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**IIT Guwahati**

**jaro education**

Transition successfully into Data Expert

Advanced Professional Certification Programme in

# Data Science & Machine Learning

## E&ICT, IIT Guwahati

> **The global data science platform market was valued at USD 95.31 billion in 2021 and is expected to reach USD 695.0 billion by 2030, to grow at a CAGR of 27.6%** during the forecast period.
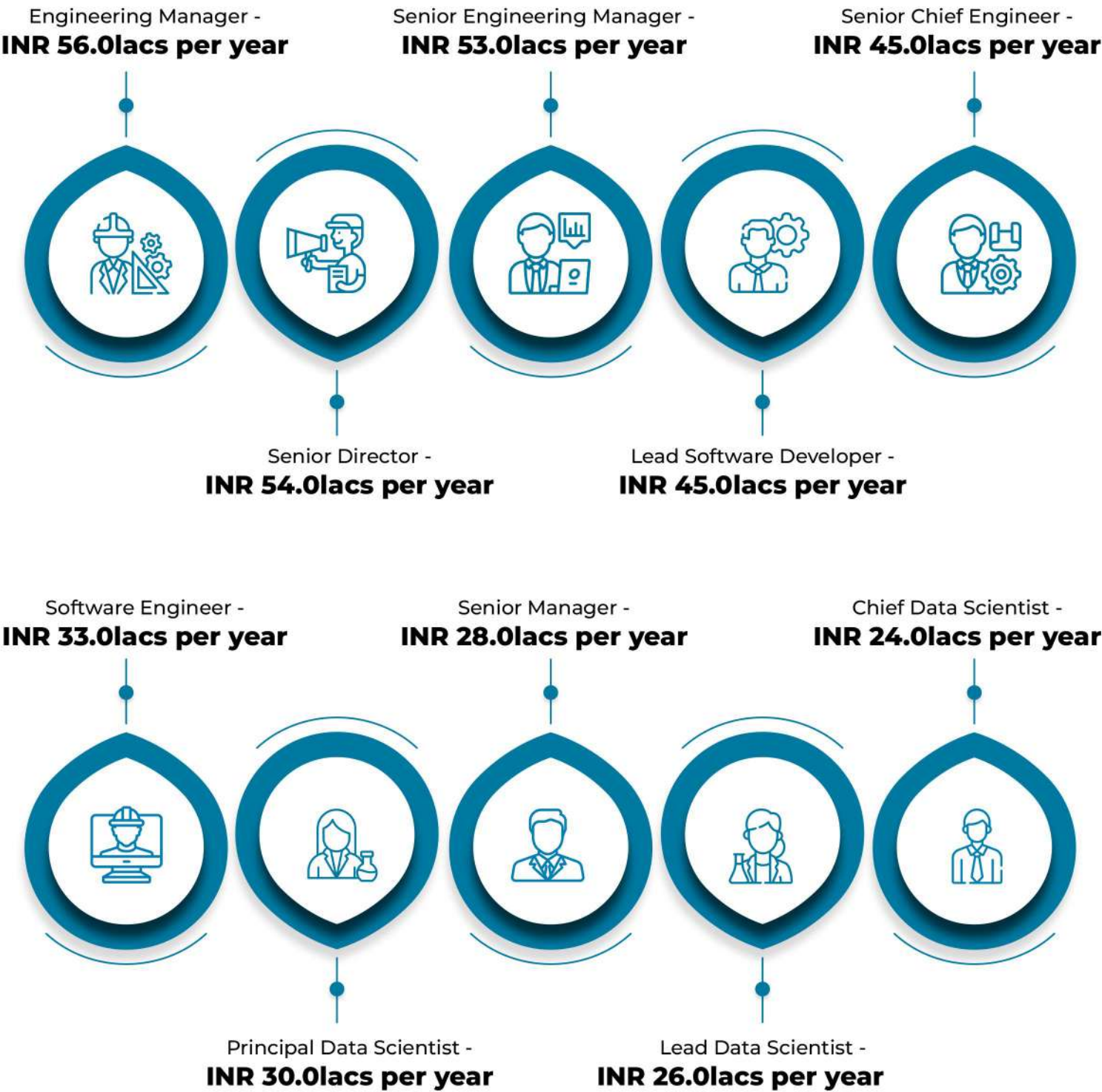
Machine Learning as a Service Market estimated to **Cross USD 302.66 Billion at a CAGR of 36.2% by 2030** - Report by Market Research Future.

# Highest Paying Career Profiles

**Engineering Manager -**
**INR 56.0lacs per year**

**Senior Engineering Manager -**
**INR 53.0lacs per year**

**Senior Chief Engineer -**
**INR 45.0lacs per year**

Senior Director -
**INR 54.0lacs per year**

Lead Software Developer -
**INR 45.0lacs per year**

Software Engineer -
**INR 33.0lacs per year**

Senior Manager -
**INR 28.0lacs per year**

Chief Data Scientist -
**INR 24.0lacs per year**

Principal Data Scientist -
**INR 30.0lacs per year**

Lead Data Scientist -
**INR 26.0lacs per year**

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# Top Employers with open positions in Data Science

Deloitte.

Microsoft

pwc

EY

*DataMotion

# Programme Overview

Become an indispensable part of the 21st Century data industry by pursuing an Advanced Professional Certification Programme in Data Science & Machine Learning from India's leading E&ICT, IIT Guwahati. Learn how to use the alchemy of data science and machine learning architecture to renovate tomorrow's enterprises with smart approaches and applications. Put the in-demand tools and techniques to use in order to leverage strategic and operational actions. This programme will equip your know-how in data analytics to build data driven business decisions. Unveil high-quality pedagogy that is an ideal blend of theory and practice.

# From Director's Desk



"We are glad to be collaborating with Jaro Education. With the rich pool of experts provided by E&ICT Academy IIT Guwahati and Jaro Education we are confident to aid the students / working Professionals industry to upgrade their skill sets in this ever-changing technological world."

**- Dr. Gaurav Trivedi**
**Associate Professor**
**IIT Guwahati**

# Know the Facilitators

## Dr. Babji Srinivasan
### Assistant Professor at IIT Madras

Dr. Babji Srinivasan is working as an assistant professor in the Department of Applied Mechanics at IIT Madras. He holds a Ph.D. - Texas Tech University, and Post Doctoral Research Fellow - Columbia University. His areas of interest in the study include Cognitive Systems Engineering and Behavioural Informatics.

## Madhu Babu Cherukuri
### AI Applied Research Scientist at Intel Corporation

With more than 15 years of experience managing numerous analytics projects and utilising various ML algorithms in various business areas, Madhu Babu Cherukuri is an expert in this field. Additionally, he has a depth of understanding in SAS, SQL, R, Python, and is skilled in the Big Data Environment.

## Dr. Mansi Sharma
### Faculty at Indian Institute of Technology, Madras

Dr. Mansi Sharma carries a Ph.D, M.Tech. in Computer Applications, and M.Sc. in Mathematics from Indian Institute of Technology Delhi. She is currently working as an INSPIRE faculty in the Electrical Engineering Department at Indian Institute of Technology, Madras. Her research areas include Deep Learning for Visual Computing, Machine Learning, Artificial Intelligence, etc.

*The above given is an indicative list of faculty and is subject to change as per E&ICT, IIT Guwahati's discretion.

# Programme Highlights

Certificate of Completion from IIT Guwahati's E&ICT Department

A contemporary and comprehensive data science programme covering data analytics, business analytics, and machine learning

Live classes by highly experienced faculty members from IITs and industry experts

Flexibility in learning: online classes on weekends or after business hours

2-Days intensive campus immersion modules

Peer-to-peer learning and mentoring from industry experts

Curated for working professionals with a practical learning approach

Learn from key modules taught by the respective area experts

# At the end of the program, participants will be able to:

- Develop relevant and critical programming abilities required in the field of data science

- Perform Predictive Analytics using Python, ML, Data Visualisation, Big Data, and NLP

- Become industry ready for roles like Data Analyst, Data Scientist, Data Engineer, Product Analyst, Machine Learning Engineer and also as a Decision Scientist

- Formulate and leverage appropriate models of data analysis to solve business-related challenges

- Develop and enhance business intelligence capabilities by adapting the appropriate technology and software solutions

- Identify the types of techniques that work on the basis of the business problems

- Understand how to select the best model and interpret it for decision making Clean the data, transform the data, usage of data for model building

- Get equipped with coding skills for writing ML models

- Deploy and maintain the model and methodologies

# Tools & libraries that professionals will gain exposure to:



APACHE Spark | python | SciPy | Spark SQL

pandas | Excel | Jupyter | NumPy

Power BI | git | matplotlib | TensorFlow

SQL

# Programme Content

## Module-1

## Introduction to Python and IDEs

- ❖ Jupyter notebook – Installation & function
- ❖ Functions, Packages & libraries like Numpy, Pandas, Scikit Learn
- ❖ Initialising & working with arrays, vectors & data frames
- ❖ Working with data structures, control statements
- ❖ Lab - Exercises

## Module-2

## Statistical Foundations for Data Science

- ❖ Linear Algebra, Multivariate Calculus
- ❖ Probability & Statistics and Optimization
- ❖ Population, sample, methods of sampling – basics of statistics
- ❖ Measures of distribution – Mean, median, mode, S.D & variance
- ❖ Empirical rule – Normal distribution
- ❖ Probability & its basics – Mutually exclusive events, independent events
- ❖ Laws of probability
- ❖ Conditional probability
- ❖ Types of distribution – Binomial, Poisson & Normal distribution
- ❖ Hypothesis & T - testing
- ❖ Lab - Exercises

## Module-3

## Data Handling and Data Visualisation with Tableau

- ❖ Data extraction, cleaning

# Programme Content

- Data Preprocessing
- Outlier Treatment for Various types of data
- Data Visualisation
- Tableau Training, GIT, SQL, JSON
- Lab - Exercises

## Module-4

## Machine Learning with Supervised Learning

- Regression (Linear, Multiple, Logistic)
- Classification (k-NN, naïve Bayes) techniques
- Decision Trees
- SVM

## Module-5

## Machine Learning using Clustering UnSupervised Learning

- K means Clustering
- Hierarchical clustering

## Module-6

## Machine Learning Optimization Techniques

- Importance of Dimensionality Reduction
- PCA
- Project

# Programme Content

## Module-7

### Performance Metrics

- ❖ Boosting methods
- ❖ Bagging techniques

## Module-8

### Recommender Systems using Artificial Intelligence

- ❖ Introduction to Recommendation systems
- ❖ Market Basket Analysis
- ❖ Content-based recommendation system
- ❖ Popularity based model
- ❖ Collaborative filtering (User similarity & Item similarity)
- ❖ Hybrid models

## Module-9

### Introduction to Neural Networks and Deep Learning

- ❖ Gradient Descent
- ❖ Introduction to Perceptron & Neural Networks
- ❖ Batch Normalisation
- ❖ Activation and Loss functions
- ❖ Confidential – Not to be shared without permission
- ❖ Hyperparameter tuning
- ❖ Deep Neural Networks
- ❖ Tensor Flow & Keras for Neural Networks & Deep Learning

# Programme Content

## Module-10

### Advanced Applications of Deep Learning

- ❖ Introduction to Convolutional Neural Networks
- ❖ Forward propagation & Backpropagation for CNNs
- ❖ Convolution, Pooling, Padding & its mechanisms
- ❖ CNN architectures like AlexNet, VGGNet, InceptionNet & ResNet
- ❖ Transfer Learning
- ❖ Auto encoders
- ❖ Semantic segmentation
- ❖ YOLO
- ❖ Siamese Networks
- ❖ Object & face recognition using techniques above

## Module-11

### Natural Language Processing using Sentimental Analysis

- ❖ Bag of Words Model
- ❖ TF-IDF
- ❖ POS Tagging
- ❖ Named Entity Recognition
- ❖ Tokenisation
- ❖ Stop Words
- ❖ Word Vectorizer
- ❖ Introduction to Sequential data
- ❖ RNNs and its mechanisms
- ❖ Vanishing & Exploding gradients in RNNs
- ❖ Time series analysis

# Programme Content

- ❖ LSTMs
- ❖ LSTMs with attention mechanism and GRU

## Module-11

- ❖ **Speech Recognition using NLP Techniques** _____

## Module-12

**Model Applications & Deployment** _____

- ❖ Deployment on Cloud
- ❖ Recent Trends in AI/ML
- ❖ Capstone Project

**Note:**

*Course pedagogy includes real time examples and mini-projects

*The above given is an indicative list of modules and is subject to change as per
   E&ICT, IIT Guwahati's discretion.

# Pedagogy

Case Methodology

Assignments

Capstone Project

PROJECT

Hands-on training

Mini Projects
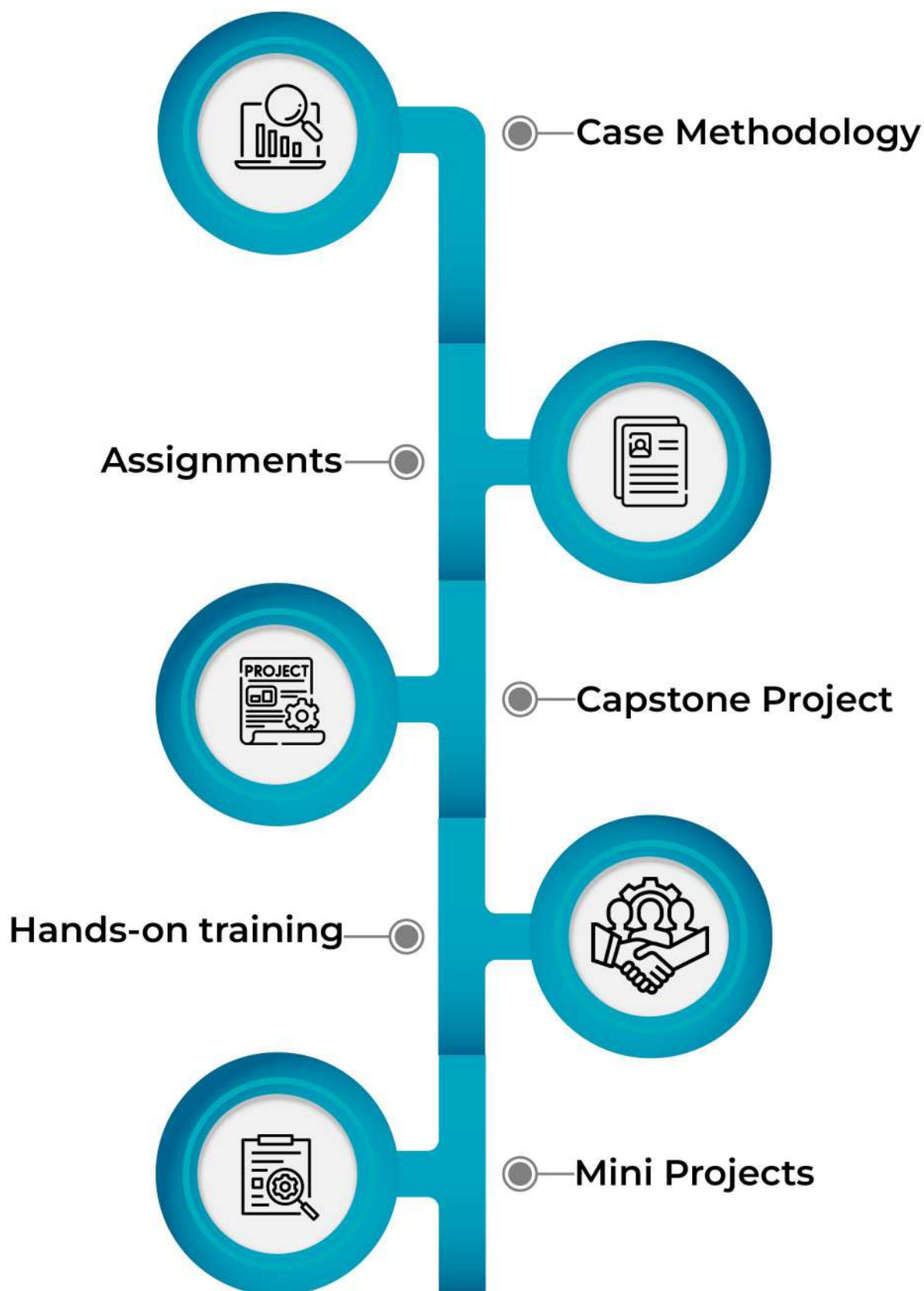
# Admission Criteria

▶ Admission will be based on the overall profile of the applicants.

# Eligibility & Selection

▶ Graduates (10+2+3 or equivalent) in any discipline recognised by UGC/AICTE with minimum 50% aggregate marks at either UG/PG level.

▶ Minimum 2 years of work experience.

# Programme Certification

Certificate ID: **OACP/2021-22/037/** Insert ID here

**Electronics & ICT Academy**

*Supported by Ministry of Electronics and Information Technology (MeitY), Govt. of India*

**Indian Institute of Technology, Guwahati**

## CERTIFICATE OF COMPLETION

This is to certify that Mr./Ms.

*Name of Participant*

has successfully completed the online

"*Advanced Professional Certification Program in Data Science & Machine Learning*"

organized by Electronics & ICT Academy Indian Institute of Technology, Guwahati
held from Start Date to End Date

Dr. Gaurav Trivedi
Principal Investigator
Electronics & ICT Academy
**Indian Institute of Technology, Guwahati**

*This is an online certification programme conducted jointly by E&ICT Academy, IIT Guwahati and Jaro Education*

# Programme Fee

| Fee Structure | Amount (in INR) |
|---|---|
| Total Programme Fee | INR 2,00,000/- + GST |

| Instalment Pattern | Amount (in INR) |
|---|---|
| Initial Payment (payable at the time of admission) | 80,000 + GST |
| 1st Instalment | 60,000 + GST |
| 2nd Instalment | 60,000 + GST |

## Easy EMI options available

# IIT Guwahati at a Glance

**7th Rank**
NIRF 2022

**41st Rank**
globally in the
'Research Citations per Faculty'

**395th Rank**
Overall in the
QS World University
Rankings 2022

Indian Institute of Technology Guwahati is the sixth member of the IIT fraternity. The academic programme of IIT Guwahati commenced in 1995. The Institute has eleven departments, five interdisciplinary academic centres and four schools covering all the major engineering, science and humanities disciplines, offering B Tech, BDes, MA, MDes, MTech, MSc and PhD programmes. This IIT fraternity is ranked among the top 100 world universities—under 50 years of age—by the London-based Times Higher Education in 2014. It continues to maintain its superior position even today in various international rankings.

# About E&ICT Academy

IIT Guwahati's E&ICT Academy (An initiative of the Ministry of Electronics & Information Technology, Government of India) aims to provide specialised training to the faculties of Engineering, Arts, Commerce & Science colleges, Polytechnics, etc. by developing state-of-the-art facilities. Academy has planned short term training programmes on fundamental and advanced topics in IT, Electronics & Communication, Product Design, Manufacturing with hands-on training and project work using latest software tools and systems.

Furthermore, the Academy will provide specialised/customised training programmes as well as research promotion workshops for the corporate sector and educational institutions. The Electronics and ICT Academy is intended to serve as a central hub for training, consulting, and entrepreneurship programmes.