XROBOTICS

INCUBATED AT
IIT BHUBANESWAR

● 1-TO-1 · ONLINE · LIVE · PERSONALISED

ROBOTICS & AI

CLASS 9–12

A fully personalised, one-on-one live robotics and AI curriculum for Class 9, 10, 11 & 12 — project-driven and designed to take students from fundamentals to industry-level skills.

CLASS 9 | CLASS 10 | CLASS 11 | CLASS 12

MONTHLY FEE	ONE-TIME ADMISSION FEE	PROGRAM LENGTH
₹2,000 per month · 1-to-1 live sessions	₹4,000 paid once at enrollment	36 sessions per grade · ~1 academic year

1:1	36	4	IIT
Dedicated instructor per student	Live sessions per grade	Grade-specific curricula	Bhubaneswar incubated

COMMENT OR DM TO ENQUIRE — "121" on our post or DM us directly

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HOW IT WORKS

YOUR JOURNEY FROM ENQUIRY TO FIRST CLASS

01 — COMMENT OR DM "121"
Find our post on Instagram or send us a direct message. Use the keyword "121" to trigger our enrollment team.
Comment "121" · or DM us

02 — COMPLETE REGISTRATION
Fill in your full details — Name, Email, Phone, WhatsApp, and Address — so we can set up your personalised profile and dispatch your kit.
Takes less than 3 minutes

03 — PAY & GET SCHEDULED
Complete admission fee and first month payment. You'll receive a confirmation email and a personal call to finalise your 1-to-1 class schedule.
Call + Email within 24 hrs

REGISTRATION DETAILS REQUIRED

- Full Name — Student's full name
- Email Address — For confirmation & reminders
- Phone Number — Primary contact
- WhatsApp Number — For class updates & schedule
- Full Address — Required for kit box delivery

★ After successful registration and payment, you will receive a confirmation email and a personal call from our team to schedule your 1-to-1 sessions at a time that works for you. Sessions are completely flexible.

FEE STRUCTURE

SIMPLE, TRANSPARENT PRICING

ADMISSION FEE — ONE TIME
₹4,000
Paid once at the time of enrollment
- Covers onboarding, curriculum setup & student profile creation
- Includes welcome kit & digital access to course materials
- Non-refundable after class schedule is confirmed

MONTHLY TUITION — RECURRING
₹2,000
Per month · billed monthly
- 1-to-1 live sessions, each ~60–90 min
- Flexible scheduling — your time, your pace
- 36 total sessions covering the full curriculum
- Session recordings, notes & assignments included

ENHANCE LEARNING WITH THE XROBOTICS KIT BOX

Optional hardware kit — grade-specific components delivered to your door before your first session. Build real projects alongside every lesson.

Arduino / ESP32 · IR & Ultrasonic Sensors · Servo & DC Motors · Robot Chassis · Breadboard & Components · Project Guidebook

ADD KIT AT CHECKOUT

CLASS 9

Robotics and Artificial Intelligence · 1-to-1 Online Live
Python · AI · Robotics

36 — 1-to-1 Sessions, ~1 Academic Year

UNIT 1 — FOUNDATIONS OF ROBOTICS

- S.1 **Introduction to Robotics** — What is a robot · Characteristics & benefits · Differences from machines
- S.2 **Evolution & Laws of Robotics** — Historical milestones 1900s–present · Asimov's Three Laws · Definition of Robotics
- S.3 **Types & Classification of Robots** — Terrain-based (aerial, ground, underwater) · Control-based (manual, automatic) · Bio-inspired (humanoids, birds, snakes, insects)
- S.4 **Building Blocks of Robots** — Mechanical, electrical & computational components · Block diagram of a robot · Industrial, humanoid, aerial, mobile robots
- S.5 **Robot Motion & Anatomy** — Motion: linear, angular, circular · Joints: prismatic, revolute, spherical · Degree of freedom (DoF)
- S.6 **Real-World Robots & Applications** — Domestic, industrial, medical, defence, agriculture · Case study: Intelligent Robotic Waste Bin

UNIT 2 — AI FUNDAMENTALS

- S.7 **Understanding Artificial Intelligence** — Definition & history · John McCarthy, Turing Test · Narrow vs broad AI · Expert systems (Eliza)
- S.8 **Applications & Benefits of AI** — Industry, healthcare, banking, transport, defence, education · Chatbots, voice assistants, facial recognition, AR/VR
- S.9 **Ethical Considerations in AI** — Bias, prejudice, fairness, accountability · Transparency, interpretability, explainability
- S.10 **Role of Data & Computing** — Data types: audio, visual, numeric, text · Data to information flow · Deterministic vs probabilistic problems

UNIT 3 — PYTHON PROGRAMMING

- S.11 **Introduction to Python** — Object-oriented, high-level language · Advantages and real-world applications
- S.12 **Data Types & Variables** — int, float, Boolean, list, tuple, string, dictionary · Variable scope · Syntax & indentation
- S.13 **Operators & Control Structures** — Arithmetic, logical, comparison operators · if, if-else, elif
- S.14–15 **Loops, Functions & Practicals** — While, for, nested loops · Break, continue, pass · User-defined functions, arguments, return types
  - 15 Practical Python Tasks

UNIT 4 — AI CONCEPTS & PROJECTS

- S.16 **Computer Vision, NLP & Neural Networks** — What is computer vision · Natural language processing · Neural network overview
- S.17–20 **AI Project Cycle — Applied** — Problem Scoping · Data Acquisition · Data Exploration · Modelling · Evaluation
  - Use Case: Smart School Design (AI-Driven)
- S.21–30 **Practicals, Assignments & Viva Prep** — Python programming practicals · Robot identification labs · AI use case charts · Sample viva questions
  - 15 Practical Assignments
- S.31–35 **Extension — Emerging Trends** — Cobots & swarm robotics · AI in education & governance · Career paths in AI & Robotics (for advanced learners)
- S.36 **Final Project & Showcase** — Integrated project presentation · Viva voce · Portfolio review · Certificate

LEARNING OUTCOMES
- Explain robot anatomy, classification, motion, joints & DoF with real examples
- Understand AI history, types, ethics, and the role of data in AI systems
- Write Python programs with full control flow, functions & modularity
- Apply the AI Project Cycle to design a real-world solution (Smart School)

CLASS 9 KIT BOX — RECOMMENDED
Hands-on components to build alongside sessions
Arduino Uno · IR & Ultrasonic Sensors · LED & Breadboard · Robot Chassis Kit · Project Guidebook
ADD AT CHECKOUT

CLASS 10

Robotics and Artificial Intelligence · 1-to-1 Online Live
Python · AI · Cobots · Tinkercad · Arduino

36 — 1-to-1 Sessions, ~1 Academic Year

PART I — ROBOTICS (UNITS 1–2)

- S.1–2 **New Age Robotic Systems (NARS)** — Warehouse robots · Smart homes · Autonomous vehicles · Delivery drones · Healthcare & education robotics · Why NARS matter
- S.3–4 **From Robots to Cobots** — Machines vs robots vs cobots · Human-robot collaboration · Cobot safety · Real-life industry applications
- S.5–6 **Components of Robots as a System** — Gears, torque, gear ratio · Vision, tactile, proximity, temperature sensors · Actuators & joints: rotary, linear, revolute, prismatic
- S.7–8 **Design, Visualization & Integration** — Designing robot joints in Tinkercad · Simulating linear vs rotary motion · Building wheeled robots (4WD, RR) · Arduino/Nano basics · Connecting sensors & motors

PART II — AI (UNIT 3)

- S.9 **Decision-Making in Machines** — Automated vs autonomous systems · Human vs machine thinking · Deterministic vs probabilistic thinking
- S.10 **Machine Learning & Cybersecurity** — Intro to ML · Cybersecurity threats: hacking, phishing, fraud, data theft · Turing Test · Ethical issues in AI
- S.11–12 **AI Project Cycle & Data** — Problem Scoping → Data Acquisition → Exploration → Modeling → Evaluation & Deployment · Types of AI models: supervised, unsupervised, reinforcement

PART III — PYTHON (UNITS 4–5)

- S.13–14 **Python Foundations** — Code structure · Variables & data types · Input/output · Debugging · Conditional statements: if, elif, else · Loops: for, while, nested · Break, continue, pass
- S.15 **Functions in Python** — Built-in vs user-defined · Argument types: fixed, default, variable · Return values & modularity
- S.16–17 **Advanced Python Tools** — Modules & packages · Lists, tuples, dictionaries · String processing · Intro to NumPy, Pandas, Matplotlib

PART IV — PRACTICALS & ENRICHMENT (UNIT 6)

- S.18–22 **Practical Assignments & Lab Work** — 3 robotics assignments · 2 AI use case concept maps · 15 Python tasks based on real-life problems
  - 15 Python Practical Tasks
- S.23–25 **Enrichment Modules** — Computational thinking in robotics · Data visualisation: graphs, pie & bar charts · Meet the inventors: AI & robotics pioneers · Healthy tech living
- S.26–30 **Data Science with Python** — EDA with Matplotlib · Basic regression with scikit-learn · Data cleaning with Pandas · Plotting insights from real datasets
- S.31–35 **Exam Preparation** — Chapter-wise revision · Pattern MCQs · Short answer & diagram questions · Practical file completion
- S.36 **Final Project & Showcase** — Integrated robotics + AI project · Demonstration · Evaluation · Certificate

LEARNING OUTCOMES
- Understand NARS, cobots, and design robots using Tinkercad & Arduino
- Apply ML concepts, cybersecurity awareness & the AI Project Cycle
- Write Python programs with functions, modules, NumPy & Pandas
- Complete 15 practical tasks and full exam preparation

CLASS 10 KIT BOX — RECOMMENDED
Build wheeled robots and circuit projects during sessions
Arduino Nano · 4WD Robot Chassis · Motor Driver L298N · Sensors: IR, Ultrasonic · Tinkercad Account
ADD AT CHECKOUT

CLASS 11

Robotics and Artificial Intelligence · 36 Sessions · 72 Contact Hours · 1-to-1 Online Live
NSQF Level 4 · IIT Delhi IHFC · Prerequisite for Class 12

36 — 1-to-1 Sessions, 7 Units · 72 hrs

UNIT 1 — ROBOTICS FOUNDATIONS (S.1–6)

- S.1–3 **Intro, Classification & Applications** — Definition, history, Asimov's laws · Field/terrain/bio-inspired types · Domestic, industrial, medical, defence, agriculture · Indian examples: ISRO Vyommitra, AIIMS surgical
- S.4–5 **Robot as a System, Joints & DoF** — Block diagram: mechanical, electronic, computational · Prismatic, revolute, spherical joints · Degrees of freedom
- S.6 **Lab 1: Robot Identification & Assembly**
  - Lab: Identify, label & assemble robot kit

UNIT 2 — SENSING, ACTUATION & CONTROL (S.7–11)

- S.7–8 **Sensors — IR & Ultrasonic** — Internal vs external sensors · IR reflection · HC-SR04 echo timing & distance calculation
- S.9–10 **Actuators & Control Systems** — DC, servo, stepper motors · PWM control · Open vs closed loop · Sense-Think-Act · PID intro
- S.11 **Lab 2: Sensors & Motors Demo**
  - Lab: HC-SR04 + servo sweep on Arduino

UNIT 3 — PROGRAMMING & EMBEDDED (S.12–17)

- S.12–14 **Python: Basics, Control Flow & Functions** — Data types, variables · if-elif-else, for/while loops · User-defined functions, arguments, modularity
- S.15 **Arduino & Microcontroller Programming** — Arduino IDE · setup() & loop() · Digital I/O, PWM, Serial Monitor
- S.16–17 **Labs 3 & 4: Robot Builds**
  - Lab 3: Line Follower Robot · Lab 4: Obstacle Avoidance Robot

UNIT 4 — AI FOUNDATIONS (S.18–22)

- S.18–21 **AI Intro, Applications, Data & Ethics** — AI history, Turing Test, narrow vs broad AI · Applications across 8+ sectors · Data types, data flow, probabilistic computing · Bias, fairness, accountability
- S.22 **Python for AI — NumPy & Pandas**
  - Lab: NumPy arrays, Pandas DataFrames, CSV analysis

UNIT 5 — MACHINE LEARNING & DATA SCIENCE (S.23–27)

- S.23–26 **ML Concepts, EDA, Regression & Classification** — Supervised, unsupervised, reinforcement learning · EDA with Matplotlib · Linear regression with scikit-learn · Decision Tree & k-NN (conceptual)
- S.27 **Lab 5: Data Analysis Project**
  - Lab: Kaggle dataset → clean → visualise → train model

UNIT 6 — AI PROJECT FRAMEWORK & CV (S.28–32)

- S.28–30 **AI Project Cycle: Scoping → Modelling** — 4Ws problem scoping · Kaggle data acquisition · Confusion matrix, precision & recall
- S.31–32 **Computer Vision & NLP Intro** — OpenCV: read, resize, edge detection, face detection · NLP: tokenisation, sentiment analysis, chatbots

UNIT 7 — INTEGRATION, IOT & CAPSTONE (S.33–36)

- S.33–34 **IoT Foundations + Lab 6** — IoT architecture · MQTT protocol · ESP32/NodeMCU
  - Lab 6: DHT11 + HC-SR04 → ThingSpeak cloud dashboard
- S.35–36 **Capstone Project + Demo Day** — Integrated Robotics + AI + IoT project · 5–7 min presentation + viva + portfolio

LEARNING OUTCOMES
- Assemble, wire & program a functional robot using Arduino/ESP32
- Write Python with NumPy, Pandas, Matplotlib for data science
- Build & deploy a basic IoT system to a cloud dashboard
- Complete integrated capstone: Robotics + AI + IoT

CLASS 11 KIT BOX — RECOMMENDED
For 6 lab sessions: line follower, obstacle avoidance, IoT dashboard
Arduino Uno + ESP32 · 2WD Robot Chassis · L298N Motor Driver · DHT11 + HC-SR04 + IR · Servo SG90 + Buzzer
ADD AT CHECKOUT

CLASS 12

Robotics and Artificial Intelligence · 36 Sessions · 72 Contact Hours
NSQF Level 5 · IIT Delhi IHFC · Deep Learning · CV · IIoT · Cloud AI

36 — 1-to-1 Sessions, 7 Units · 72 hrs

UNIT 1 — ADVANCED ROBOTICS: KINEMATICS & DESIGN (S.1–6)

- S.1 **Recap & Bridging from Class 11** — Robot anatomy, DoF, sensors, actuators, Python basics · Gap assessment quiz · Class 12 roadmap
- S.2–3 **Robot Kinematics & Path Planning** — Forward & inverse kinematics · Denavit-Hartenberg notation · Trajectory planning: point-to-point vs continuous · A* algorithm concept
- S.4–5 **Cobots & New-Age Robotic Systems** — Cobot safety ISO/TS 15066 · Force-torque sensing · Warehouse, surgical, autonomous drones, swarm robotics
- S.6 **Lab 1: Robotic Arm Build & Kinematics**
  - Lab: 3/4-DOF servo arm → pick-and-place sequence

UNIT 2 — IIOT & INDUSTRIAL AUTOMATION (S.7–11)

- S.7–10 **Industrial Sensors, IIoT, SCADA & Predictive Maintenance** — Encoders, load cells, LIDAR · Kalman filter, IMU · IIoT Purdue model · Modbus, OPC-UA, PROFINET · PLC ladder logic · Digital twin · ML-based anomaly detection
- S.11 **Lab 2: IIoT Smart Sensor Dashboard**
  - Lab: ESP32 + DHT22 + soil moisture → MQTT → Node-RED

UNIT 3 — ADVANCED PYTHON, OOP & DATA (S.12–16)

- S.12–15 **OOP, Data Structures, File Handling & APIs** — Classes, objects, inheritance, polymorphism · Stacks, queues, trees · File I/O: CSV, JSON · REST API calls (requests library) · Flask web endpoints · NumPy broadcasting, Seaborn
- S.16 **Lab 3: Advanced Data Pipeline**
  - Lab: Kaggle dataset → clean → feature engineer → Seaborn

UNIT 4 — DEEP LEARNING & NEURAL NETWORKS (S.17–22)

- S.17–20 **Neural Networks, Backprop, CNNs & RNNs** — Perceptron, activation functions, feedforward networks · Loss functions, gradient descent, dropout · Keras Sequential API · CNN: convolution, pooling, transfer learning (MobileNet) · RNN, LSTM, word embeddings
- S.21–22 **Lab 4: CNN Image Classifier**
  - Lab: Google Colab · CIFAR-10 · Conv2D + MaxPool · 10 epochs

UNIT 5 — COMPUTER VISION & AI ROBOTICS (S.23–27)

- S.23–26 **Advanced OpenCV, Detection, AI Robots & NLP** — Gaussian/median filters, contour detection · Haar cascade, HOG+SVM, YOLO (conceptual) · Lane detection, colour-sorting robot, gesture control (MediaPipe) · TF-IDF, sentiment analysis, chatbot design
- S.27 **Lab 5: AI Vision Robot Challenge**
  - Lab: Line-follow + colour detect + object stop (Arduino)

UNIT 6 — BIG DATA, CLOUD AI & RESPONSIBLE AI (S.28–32)

- S.28–31 **Big Data, Cloud AI, RL & Ethics** — 5 Vs of big data · Batch vs stream processing · AWS Rekognition, Google Vision API · Flask ML deployment · Q-learning, OpenAI Gym · DPDP Act 2023, EU AI Act, LIME/SHAP
- S.32 **Lab 6: Cloud-Deployed AI Model**
  - Lab: Flask/Gradio ML model → live browser inference

UNIT 7 — CAPSTONE, EXAM PREP & CAREER (S.33–36)

- S.33–34 **Capstone: Ideation, Design & Build** — Full system: Robotics + AI + IoT · Gantt chart · Mentor review · Sample ideas: AI waste sorter, smart agriculture, sign language translator, autonomous warehouse bot
- S.35 **Revision & Mock Assessment** — Unit-wise concept maps · Pattern questions (MCQ, short answer, case study) · 40–50% CBQ practice
- S.36 **Demo Day — Final Presentation & Assessment** — 7–10 min presentation + live demo · Viva voce · Portfolio handover · Industry certification sign-off

LEARNING OUTCOMES (INDUSTRY READY)
- Design multi-DOF robotic arms and deploy kinematics-based tasks
- Build IIoT systems with MQTT, SCADA concepts & predictive maintenance
- Train and deploy CNNs, RNNs using TensorFlow/Keras on Google Colab
- Deploy ML models to cloud via Flask/Gradio · Apply DPDP Act ethics

CLASS 12 KIT BOX — RECOMMENDED
Advanced hardware for 6 labs including robotic arm & vision robot
4/6-DOF Servo Arm Kit · USB Webcam (720p) + Camera Module · ESP32 DevKit · DHT22 + IMU + LDR · USB Webcam (720p)
ADD AT CHECKOUT