UrbanScholar

PROGRAM BROCHURE

CAREER TRACK · EMBEDDED SYSTEMS

EMBEDDED SYSTEMS



A register-level embedded systems track — microcontrollers, RTOS, and interfacing — for learners who want to write firmware, not just wire a breadboard.

10–12	7	6	2
WEEKS	MODULES	CAPSTONES	PROGRAM TRACKS

TWO TRACKS · KICKSTART & CAREER

Program Overview

How this track builds real firmware & hardware-interfacing skills

Down to the register, not just the library. This track goes past Arduino-style abstractions into how microcontrollers actually work — registers, interrupts, timing — the depth that separates a hobbyist from an embedded engineer.

Built-in mentorship. Each module closes with a mentor-reviewed checkpoint, so gaps get caught early instead of at the final capstone.

Career layer, not an afterthought. Resume positioning, interview readiness, and aptitude prep run alongside the technical modules — not bolted on in the last week.

Who This Is For

- Students & freshers targeting embedded/ firmware roles
- Electronics engineers wanting structured firmware skills
- Anyone comfortable with C programming basics

What You'll Walk Away With

- 6 working embedded systems projects for your portfolio
- Working fluency in embedded C, RTOS & hardware interfacing
- A recruiter-ready resume built around real firmware work

Program Snapshot

18+ Hrs Live Instructor-Led Sessions

6 Working Embedded Projects

7 Structured Learning Modules

Training + Internship Certificate

Mentor-Reviewed Project Checkpoints

Placement & Interview Support

Learning Path

7 modules, sequenced from foundations to deployment

1 · Embedded Systems Fundamentals

- Microcontroller vs. microprocessor, clearly explained
- Embedded system architecture basics
- An introduction to real-time systems

2 · Digital Electronics Basics

- Logic gates & number systems
- Basic circuit analysis for firmware engineers
- Reading a datasheet without fear

3 · Microcontroller Programming

- Embedded C, written properly
- Register-level programming
- Memory-mapped I/O, explained practically

4 · Peripherals & Interfacing

- GPIO, ADC/DAC & timers
- PWM for motor & LED control
- UART/SPI/I2C communication protocols

5 · RTOS Concepts

- Tasks & scheduling, explained clearly
- Interrupts done right
- FreeRTOS fundamentals, hands-on

6 · PCB & Hardware Design Basics

- Schematic design, a first pass
- Going from breadboard to PCB
- A working overview of KiCad

7 · Debugging & Testing

- Using oscilloscopes & logic analyzers
- Debugging embedded code systematically
- Testing strategies for hardware-in-the-loop

Tools and Softwares You Can Work With

EC **Embedded C**

SA **STM32 / AVR**

FR **FreeRTOS**

KC **KiCad**

Os **Oscilloscope**

LA **Logic Analyzer**

Capstone Projects

Six builds that turn coursework into a portfolio — 1 of 2

1 · Automated Traffic Light Controller

A timer-based traffic signal system with sensor override for real traffic conditions.

SOFTWARE USED

Mi Microcontroller | EC embedded C

- Implement timed state transitions
- Add sensor-based override logic
- Handle edge cases (pedestrian crossing, etc.)

2 · Digital Thermometer with Display

A sensor-driven temperature reader with a live LCD display.

SOFTWARE USED

Mi Microcontroller | TS temp sensor | LCD LCD

- Read & calibrate a temperature sensor
- Drive an LCD display reliably
- Handle sensor noise & edge readings

3 · RFID-Based Access Control System

A card-based door lock or attendance system built from scratch.

SOFTWARE USED

Mi Microcontroller | RM RFID module

- Read & validate RFID card data
- Control a lock/relay on valid access
- Log access events with timestamps

Capstone Projects

Six builds that turn coursework into a portfolio — 2 of 2

4 · Motor Speed Control System

A PWM-based DC motor speed controller with closed-loop feedback.

SOFTWARE USED

Mi Microcontroller | MD motor driver | PWM PWM

- Generate PWM signals for speed control
- Add feedback for closed-loop control
- Tune for stable, responsive control

5 · Embedded Data Logger

Log sensor data to onboard memory with timestamped retrieval.

SOFTWARE USED

Mi Microcontroller | SC SD card module | RTC RTC

- Log sensor readings with real timestamps
- Store data reliably to onboard memory
- Build a simple retrieval/export method

6 · Home Security Alarm System

A motion/door-sensor triggered alert system with buzzer and notification.

SOFTWARE USED

Mi Microcontroller | PD PIR/door sensors

- Detect motion/door-open events reliably
- Trigger a local alarm immediately
- Send a remote notification on trigger

A Day in the Role

What an Embedded Engineer's Day Actually Looks Like

- Write & test firmware against hardware
- Debug timing & interrupt-related bugs
- Interface new sensors/peripherals
- Use an oscilloscope to verify signal behavior
- Optimize code for memory & power constraints
- Collaborate with hardware engineers on PCB revisions

The throughline: every capstone in this brochure is a smaller version of one of these responsibilities — so the portfolio you leave with maps directly to the job you're training for.

Career Outlook

Where an embedded systems skill-set actually leads

Embedded engineers are in structural demand across automotive, consumer electronics, industrial automation, and medical devices — hardware never stopped needing firmware.

Role	What They Do	Salary Range (Fresher / Experienced)
Embedded Software Engineer	Writes firmware for microcontroller-based systems	₹4–8 LPA / ₹10–20 LPA
Firmware Engineer	Develops & debugs low-level device firmware	₹5–9 LPA / ₹12–22 LPA
Hardware-Software Integration Engineer	Bridges hardware design & firmware	₹5–9 LPA / ₹12–22 LPA
RTOS/Systems Engineer	Builds real-time systems for critical devices	₹6–10 LPA / ₹14–24 LPA
Test & Validation Engineer	Validates embedded systems against specs	₹4–7 LPA / ₹9–18 LPA
Automotive Embedded Engineer	Builds firmware for automotive ECUs	₹6–10 LPA / ₹14–24 LPA

Indicative ranges from general India market trends — validate against current job-board data before publishing.

Companies Actively Hiring in This Space

Bo Bosch · Qu Qualcomm · TI Texas Instruments · LT L&T · Co Continental · Wi Wipro

Representative employers in this space — not confirmed UrbanScholar hiring partners.

Program Tracks

Two tracks, same curriculum depth — the difference is placement intensity

KICKSTART

- 14+ hrs live cohort + recorded lectures
- 2 guided projects
- 6 months LMS access
- QR-verified completion certificate
- Mentor support — SLA ≤ 48 hrs
- Resume building workshop
- Mock aptitude test
- Pre-placement orientation session

CAREER

- 20+ hrs live cohort + recorded lectures
- 2 projects + capstone (Minor + Major)
- 6 months LMS access, extendable till placed
- QR-verified + Industry-Readiness certification
- Priority mentor support — SLA ≤ 24 hrs
- Resume + LinkedIn profile building
- 1-on-1 mock interviews with feedback
- Active placement & referral assistance

Common to Both Tracks

All 7 Curriculum Modules

All 6 Capstone Projects

Mentor-Reviewed Checkpoints

Training + Internship Certificate

Where UrbanScholar Embedded Systems Learners Can Head

Automotive & EV Companies

Consumer Electronics

Industrial Automation

Medical Device Companies

Freelance / Independent Consulting

Placement Journey

How career support is woven through the program, not tacked on at the end

1

Build Foundation

Resume & LinkedIn built around real project outcomes, not generic templates.

2

Sharpen Aptitude

Structured aptitude & reasoning practice aligned to actual hiring-test formats.

3

Practice Interviews

Mock interviews with direct, specific feedback — not just a pass/fail score.

4

Get Placement Ready

Soft-skill coaching and, on the Career track, active referral support.

Why this order matters: most programs bolt placement prep onto the last week. Here it runs in parallel with the technical modules, so by the time your capstones are done, your resume and interview readiness are already in place — not started from scratch.

Quick Questions

Do I need prior background to start?

Some familiarity helps, but the early modules — starting with Embedded Systems Fundamentals — rebuild the fundamentals from the ground up.

What happens if I fall behind a session?

Every live session is recorded, and mentor SLA windows exist specifically to help you catch up between checkpoints.

Can I switch tracks mid-program?

Yes — Kickstart learners can upgrade to Career at any point by paying the difference, carrying forward completed modules.

Is the certificate recognized by employers?

It's a QR-verified training + internship certificate — employers can verify authenticity directly, not just take it on faith.

UrbanScholar

Industry-Trained. Project-Proven. Career-Ready.

Get In Touch

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PROGRAM

Embedded Systems — Kickstart & Career Tracks