IITM PRAVARTAK
CATALYSING INNOVATION
Technology innovation Hub of
IIT Madras

Batch 02

Transform Your Future With
Generative AI & Machine Learning Mastery

Advanced Certificate Programme in
Machine Learning, Gen AI & LLMs for Business Applications

IITM Pravartak

Technology Innovation Hub of IIT Madras

Marketing Partner

jaro education

Unlock Trillions: Generative AI Driving Economic Impact and Business Success

Generative AI could have an **economic impact of up to $7.9 trillion per year**

*McKinsey & Company

92% of Fortune 500 companies are using OpenAI's technology

*Financial Times

94% of business executives believe that AI is a key to success in the future

*Deloitte

The global Machine Learning market, valued at $19.20 billion in 2022, is projected **to grow to $225.91 billion by 2030**

*Fortune Business Insights

Programme Overview

The Advanced Certificate Programme in Machine Learning, Generative AI & LLMs for Business Applications is crafted to empower professionals with the expertise to harness the transformative potential of AI-driven technologies. Beginning with the fundamentals of artificial intelligence, mathematics, and machine learning, the programme builds a strong foundation before advancing into deep learning, large language models, and generative frameworks.

What sets this programme apart is its focus on business applications—equipping participants not just with technical mastery, but with the ability to apply AI and ML innovations strategically across industries. The learning journey culminates in exploring emerging technologies and future trends, enabling participants to stay ahead in an era where AI is reshaping business models, decision-making, and competitive advantage.

Programme Highlights

- Campus Immersion (Optional)
- Comprehensive Pedagogy
- Flexibility in learning: online classes on weekends
- Access to Extensive Reference Materials for Continuous Learning
- Certificate of Completion by IITM Pravartak
- Dedicated Programming Sessions to Enhance Practical Skills

Learning Outcomes

- Acquire a solid understanding of the fundamental concepts of AI, ML, and emerging technologies.
- Apply theoretical knowledge through hands-on projects, including text generation with GPT models.
- Develop specialised knowledge of generative AI, including GANs, VAEs, large language models, and reinforcement learning for generative tasks.
- Explore diverse applications of AI in image processing, speech processing, text processing, chatbots, and natural language processing (NLP).

This Programme is Curated For:

- Individuals with backgrounds in Science, Technology, Engineering, and Mathematics, including fields such as computer science, physics, mathematics, statistics, and engineering.
- Professionals working in the IT industry, software development, programming, and related fields who want to specialize in data science and AI.
- Professionals involved in business analysis, market research, and strategic planning who wish to develop expertise in data-driven decision-making.
- Tech professionals with a minimum of 1 year of work experience.

Career Prospects:

Upon completion of this programme, participants will be well-equipped to pursue diverse career opportunities. Potential career paths include:

AI/Machine Learning Engineer:

Design and implement ML/AI algorithms and systems for various applications, including image and speech recognition, natural language understanding, and recommendation systems.

Data Scientist:

Analyze complex datasets, develop predictive models, and derive actionable insights to drive business decisions and innovation.

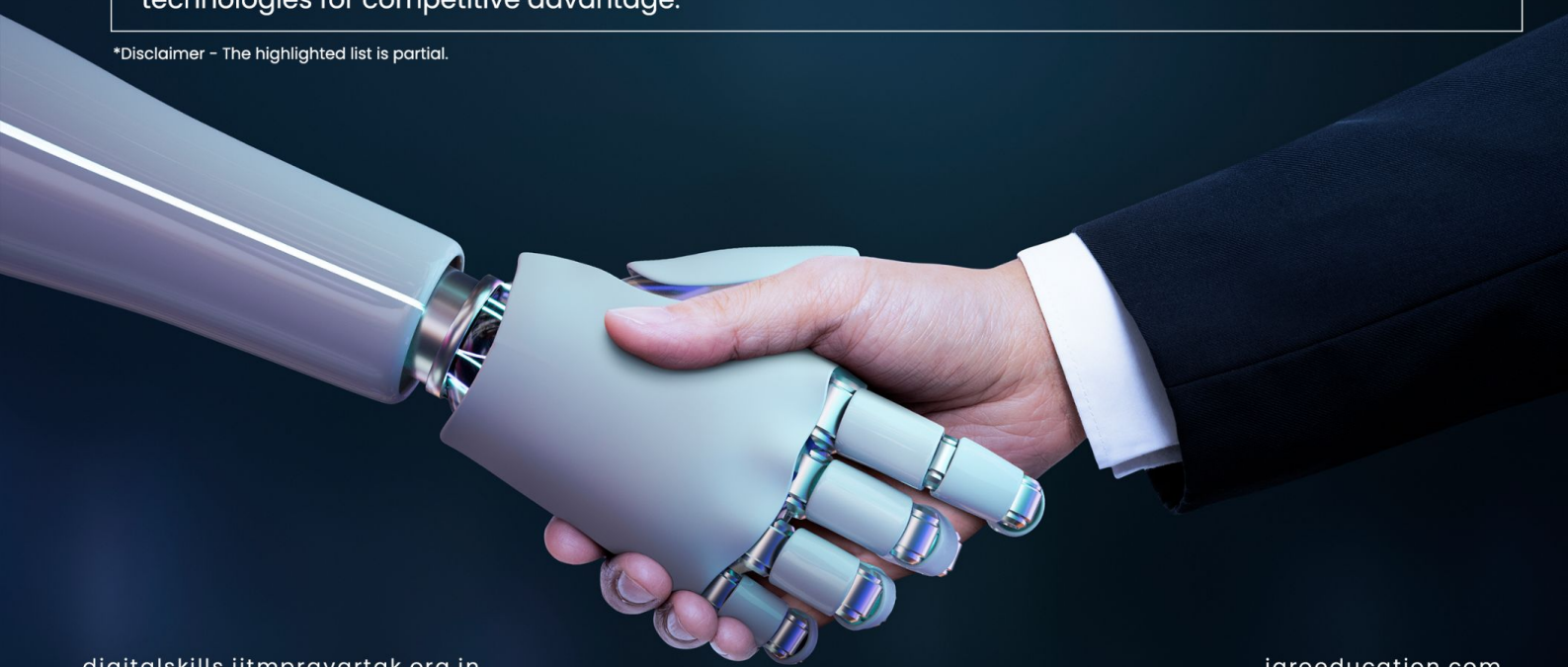
AI Researcher:

Contribute to cutting-edge research in AI and ML, exploring novel algorithms, architectures, and applications.

AI Consultant:

Provide strategic guidance and technical expertise to organizations seeking to leverage AI and ML technologies for competitive advantage.

*Disclaimer - The highlighted list is partial.



Pedagogy

Live Immersion Classes

Tutorial Sessions

Project Work

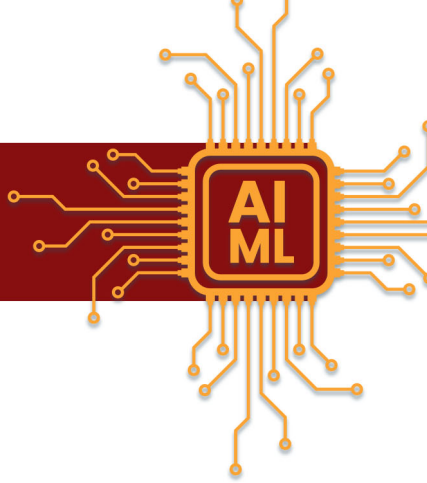
Online Sessions

Programming Sessions

Mini Quizzes

Reference Materials

Programme Details



Delivery Mode:	Hybrid (Online with an optional 1-day campus immersion for the valedictory session towards the end)
Duration:	10-11 Months
Commencement Date:	11th January, 2026
Application Closure Date:	Applications Closing Soon
Class Schedule:	• Saturday (2nd and 4th), 8 PM to 10 PM • Sundays (All), 10 AM to 1 PM
Campus Immersion:	1 Day Campus Immersion (Optional)*

Disclaimer:
Participants are expected to make their own travel arrangements. While the Institute will assist in identifying suitable lodging, boarding, and refreshment facilities, all associated expenses shall be borne by the participants.

Admission & Evaluation Criteria

Eligibility:

- Qualification: Graduate/4-year Engineering/Technical Degree/B.Sc/BCA/M.Sc/MCA from a recognized university (UGC/AICTE/DEC/AIU/State Government/recognized international universities).
- Minimum 50% and above is required for qualification.
- Industry Targeting (Preference): IT, Tech, Software, Engineering Research, Business Analytics, etc.
- Professionals from a tech background must have a minimum of 1 year of work experience.

Assessment:

- Homework, Final exam, project.
- 50% weightage to homework/case studies and 50% to the final exam.
- Attendance: 70% attendance is mandatory.

Fee Structure

Application Fee: INR 1500/- + GST

Total Programme Fee: INR 1,30,000/- + GST

EASY EMI OPTIONS AVAILABLE

Instalment Pattern

Instalment No.	Amount	Payment Schedule
Instalment I	INR 60,000/- + GST	As mentioned in the offer letter
Instalment II	INR 40,000/- + GST	5th March 2026
Instalment III	INR 30,000/- + GST	5th May 2026

Certification

Participants who successfully meet the evaluation criteria and satisfy the requisite attendance criteria will be awarded a '**Certification of Completion**' - Advanced Certificate Programme in Machine Learning, Gen AI & LLMs for Business Applications.

IITM PRAVARTAK
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Technology Innovation Hub Of IIT Madras

CERTIFICATE

OF COMPLETION

THIS CERTIFICATE IS AWARDED TO

CANDIDATE NAME

Completed "**Advanced Certificate Programme in Machine Learning, Gen AI & LLMs for Business Applications**" held from _____ to _____ through **IITM Pravartak Technologies Foundation** (Technology Innovation Hub of IIT Madras).

PROF. BABJI SRINIVASAN
ASSOCIATE PROFESSOR
APPLIED MECHANICS
IIT MADRAS

DR. M J SHANKAR RAMAN
CEO
IITM PRAVARTAK
TECHNOLOGIES FOUNDATION

SAMPLE

Note: The above certificate is for illustrative purposes only.

Programme Content

Module 1:
Fundamentals of Machine Learning with Practical Applications

1. Introduction to Machine Learning

- Overview of Machine Learning Concepts
  - Supervised, Unsupervised, and Reinforcement Learning
  - Common Machine Learning Algorithms
- Machine Learning Workflow
  - Problem Definition and Data Collection
  - Data Preprocessing and Feature Engineering
  - Model Selection and Training
  - Model Evaluation and Tuning

2. Python Tools for Machine Learning

- Introduction to Scikit-Learn
  - Data Preprocessing with Scikit-Learn
  - Implementing Classification and Regression Models
  - Model Evaluation Metrics and Cross-Validation
- Advanced Machine Learning Techniques
  - Ensemble Methods: Random Forests, Gradient Boosting
  - Dimensionality Reduction: PCA, LDA
  - Clustering Techniques: K-Means, Hierarchical Clustering

3. Practical Applications of Machine Learning

- Predictive Modeling with Real-World Datasets
- Implementing Recommendation Systems
- Time Series Forecasting with Machine Learning Models

4. Capstone Project: Machine Learning Application

- Problem Statement and Data Exploration
- Model Development and Evaluation
- Optimization and Final Presentation

Programme Content

Module 2:
Deep Learning Technologies with Practical Python Tools and Frameworks

5. Introduction to Deep Learning

- Fundamentals of Neural Networks
  - Neurons, Layers, and Activation Functions
  - Loss Functions and Optimization
- Deep Learning Architectures
  - Convolutional Neural Networks (CNNs)
  - Recurrent Neural Networks (RNNs)
  - Advanced Architectures: LSTMs, GRUs, Attention Mechanisms

6. Python Tools for Deep Learning

- Introduction to TensorFlow and Keras
  - Building Neural Networks with Keras
  - Training and Evaluating Deep Learning Models
  - Visualizing Model Performance
- PyTorch for Deep Learning
  - Understanding Tensors and Autograd
  - Implementing CNNs and RNNs with PyTorch
  - Transfer Learning and Fine-Tuning Pre-Trained Models

7. Practical Applications of Deep Learning

- Image Classification and Object Detection with CNNs
- Sequence Modeling for NLP Tasks with RNNs
- Advanced Topics: GANs, Autoencoders, and Attention Models

8. Capstone Project: Deep Learning Application

- Problem Statement and Data Preparation
- Model Development and Tuning
- Final Model Evaluation and Presentation

Programme Content

Module 3:
Generative AI Technologies with Python Tools and Frameworks

9. Introduction to Generative AI

- Overview of Generative Models
  - GANs, VAEs, and Diffusion Models
  - Applications of Generative AI
- Generative Adversarial Networks (GANs)
  - GAN Architecture and Training Process
  - Implementing GANs with TensorFlow/PyTorch
  - Applications of GANs: Image Synthesis, Style Transfer

10. Variational Autoencoders (VAEs) and Diffusion Models

- Understanding VAEs
  - Encoder-Decoder Architecture
  - Latent Space Representation and Sampling
- Diffusion Models for Generative AI
  - Basics of Diffusion Processes
  - Implementing Diffusion Models in Python

11. Practical Applications of Generative AI

- Creative AI: Art and Music Generation
- Data Augmentation with Generative Models
- Ethical Considerations in Generative AI

12. Capstone Project: Deep Learning Application

- Project Setup and Data Collection
- Model Development and Fine-Tuning
- Final Model Deployment and Presentation

Programme Content

Module 4:
Large Language Models (LLMs), Fine-Tuning, Agents, and RAG

13. Introduction to Large Language Models (LLMs)

- Evolution of LLMs: From GPT to GPT-4 and Beyond
- Transformer Architecture and Attention Mechanism
- Pre-trained vs. Fine-Tuned LLMs: Differences and Use Cases

14. Fine-Tuning LLMs

- Data Preparation for Fine-Tuning
- Fine-Tuning LLMs with Hugging Face Transformers
- Evaluating and Optimizing Fine-Tuned Models

15. Building Custom AI Agents with LangChain

- Data Preparation for Fine-Tuning
- Fine-Tuning LLMs with Hugging Face Transformers
- Evaluating and Optimizing Fine-Tuned Models

16. Retrieval-Augmented Generation (RAG)

- Understanding RAG Concepts and Architecture
- Implementing RAG with Hugging Face Transformers
- Practical Applications of RAG in QA and Search Systems

17. Capstone Project: LLM and RAG Application

- Project Setup and Data Collection
- Model Development and Fine-Tuning
- Final Model Evaluation and Presentation

Programme Content

Module 5:
Applications of LLMs with Text, Video, Image, and Audio

18. Text-Based Applications of LLMs

- Automated Content Creation and Summarization
- Building Conversational Agents and Chatbots
- Sentiment Analysis and Text Classification

19. Image and Video Applications with LLMs

- Text-to-Image Generation with DALL-E and CLIP
- Video Synthesis and Editing with Generative Models
- Combining LLMs with Computer Vision Tasks

20. Audio Applications of LLMs

- Text-to-Speech (TTS) Systems with LLMs
- Music and Sound Generation
- Voice Cloning and Audio Enhancement

21. Capstone Project: Multimodal LLM Application

- Project Proposal and Planning
- Data Collection and Model Development
- Final Integration and Presentation

Module 6:
Building Integrated Generative AI Applications (Weeks 13-14)

22. Multimodal Generative AI Systems

- Integrating Text, Image, and Audio Models
- Case Studies: AI Art, Music Videos, Virtual Worlds
- Developing Cross-Modal Retrieval Systems

Programme Content

23. Customizing and Extending Generative AI Models

- Fine-Tuning LLMs for Multimodal Tasks
- Building End-to-End Multimodal Pipelines
- Deployment Strategies for Multimodal Applications

24. Capstone Project: Integrated Generative AI Application

- Project Planning and Data Collection
- Model Integration and Workflow Design
- Final Testing, Optimization, and Presentation

Module 7:
Productionizing the Applications – End-to-End Pipeline

25. Introduction to Productionizing AI Models

- Overview of MLOps and Best Practices
- Setting Up CI/CD Pipelines for AI Applications
- Monitoring and Maintaining AI Models in Production

26. Deploying AI Models with Python Tools

- Model Deployment with TensorFlow Serving and TorchServe
- Scaling Applications with Docker and Kubernetes

27. End-to-End Pipeline for LLM and Generative AI Applications

- Text-to-Speech (TTS) Systems with LLMs
- Music and Sound Generation
- Voice Cloning and Audio Enhancement

Note: *subject to modifications at a later stage if required, as per the discretion of the faculty.

Cutting-Edge Tools and Technologies

ML PACKAGES

scikit learn

PyTorch

TensorFlow

GEN AI PACKAGES

Hugging Face

LangChain

MODELS

BERT, Transformer, along with several conventional models

IITM Pravartak at a Glance

IITM Pravartak operates as a Section 8 company, generously funded by the Department of Science and Technology, Government of India, as part of its esteemed National Mission on Interdisciplinary Cyber-Physical Systems. As a Technology Innovation Hub (TIH) proudly hosted by IIT Madras, its core focus lies in the realm of Sensors, Networking, Actuators, and Control Systems (SNACS). This strategic alignment positions IITM Pravartak at the forefront of cutting-edge research and development, facilitating groundbreaking advancements in the convergence of physical and digital technologies. Through its collaborative efforts and innovative initiatives, IITM Pravartak endeavors to spearhead transformative solutions and foster sustainable progress in various domains of science and technology.

From the Director's Desk

Prof. Babji Srinivasan

Director and Programme Coordinator

Professor in the Department of Applied Mechanics and Biomedical Engineering, IIT Madras

Prof. Babji Srinivasan received his B.Tech degree in instrumentation and control engineering from Madras Institute of Technology, Chennai, India. In 2008, he received the Master's degree in chemical engineering from the Indian Institute of Technology Madras, Chennai, India. He then started his doctoral work at the department of chemical engineering at Texas Tech University, Lubbock, TX, USA and received his doctorate in 2011.

In 2012, he joined the Indian Institute of Technology Gandhinagar, India as an Assistant Professor in the departments of chemical and electrical engineering. In 2020, Prof. Babji joined the Indian Institute of Technology Madras as an Associate Professor in the department of applied mechanics, IITM.

His research interests include cognitive systems engineering, behavioral informatics and human cyber-physical systems.

> ***This pioneering programme in the AI & ML domain offers participants a unique opportunity to delve into cutting-edge techniques including Generative AI, GPTs, text generation, and Quantum technologies. With a dedicated project module, participants can apply learned concepts effectively. The programme prioritizes skill development through diverse pedagogical approaches such as online classes, Python tutorials, hands-on projects, and mini quizzes, supplemented by relevant reference materials.***

Know The Facilitators

Dr. Ramji Srinivasan

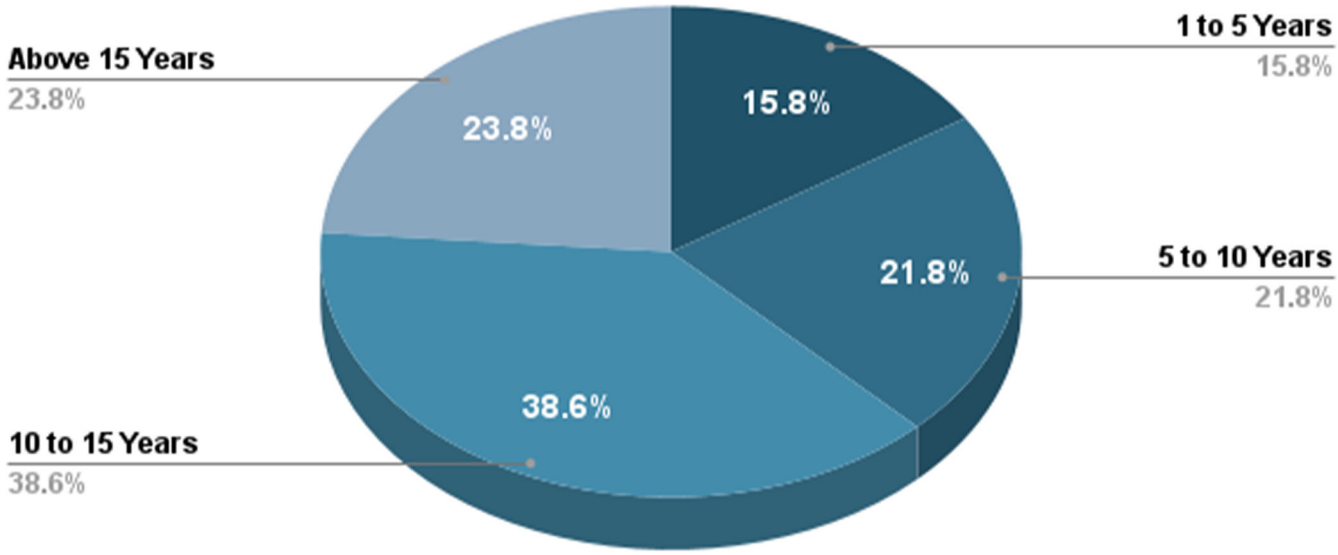
Director, Bit2Qubit Technologies

Dr. Ramji Srinivasan is an accomplished professional with over 22 years of experience in cutting-edge technologies like AI, NLP, Computer Vision, and IoT across industries such as entertainment, automotive, retail, and healthcare. He holds a Ph.D. from Anna University, Chennai, and has held significant positions, including Co-Founder at Bit2Qubit Technologies and Staff Engineer at Qualcomm Technologies. His expertise spans developing and deploying innovative algorithms and ML solutions, and he has been instrumental in bridging academic research with business needs.

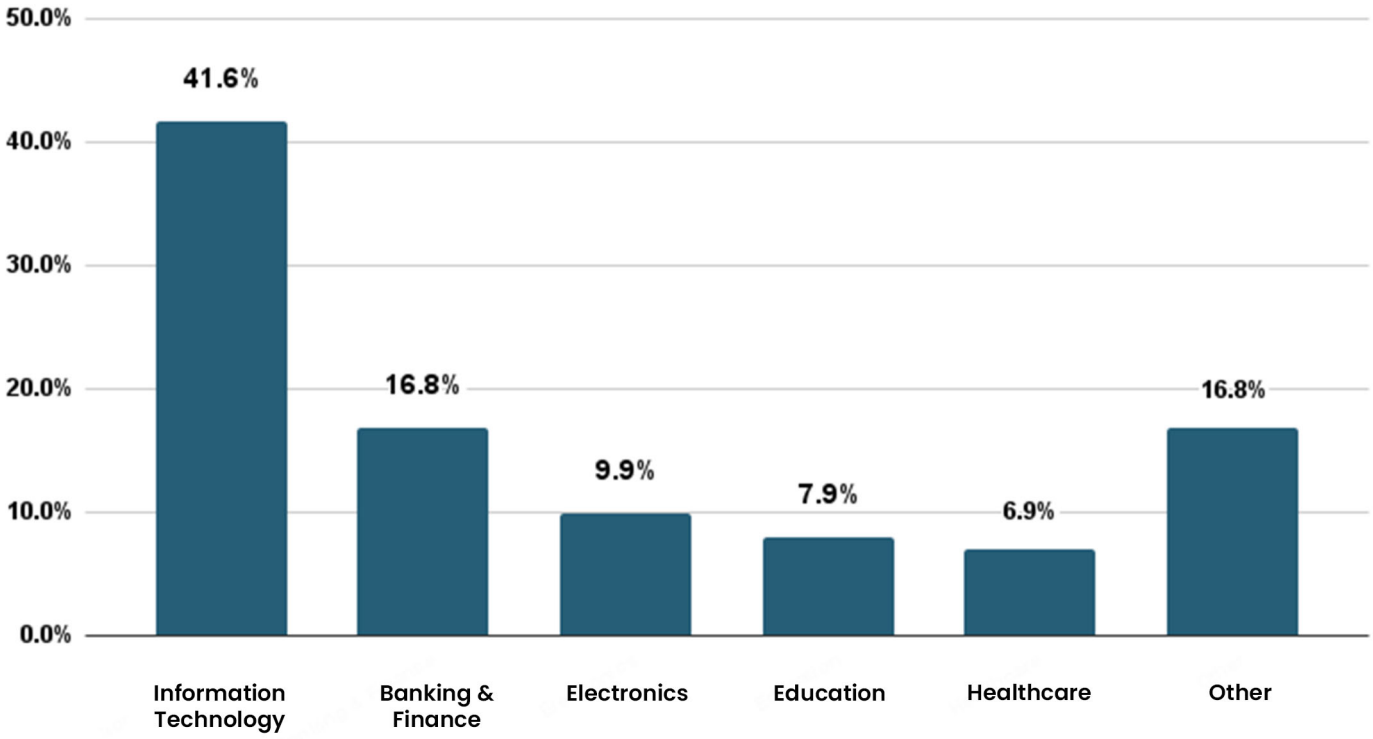
Dr. Ramji's notable achievements include 2 granted US patents, 25+ research articles, and key roles in securing substantial project funding. He is proficient in various programming languages, ML/DL frameworks, and cloud platforms. With strong leadership and mentorship skills, he has consistently driven technological advancements and delivered impactful solutions.

Participant Snapshot: A Closer Look at Our Latest Cohort's Demographics

Work Experience



Industry Wise Bifurcation



Participant Snapshot: A Closer Look at Our Latest Cohort's Demographics

Top Organizations Represented

amazon | ORACLE | J.P.Morgan | AMERICAN EXPRESS | VISA
salesforce | Walmart | AIRBUS | BANK OF AMERICA | EY
accenture | Deloitte. | Adobe | HCL

Key Roles & Designations

- Chief executive officer
- Senior Engineering Manager
- Chief Technology Officer
- Master Principal Cloud Architect
- Vice President
- Consultant
- Technical Architect

NOTE:

- Past performance is not indicative of future results.
- All company names are trademarks or registered trademarks of their respective holders. The use of these names does not imply any affiliation with, or endorsement by, them.
- This is only a partial list.

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Jaro Education is an online higher education company that specialises in executive education, serving as a liaison between the world's leading universities and institutes to create online and technology-driven programmes. The company provides a quality bucket of online executive education programmes catering to domains such as Doctorate & Ph.D., Analytics & Data Science, Management, Finance, etc., from renowned national and international institutions to meet the needs of working professionals. Our goal is to foster the growth of entrepreneurs and professionals at all levels, from entry-level to C-Suite, through world-class executive education programmes.

Career Assistance by Jaro Education

Resume Building

We create ATS-friendly resumes that highlight your skills and achievements.

Linkedin Optimization

Enhance visibility and connect with the industry leaders.

Career Sessions

Jaro Connect offers expert-led bootcamps on industry trends.

Note: IITM Pravartak and Jaro Education do not guarantee employment or career advancement; career services are provided solely by Jaro Education as guidance to help you manage your career proactively.

CONNECT *With Us*

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