IIT MADRAS × PHN TECHNOLOGY

PROFESSIONAL CERTIFICATION PROGRAM

EDGE AI ML And IoT System

From Raw Sensor Data to Deployed Intelligence on Real Hardware.

The only IIT-led Edge AI program that bridges theory and industry-grade deployment — live, hands-on, and hardware-first.

60 Hours	16 Sessions	4 Months	100	₹60,000
Live Instruction	*Weekends Only*	*Duration*	*Max Cohort Size*	*Program Fee*

Faculty / Coordinator

Prof. Babji Srinivasan
| AI & Cyber-Physical Systems Expert |
| Translational Research Strategist |
Professor — Department of AM & BE, IIT Madras
Director — ParvAI Labs Pvt Ltd

***15+** Years of Academic & Research Experience in IITs*

150+ Publications · ₹250M+ Research Funding · 2300+ Citations (H-index: 27)
| Co-Head — FedEx SMART |
| Co-PI — Sports Science & Analytics |

· Columbia University · Texas Tech University ·
· Indian Institute of Technology Madras ·
· Anna University ·

Faculty / Facilitator

Dr. Ramji Srinivasan
| AI Strategist | Deep Tech Specialist |
| Enterprise AI Consultant |
Adjunct Professor & Senior Consultant — IIT Madras
Director — Bit2Qubit Technologies (UK) | PlayuNxt Tech Pvt. Ltd
Scientific Advisor — ParvAI Labs | Sonolight Imaging

***23+** Years Leading Scalable AI Systems, Product Innovation & Real-World Deployments*

Innovation lead with 20+ Global Patents & Filings
Former AI Lead — Qualcomm (UK)
Former Lead Researcher — Cambridge Silicon Radio (UK)
Former Scientist — NIOT (India)

· Queen's University Belfast ·
· Indian Institute of Technology Madras ·
· Anna University ·

COHORT 1 - June 5, 2026 · ENROLLMENT CLOSES - May 31, 2026

01 ABOUT THE PROGRAM

India has hundreds of thousands of ML engineers. Very few can deploy a model to real hardware. That gap — between knowing theory and building systems that work — is what this program exists to close.

PROGRAM VISION

This is not a course that teaches you to follow tutorials. It is built around the belief that genuine engineering skill comes from understanding systems deeply — the mathematics behind models, the physics of sensor data, the constraints of edge hardware, and the rigour of professional deployment. Every session connects theory to practice. Every practical build toward a portfolio artifact that speaks for itself.

WHY NOW — MARKET DEMAND

THE INDUSTRY SIGNAL

Edge AI roles — Embedded ML Developer, TinyML Engineer, Edge AI Systems Engineer — are among the fastest-growing specializations in the technology hiring market. Companies including NVIDIA, Qualcomm, Bosch, Google, Intel, and India's fastest-growing IoT startups are actively building edge inference capabilities into their products.

What they cannot find: engineers who understand the complete pipeline. Not just model training. The full loop — sensor sampling, data engineering, quantization, on-device inference, latency optimization, and real-world robustness.

SALARY BENCHMARKS

Edge AI Engineer: ₹12–22 LPA

Embedded ML Developer: ₹14–28 LPA

ML Systems Engineer: ₹15–30 LPA

TARGET COMPANIES HIRING

NVIDIA · Qualcomm · Google · Intel · Bosch · Tesla · Edge Impulse · Siemens · Tata Elxsi · L&T Technology · Indian IoT Startups

CAREER TRAJECTORY

Students completing this program are positioned to move from ₹6–8 LPA service roles to ₹14–22 LPA product-company positions within 12 months of placement.

THE MARKET GAP THIS PROGRAM FILLS

- **Self-paced courses**: global content, but no real hardware, no deployment, minimal interaction
- **Premium EdTech**: trainer-led, surface-level ML, demo-grade projects, large cohorts
- **Government MOOCs**: strong theory, but no edge deployment, no sensor pipeline, no portfolio outcome

None teach the full sensor-to-deployment pipeline.
None provide real hardware practical.

PROGRAM HIGHLIGHTS

Live	2 + 1	Real H/W	IIT Madras
Instructor-led — not pre-recorded	*Theory + Practical per session*	*Live remote access to real-time practice and deployment*	*IIT Madras faculty certificate*

02 FACULTY — YOUR INSTRUCTORS

Your instructors don't just teach AI—they build, deploy, and publish it.
Bringing together IIT Madras research excellence and global industry experience, they deliver AI that works in the real world.

FACULTY / COORDINATOR

Prof. Babji Srinivasan

Professor, Department of Applied Mechanics and Biomedical Engineering
Indian Institute of Technology Madras

ACADEMIC CREDENTIALS

Prof. Babji Srinivasan is a **Professor** at Indian Institute of Technology Madras, with prior academic experience at Indian Institute of Technology Gandhinagar and international research experience at Columbia University, New York. His work spans machine learning, control systems, and cyber-physical systems, with a strong focus on real-world data and deployment.

HIGHLIGHTS

150+	₹250M+	CoE – SS&A, FedEx SMART	Sports Analytics
Research Papers in Top-Tier Journals	*Research Funding Secured*	*Leading Applied Research & Industry Collaboration*	*Advisor in High Performance Systems*

- Co-Head at FedEx Smart Center for supply chain Modeling, Algorithm, Research and Technology, Indian Institute of Technology Madras. Co- Principal Investigator at the Center for Excellence in Sports Science and Analytics Indian Institute of Technology Madras
- Secured ₹250M+ in competitive research funding across industry and government, enabling large-scale real-world deployments.
- Active industry and government collaboration with FedEx, Defence Research and Development Organisation (CVRDE, NPOL), MoE, SAI, SERB, DAE, Pfizer, and many startups, delivering deployed AI systems across logistics, defense, healthcare, sports, and industrial domains.
- Combines deep academic rigor with real-world system deployments, enabling a clear understanding of both mathematical principles and engineering trade-offs.

WHY LEARN FROM PROF. BABJI?

Prof. Babji teaches Edge AI through real-world deployments, bringing practical insight into how AI systems operate under real constraints. His approach combines machine learning, control systems, and cyber-physical systems with strong mathematical grounding to enable the development of end-to-end, deployable solutions.

FACULTY / FACILITATOR

Dr. Ramji Srinivasan

Adjunct Professor | Senior Consultant, IIT Madras
Facilitator/Instructor, IITM Pravartak | Jaro Education | FedEx Smart Center and IITM CODE
Co-founder & Director, Bit2Qubit Technologies Ltd | PlayuNxt Tech Private Limited
Scientific Advisor | Lead AI Consultant, ParvAI Labs | Sonolight Imaging Innovations Pvt Ltd

INDUSTRY & ACADEMIC CREDENTIALS

Dr. Ramji Srinivasan is an **AI Strategist and Deep Tech Specialist** with over 23+ years of global experience spanning industry, research, and academia. He has led the development of production-grade AI systems for embedded platforms, including wearables and audio technologies, delivering machine learning solutions under real-world constraints. At present, he focuses on bridging cutting-edge AI research with scalable, real-world deployments, driving innovation across domains such as healthcare, logistics, and intelligent systems in collaboration with startups and enterprise partners.

HIGHLIGHTS

23+ Years	**20+**	**Startup & Product Impact**	**Strategic Advisor**
Deep Tech & AI Leadership	*Global Patents & Filings*	*Ventures & real-world deployments*	*Enterprises & deep-tech startups*

- Drives AI innovation from research to real-world impact, delivering systems that perform reliably under complex, constrained environments.
- Architects scalable, production-grade AI solutions, bridging embedded intelligence, signal processing, and wearable platforms.
- Transforms cutting-edge AI into tangible business and technology outcomes, enabling startups and enterprises to deploy actionable, high-value solutions.
- Combines technical rigor with deployment experience, offering a strategic perspective on what truly works at scale in applied AI systems.

WHY LEARN FROM DR. RAMJI?

Dr. Ramji Srinivasan bridges cutting-edge AI research with real-world deployment, teaching how AI systems succeed under real constraints. Learners gain hands-on expertise in embedded AI, on-device machine learning, and scalable intelligent systems for deployment - ready applications.

This program uniquely combines academic depth from the faculty of the Indian Institute of Technology Madras with extensive industry experience — a combination rarely found in a single course.

03 WHAT YOU WILL BUILD — A GLIMPSE

Throughout the program, you will build a complete end-to-end edge AI system — progressing from raw sensor data to real-time intelligence on embedded hardware.

- Collect real-world data from onboard sensors such as temperature, motion, and audio.
- Clean, segment, and transform raw signals into meaningful features using signal processing techniques.
- Design and train machine learning models suited for edge applications (classification, anomaly detection).
- Evaluate model performance using metrics such as accuracy, precision–recall, and F1-score.
- Optimize models through quantization and compression for deployment on memory-constrained devices.
- Convert trained models into efficient embedded formats (TensorFlow Lite / C libraries).
- Deploy and integrate models with microcontroller firmware.
- Implement real-time inference pipelines directly on the device.
- Design decision logic (thresholding, smoothing) for stable real-world performance.
- Interface the system with external components for monitoring and interaction.

By the end of the program, you will have built, deployed, and validated a complete edge AI system running on real hardware.

04 CURRICULUM STRUCTURE

The program consists of 16 sessions delivered across 4 months.

Each 3-hour session follows a structured 2+1 format, with 2 hours of instructor-led theory with engineering depth and 1 hour of guided practical implementation. Every session builds on the previous one.

TOOLS & TECHNOLOGIES COVERED

- **Python ecosystem** — NumPy, Pandas, Scikit-learn, and TensorFlow Lite — used for data processing, model development, and deployment workflows
- **Development platforms** — Arduino IDE, Edge Impulse, and exposure to NRF Edge AI toolchains for end-to-end TinyML pipeline implementation across platforms
- **Embedded systems programming** — integration of trained models into microcontroller firmware using Embedded C / Arduino sketches for real-time inference
- **Hardware** — hands-on work with the Seeed XIAO BLE Sense (nRF52840), Arduino UNO, along with exposure to resource-constrained microcontroller environments
- **Systems exposure** — introduction to ROS (Robot Operating System), serial communication, and interfacing TinyML devices with ROS.
- **Version control & portfolio** — Git and GitHub for structured project documentation and professional portfolio development
- **Advanced workflows** — quantization pipelines (float32 → int8), signal processing techniques, and latency/memory optimization for production-grade edge AI systems

MODULE 01–02 **ML FOUNDATIONS FOR EDGE APPLICATIONS**

Sessions 1–2 · 6 Hours

The mathematical and conceptual backbone that every session builds from

- ✓ **Core ML concepts:** supervised learning, loss functions, overfitting, and model evaluation — introduced from an embedded AI perspective
- ✓ **Why models fail on devices:** understanding memory, latency, and power constraints that govern real-world performance, and how these constraints influence model design choices
- ✓ **Introduction to the Seeed XIAO BLE Sense and Arduino UNO:** architecture, onboard sensors, and its role as a deployment platform for TinyML systems
- ✓ **Practical:** environment setup, toolchain familiarization, and initial data capture from onboard sensors for building a real-world dataset

MODULE 03–05 **SENSOR DATA ENGINEERING**

Sessions 3–5 · 9 Hours ·

The pipeline most courses skip entirely — and the one interviewer ask about most

- ✓ **Sensor physics:** accelerometers, microphones, and temperature sensors — how they work, what their signals represent, and how physical phenomena translate into digital data
- ✓ **Signal sampling:** aliasing, Nyquist theorem, and anti-aliasing filters — why incorrect sampling invalidates downstream model performance on embedded systems
- ✓ **Real-world data challenges:** noise characterization, calibration drift, and data quality — handling imperfect signals beyond curated datasets
- ✓ **Feature engineering:** time-domain (mean, RMS, zero-crossing) vs. spectral (FFT, MFCC) — selecting representations based on signal characteristics and computational constraints
- ✓ **Data pipeline design:** windowing strategies, labeling approaches, and building a training-grade dataset from raw sensor capture for reliable edge deployment
- ✓ **Exposure to constrained TinyML environments:** understanding how data representation and feature extraction must adapt for microcontrollers with limited memory and compute

MODULE 06–09

MODEL TRAINING FOR EDGE DEPLOYMENT

Sessions 6–9 · 12 Hours ·

Training models with deployment constraints in mind from day one

- ✓ **Core paradigms:** classification, regression, and anomaly detection — selected and contextualized for edge-relevant use cases
- ✓ **Edge-aware model selection:** balancing accuracy, memory footprint, latency, and power — an engineering decision framework for constrained devices
- ✓ **Training workflows:** using platforms such as Edge Impulse and exposure to alternative TinyML pipelines, including DSP blocks, feature extraction, and end-to-end configuration
- ✓ **Model evaluation:** confusion matrices, precision–recall, and F1-score — interpreted in the context of real-world deployment constraints and failure modes
- ✓ **Practical:** train and validate a classification model using XIAO BLE sensor data, with cross-validation, performance analysis, and deployment readiness considerations

MODULE 10–12

EDGE DEPLOYMENT & OPTIMISATION

Sessions 10–12 · 9 Hours ·

Where most ML engineers fail — and where this program goes deepest

- ✓ **Model compression:** pruning, quantization (float32 → int8), and knowledge distillation — understanding the trade-offs between accuracy, memory footprint, and computational efficiency
- ✓ **Deployment workflows:** TensorFlow Lite for Microcontrollers, model conversion, and microcontroller-specific optimization for constrained hardware environments
- ✓ **On-device inference:** implementing efficient inference loops, latency measurement, memory profiling, and power-aware execution on embedded devices
- ✓ **Decision policies:** confidence thresholding, output smoothing, and majority voting — designing stable and reliable inference behavior under noisy real-world conditions
- ✓ **Robustness in production:** handling domain shift, dataset drift, and real-world variability through testing strategies, validation pipelines, and iterative refinement

MODULE 13–15 INTEGRATION & SYSTEMS THINKING

Sessions 13–15 · 9 Hours ·

Connecting edge inference to real systems — the final engineering mile

- ✓ **Serial communication:** transmitting inference outputs from the device to external systems for monitoring, logging, and control
- ✓ **Systems integration:** interfacing edge AI devices with host systems, robotics frameworks (ROS), and external applications for real-time decision workflows
- ✓ **Introduction to ROS (Robot Operating System):** subscribing to inference outputs and integrating edge intelligence within a robotics or automation pipeline
- ✓ **Use-case exploration:** industrial and consumer applications — predictive maintenance, wearables, smart sensors, and interactive edge systems
- ✓ **Capstone sprint:** integrate, deploy, and validate the trained model on the Seeed XIAO BLE / Arduino UNO, including real-time inference, system interaction, and performance measurement

MODULE 16 CAPSTONE PRESENTATION & PORTFOLIO COMPLETION

Session 16 · 3 Hours ·

The session that produces what matters most — your portfolio artifact.

- ✓ **Live capstone demonstration:** a fully functional edge AI system running on the Seeed XIAO BLE / Arduino UNO — presented and validated in front of peers and faculty
- ✓ **Documentation and engineering review:** complete pipeline write-up, performance metrics, and key design decisions — structured for GitHub and technical evaluation
- ✓ **Interview preparation:** presenting and defending your system in a technical interview, including typical questions on design choices, trade-offs, and failure scenarios
- ✓ **Expert feedback:** detailed, actionable, and engineering-grade input on system design, performance, and deployment

CAPSTONE DELIVERABLE

Every student who completes Cohort 1 leaves with:

- A fully functional edge AI system running on Edge devices — demonstrating real-time, on-device machine learning
- A complete, documented pipeline on GitHub: data collection → preprocessing → model training → deployment → performance analysis
- A performance report covering accuracy, latency, and memory footprint — aligned with real-world evaluation criteria
- A structured presentation walkthrough — refined and ready for technical interviews, including design decisions and trade-offs
- An IIT Madras faculty programme certificate

It is a system you designed, built, and deployed.

05 LEARNING EXPERIENCE

This program is structured around one belief: engineers learn by building things that break and fixing them. Every session creates that opportunity — with faculty who have broken and fixed real systems.

PEDAGOGY — THE 2 + 1 FORMAT

THEORY BLOCK (2 HOURS)	PRACTICAL BLOCK (1 HOUR)
• Every session begins with deep, instructor-led learning. Prof. Babji and Dr. Ramji go beyond concepts to explain *why the mathematics works, how it translates to real-world systems, and where conventional approaches break down in practice.* • This is a highly interactive environment. Students are encouraged to question, challenge, and think critically — not just follow steps, but understand the reasoning behind them. This is what sets the program apart from standard tutorials.	• Each session concludes with a hands-on practical on real hardware — Seeed XIAO BLE Sense / Arduino UNO — working with live sensor data, real models, and real-world constraints. • IITM Team actively mentor during these sessions — debugging, guiding, and pushing students forward. This is live engineering support, not auto-graded exercises. • Every practical is tightly integrated with the session's theory. By Session 16, these build into a complete, end-to-end capstone system.

MENTORSHIP & SUPPORT

Live Q&A	Peer Cohort	Community Access	Session Recordings
Every session includes open Q&A. No question is deferred to a forum.	Maximum 100 students. You get to know your peers. Accountability is built in.	Private social media grouping (WhatsApp) — active throughout the 4 months.	All sessions recorded for review.

LIVE CASE STUDIES

This program uses real-world case studies drawn from faculty research and industry experience — not hypothetical examples. Case studies include:

- **Weather prediction on Tiny ML systems:** Building a real-time weather classification system using temperature and humidity data from DHT11 sensors, deployed on an 8-bit microcontroller with just 2 KB RAM using a compressed Decision Tree model
- **Non-voice audio classification on edge devices:** Classifying environmental sounds (e.g., faucet vs. noise) using a 1-D CNN model running on microcontrollers with on-board PDM microphones, including feature extraction and real-time inference under strict resource constraints

NETWORKING

Cohort 1 students enter a permanent network that grows with every cohort. Alumni of this program share a rare credential — IIT Madras faculty certification in a specialization that most of the market has not yet reached. The cohort WhatsApp and alumni group remain active after the program ends.

06 CAREER OUTCOMES

A certificate shows you completed something. A working edge AI demo shows you can do something. Employers in product companies have seen thousands of the former and are still looking for the latter.

ROLES YOU ARE POSITIONED FOR

ROLE	SALARY RANGE
Edge AI Engineer	₹12–22 LPA
Embedded ML Developer	₹14–28 LPA
ML Systems Engineer	₹15–30 LPA
IoT AI Specialist	₹10–20 LPA
Robotics AI Engineer	₹12–24 LPA
Industrial AI Developer	₹10–18 LPA

CAREER IMPACT — THE TRANSFORMATION

₹6–8 LPA
Typical pre-program salary (service company roles)

→ **Career Trajectory**

₹14–22 LPA
12-month target post-placement (product company roles)

3X
Average interview differentiation score*

*Based on feedback from hiring managers at product companies: candidates with a deployed edge AI demo score 3× higher in technical screening relative to candidates with equivalent certificates but no portfolio artifact.

07 PROGRAM HIGHLIGHTS & KEY DIFFERENTIATORS

Features	Self-Paced Online Courses	Premium EdTech Platforms	Government MOOC Programs	THIS PROGRAM
Instruction Format	✗ Fully recorded	✗ Trainer-led (recorded-heavy)	✗ Fully recorded	✓ Live sessions by IIT faculty
Hardware Access	✗ No hardware	✗ No hardware	✗ No hardware	✓ Remote hardware access with real-time practical
Faculty Profile	✗ Not included	✗ Not included	Partial exposure	✓ Delivered by IIT faculty with strong industry experience
Edge Deployment	✗ Simulated environments	✗ Limited to demos	✗ Rarely covered	✓ Live on-device deployment
Sensor Data Pipeline	✗ Limited coverage	✗ Often skipped	✗ Academic focus	✓ End-to-end implementation
Portfolio Outcome	✗ Certificate only	✗ Mini-projects	✗ Certificate only	✓ Fully deployed working system
Cohort Size	Self-paced (1000+)	100+ learners	Self-paced (1000+)	✓ Max 100 (focused cohort)
Engineering Depth	✗ Minimal	✗ Limited	Academic-oriented	✓ Industry-grade depth
Price (INR)	₹4,000–₹33,000	₹48,000–₹3,00,000	₹15,000–₹50,000	₹ 60,000
Duration	3–6 months	8–12 months	12+ weeks	4 months (efficient & intensive)

8 REASONS THIS PROGRAM IS DIFFERENT

	Reason
1	**IIT MADRAS FACULTY —** Designed and delivered by active IIT Madras professors with industrial expertise, alongside a core team of experienced IITM researchers and engineers — the same people building and deploying real-world systems.
2	**SENSOR-TO-DEPLOYMENT PIPELINE —** Master the complete stack most programs ignore: sensor physics, data engineering, quantization, on-device inference, and production-grade robustness.
3	**ENGINEERING THINKING, NOT TUTORIALS —** Learn how real engineers think — through trade-offs, baselines, failure modes, and design decisions.
4	**SMALL COHORT —** Limited to 100 participants to ensure every question is addressed and every capstone is reviewed directly by IITM Team.
5	**PORTFOLIO ARTIFACT, NOT A CERTIFICATE —** Graduate with a working edge AI system, a documented pipeline, and measurable performance.
6	**WEEKEND-ONLY SCHEDULE —** 16 intensive sessions across weekends, designed for working professionals who want to build deeply without stepping away from their careers.
7	**INTERVIEW-READY OUTCOME —** Your capstone is built, refined, and presented to meet the expectations of top product companies.

08 ADMISSIONS — COHORT 1

100 seats. One cohort. June 5, 2026.

The application process is designed to ensure every student who joins is ready to commit — and ready to succeed.

SELECTION PROCESS

STEP	STAGE	DETAIL
01	**Apply Online**	Submit application form: name, background, current role, motivation (3–5 sentences). Link to any GitHub or project work if available — not mandatory.
02	**Fee Payment & Enrollment**	Pay program fee (₹60,000) to confirm your seat. EMI options available in 3 monthly installments.
03	**Confirmation Email**	Receive confirmation within 24 hours.

IMPORTANT DATES — COHORT 1

Apr 1	Apr 30	May 31	June 5
Applications Open	Free Info Webinar	Enrollment Closes	Cohort 1 Begins

FEE STRUCTURE

PROGRAM FEE — ₹60,000/-

The fee covers:

60 hours of live instruction · access to all required hardware/software tools and platforms · IIT Madras faculty programme certificate · private cohort community access · session recordings for revision.

PAYMENT OPTIONS:

- Full payment at enrollment · ₹60,000 — immediate seat confirmation
- 3-month EMI · ₹20,000/month — seat confirmed on first installment

All payments are processed through a secure payment gateway. Invoice provided for company reimbursement or educational loan applications.

09 APPLY NOW — COHORT 1

100 seats. One cohort. June 5, 2026.

This program is designed to help you build, deploy, and understand a complete edge AI system — so you're prepared for real-world engineering challenges.

Enrollment closes May 31, 2026.

Apply at: www.phntechnology.com/edge-ai | Or WhatsApp: +91 [XXXXX XXXXX]

CONTACT ADMISSIONS

For questions about EMI, group enrollment.

Email: admissions@phntechnology.com

WhatsApp: +91 [XXXXX XXXXX]

Website: www.phntechnology.com/edge-ai

Response within 24 hours, Monday–Saturday.

PHN TECHNOLOGY · NSDC TECHNOLOGY PARTNER · IIT MADRAS FACULTY COLLABORATION

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