

4–5 hours	Live interaction with the programme learning facilitator
1–2 hours	Recorded video lecture with faculty
1 hour	Group discussion with industrial mentor and academic instructor
4–5 hours	Hardware bench and cloud lab practice exercises
2 hours	Rigorous, graded assignments to apply and reinforce the material
12–15 hours	**Total weekly effort**

At this weekly commitment, each 120-hour module takes approximately 8 to 10 weeks. The full six-module track runs approximately 48 to 60 weeks.

Who Is This Program For?

Career Launchers	Modules 01 and 02 are designed for students and early-career professionals with no prior programming or electronics background who want a structured, hands-on entry into connected hardware and AIoT.
Career Builders	Modules 03 and 04 suit electronics, instrumentation and IT support staff who already work with devices and want to move into telemetry analysis, edge AI and end-to-end solution engineering.
Career Switchers	Module 05 serves mid-career professionals working outside security who want credible, hands-on device hardening and penetration testing capability before making a career change.
Specialists & Founders	Module 06 is for learners who have completed the earlier modules, or who bring equivalent applied IoT experience, and want to move into embedded and full stack delivery — or to build a connected-device venture through the entrepreneurial programme.

Progressive Learning Pathway: Our curriculum is structured to provide a seamless learning experience, starting from AIoT foundations and hardware fundamentals through to edge AI, device security and full stack delivery. Each 120-hour module is a complete programme in its own right.

- **Modules 01 and 02 — Foundation of AIoT and IoT Hardware Analyst** for 2nd-year graduate students, providing the systems view, Python, electronics and hardware skills to begin the journey
- **Modules 03 and 04 — Data Analytics for IoT and IoT Solution Engineer** for 3rd-year students who have completed the foundations, and for individuals looking to upskill into telemetry, edge AI and solution engineering
- **Modules 05 and 06 — IoT Security Analyst and Embedded & Full Stack IoT** for students who have finished the earlier modules, and experienced individuals transitioning into specialist roles or entrepreneurship

Programs Key Features

Why Choose Our Courses?

Hardware Bench and Cloud Lab: Gain hands-on experience with a physical device kit, bench oscilloscopes, logic analysers and hardware debuggers, alongside licensed PCB design and IoT cloud platform environments for real, industry-level projects.

Industrial Internships & Expert Mentorship: Work on live industry projects, receive guidance from practising engineers, and get the support you need for your career or entrepreneurial journey.

Personalized Instructor Support: Learn from experienced instructors committed to your growth, whether you're wiring your first sensor in Module 01 or shipping a secured AIoT device in the capstone.

	Cloud Lab Access	Industry-Integrated Internship	Live Mentorship by Industry Experts	Entrepreneurship Support
Coursera				
Udemy				
UpGrad Online				
Scaler Academy				
Simplilearn				
Unacademy				
EduBlends Academy	✓	✓	✓	✓

Comparison rows left intentionally blank pending verification. Competitor feature claims must be sourced, dated and evidenced before publication.