R-A-I-Π
AI ROBOTICS

Robotics & Artificial Intelligence Nigeria

Training Brochure

Robotics and Artificial Intelligence Nigeria, Ibadan

What you would learn

The world is fast changing, and the demand for advanced I.T skills is the new order. Regardless of your career background, there is a role for you in this fast changing world ruled by Artificial Intelligence and Robotics.

Our certification courses will take you from zero to hero in Python and C programming, computer vision, machine learning and neural networks

Get the best of learning experience at RAIN. Our UK trained course facilitators will make sure you get as much practical exposure required to be able to compete favourably in the global society.

9-Months Intensive Courses in Machine Learning and Robotics

Learning from some of the best faculties, and using the most up-to-date curriculum in AI and Robotics, RAIN provides a 9-Months 3-Semester in-Class intensive course in Robot Development and Automation, as well as in Artificial Intelligence and Machine Learning.

Learn Product Development from the Experts

At this point in your life, you don't want boring classroom sessions. The universities are there for that. When you walk into RAIN, what you want is to learn how to solve real problems by building actual standard sell-able products. We know what you want. That is why we make sure the curriculum is 70% product development.

Let Us Help Build you a Career and get you Self-Employed

At RAIN, our courses are not designed to get you a job at the end, but to get you creating Jobs. That's why we include project management as an extra. Trainees are organised at the end of the program into pockets of start-ups with inter dependable business goals.

Senior Technical Advisor: Kyle Jenkinson

Kyle is a highly experienced product development engineer based in the United Kingdom. With over ten years' experience developing commercial solutions for UK's Nuclear Decommissioning and Oil & Gas exploration challenges, Kyle has built a high reputation for strict adherence to standards and eye for detail. Kyle has a passion for 3-dimensional product designs and is a graduate of Lakes College, Cumbria, UK.

Senior Technical Advisor: Abdulmujeeb Tolu Onawole, B.Sc, M.Sc

Tolu is a Computational Chemist at the Gas Processing Center, Qatar University. He had his Master's degree in Chemistry at the King Fahd University of Petroleum and Minerals, Saudi Arabia in 2017 and had his Bachelor's degree in Pure and Applied Chemistry at Ladoke Akintola University of Technology, Ogbomoso, Nigeria in 2011. He has some publications where he has applied machine learning to drug discovery and oilfield chemistry.

Senior Technical Advisor: Sobur Carim-Sanni

After an exciting career with Soterix Medical, Attomed and Boston Scientific, RAIN is pleased to welcome USA based Biomedical Engineer, Sobur Carim-Sanni. Sobur's passion is in applying embedded systems solution for solving medical related problems common in developing countries. His recent focus has been on brain related illnesses. He has also researched into Transcranial Direct Current Stimulation voltage distribution and protein dynamics. He studied biomedical engineering at City College of The City University of New York.

Senior Technical Advisor: Peter Routledge

Peter leads us in Project Management with over 30 years' experience in industry. With remarkable skills in leadership and resource management, Peter galvanises engineering teams and project stakeholders towards delivering on schedule and within budget. He is critical of QA procedures and adherence to industry standards with regards to documentations, drawings and calculations. He is also skilled in SWOT analysis for future business planning. Peter has managed a wide range of European Union funded projects under grants by innovateUK. His exposure cuts across nuclear, marine and civil engineering related projects. Although based in the United Kingdom, RAIN is pleased to have Peter as one of those who would mentor trainees in product development and project management.

Senior Technical Advisor: Aminat Akinyemi

Aminat is a first class graduate of Computer Science Department, University of Ibadan. She graduated as the best female student in her department and was a recipient of a number of scholarships including Shell Petroleum, MTN Telecommunications and Commonwealth Shared Scholarship. She was also awarded best female programmer in her class.

Aminat attended the University of Hull, United Kingdom where she graduated with a distinction in the Computer Science Master's degree. Due to her passion for IT, specifically to encourage women in programming, she volunteers as a mentor for the STEM Girls Initiative. She is currently into Data Science and AI, and works with Robotics and Artificial Intelligence Nigeria - RAIN.

Founder: Dr Olusola Ayoola, MSc, PhD, MIET

Olusola is the founder of Robotics and Artificial Intelligence Nigeria (RAIN). He lectures at the prestigious University of Ibadan, Nigeria where he specialises in robotics and advanced control. Olu has been a recipient of local and international scholarship awards. He holds a first class Bachelor's degree in Electrical and Electronic Engineering from the University of Ibadan. He also holds with distinction a Masters' degree in Advanced Control and Systems Engineering as well as a Doctorate degree in Electrical and Electronic Engineering from the University of Manchester, UK. Olu served as a member of the robotics research group at the University of Manchester, UK between 2014 and 2019. During this period,

and in partnership with Forth Engineering, UK, Olu focused on developing ground and underwater robots to support UK's Nuclear Decommissioning programme. He also developed acoustics systems for underwater robot positioning and non-tethered communication. Olu is a member of the prestigious Institution of Engineering and Technology (IET). He has a proven passion for knowledge transfer and an extensive record of delivering robotics and STEM outreach programmes in the UK. At RAIN, Olu leads groundbreaking research in Robotics and Drone Technology.

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OUR COURSES.

Full courses comprise: First and second semesters (6 months) - classroom and workshop based classes. Third semester (3 months) - Product Development/Final Project AI trainees towards the end of second semester get to choose whether to specialise in Computer Vision or Natural Language Processing for deep learning application. Our full courses also include free project management seminars. At the end of the full course, best performances are rewarded with a fully sponsored startup set-up.
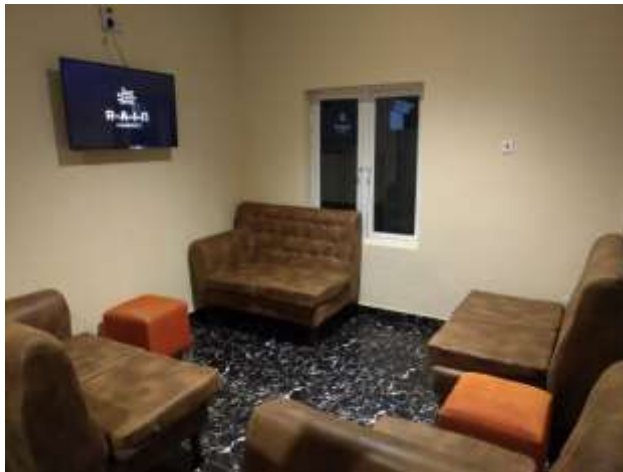
Comfortable Learning Environment

Our Programmes

Robot development and Automation

Pre-Requisite: Basic Mathematics and Statistics Knowledge equivalent to a credit in GCE O level Mathematics)

Course Includes: - Python and C Programming, - Automated Systems and Control, - Robot Development, - Embedded System Development, - Intelligent and Robust Control, -Adaptive and Non-Linear Control, - Internet of Things, - Text and Image Recognition (optional), - Natural Language Processing (optional), - Computer Vision (optional), - Project Management, - Product Development, - Final Project

Artificial Intelligence and Machine Learning

Pre-Requisite: Basic Mathematics and Statistics Knowledge equivalent to a credit in GCE O level Mathematics)

Course Includes: - Data Science, - Machine Learning, - Deep Learning, - Neural Networks, - Text and Image Recognition, - Computer Vision, - Natural Language Processing, - Project Management, - Product Development, - Final Project

What will your rain days be like?
WEEK DAYS

From Mondays to Fridays, trainees will be engaged at RAIN from 9 am till 5 pm. We understand that trainees are mostly adults and therefore we try to make training sessions extremely interactive, lively and educative. Course facilitators will do everything to help trainees achieve their goals, including listening attentively to questions asked during sessions and via email, and providing close guidance during practical sessions.

A typical day will involve theory in-class sessions and workshop practise sessions. Each trainee will be assigned to mentors (any of the senior technical advisors), and will have occasional mentorship meetings arranged.

Trainees who are sponsored by state or federal government bodies would need to ensure that their projects/product development focus is on an immediate need of their sponsor. This will be pre-agreed.

All trainees are required to have a laptop, however, on-site computers would be provided where needed.

There will be safety rules, risk assessments and necessary equipment safety training to be undertaken before trainees are allowed to make use of on-site workshop equipment such as laser CNC machine and others.

WEEKEND DAYS:

On weekends, trainees would not be required to visit the learning hub. The hub would however be opened to research members every day of the week.

Trainees who wish to visit the hub on weekends for extra work would need prior booking.
Otherwise, activities available for trainees on weekends will include:
General Leisure and Relaxation Activities
Vehicle Driving Lessons (Optional)
Outdoor Sport Activities (Optional)
Weekend Jobs (if any)

Ibadan city is known for its social life. There are a number of places to visit, and our trainees would be given orientation about the city of Ibadan, the sights and facts about the ancient city.

PUBLIC/BANK HOLIDAYS:
AT RAIN, we observe every and all public and bank holidays as directed both by the federal and state government.

List of Courses

COURSE OUTLINE FOR ROBOT DEVELOPMENT AND AUTOMATION

MODULE 1: **Product Design and Development** – RDA 111
- 2D and 3D CAD Design
- Product life cycle,
- Joinery
- Materials
- Workshop tools
- Design
- Fabrication of parts

MODULE 2: **Practical electronics and embedded systems** – RDA 112
- Multisim for electronic circuit development
- Circuit analysis and Power Calculation
- PCB development
- Signal and sensing
- Sensors and Motors
- Electronic component assembly
- Wiring and Soldering

MODULE 3: **Control Theory and iOT** – RDA 113
- Matlab/Simulink for system identification and modelling
- C++ Programming
- Bang Bang Control, PID Control, obstacle detection, object tracking
- Arduino Programming and Modules
- Types of Motors and their Control
- Digital Controller design and development
- Robot arm control

MODULE 4: **Advanced Control Theory for Mobile Robots** – RDA 211
- Robust Control for Drone Flight Stability

- Understanding Robot Kinematics
- Intelligent Control for 2-Legged Mobile Robot Gait Control

MODULE 5: **AI for Humanoid Robotics** – RDA 212

- Python Programming on Raspberry Pi
- Robot Operating System
- SWARM Robotics
- SLAM and position awareness
- Computer Vision
- Natural Language Processing
- Speech Synthesis

MODULE 6: **Project Management** – PPM 101

COURSE OUTLINE FOR MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE

MODULE 1: PYTHON PROGRAMMING - PY 101

- PYTHON BASICS
- DATA STRUCTURES
- CONTROL FLOW
- FUNCTIONS
- CLASSES
- OBJECT ORIENTED PROGRAMMING
- REGULAR EXPRESSIONS
- READING, WRITING AND ORGANISING FILES
- DEBUGGING
- EXCEPTION HANDLING
- WEB SCRAPING
- WORKING WITH DOCUMENTS (SPREADSHEETS, WORD, PDF, CSV)
- JSON
- KEEPING TIME, SCHEDULING TASKS AND LAUNCHING PROGRAM
- SENDING EMAIL AND TEXT MESSAGES

- IMAGE AND VIDEO PROCESSING
- GUI AUTOMATION

MODULE 2: DATA SCIENCE WITH PYTHON (4 WEEKS) - DS 101

- PROGRAMMING AND PYTHON FUNDAMENTALS
- DATA STRUCTURES AND ALGORITHMS
- OBJECT ORIENTED PROGRAMMING AND PYTHONIC SYTLE
- READING AND WRITING DATA
- PYTHON DATA SCIENCE PACKAGES
- DATA MUNGING
- STRUCTURED QUERY LANGUAGE (SQL)
- CLASSES AND OBJECT RELATION MAPPING

MODULE 3: SUPERVISED LEARNING AND ENSEMBLE TECHNIQUES (4 WEEKS) - ML 101

- LINEAR AND NON LINEAR REGRESSION
- LOGISTIC REGRESSION
- NAIVE BAYE'S
- K NEAREST NEIGHBOUR (KNN)
- SUPPORT VECTOR MACHINE (SVM)
- DECISION TREES
- ENSEMBLE METHODS
- RANDOM FOREST

MODULE 4: UNSUPERVISED LEARNING (2 WEEKS) - ML 102

- K MEANS CLUSTERING
- HIERARCHICAL CLUSTERING
- PRINCIPAL COMPONENT ANALYSIS (PCA)
- MODULE 5: FEATURISATION, MODEL SELECTION AND TUNING (2 WEEKS) - ML 103
- FEATURE EXTRACTION
- MODEL DEFECTS AND EVALUATION
- METRICS
- MODEL TUNING

MODULE 6: RECOMMENDER SYSTEMS (2 WEEKS) - ML 104

- POPULARITY BASED MODEL
- MARKET BASKET ANALYSIS
- CONTENT BASED MODEL
- COLLABORATIVE FILTERING

MODULE 7: REINFORCEMENT LEARNING (2 WEEKS) - ML 105

- Q LEARNING
- STATE ACTION REWARD STATE ACTION (SARSA)
- DEEP Q NETWORK
- DEEP DETERMINISTIC POLICY GRADIENT

MODULE 8: NEURAL NETWORKS (4 WEEKS) - DL 101

- NEURAL NETWORK BASICS
- DEEP NEURAL NETWORKS
- ACTIVATION FUNCTION AND LOSS FUNCTION
- OPTIMISERS, DROPOUTS AND REGULARISATION PARAMETERS
- TENSOR FLOW AND KERAS FOR DEEP LEARNING AND NEURAL NETWORKS

MODULE 9: COMPUTER VISION (5 WEEKS) - DL 102

- INTRODUCTION TO CONVOLUTIONAL NEURAL NETWORKS (CNN)
- FORWARD PROPAGATION AND BACKWARD PROPAGATION FOR CNNs
- CONVOLUTION, POOLING, PADDING AND ITS MECHANISMS
- CNN ARCHITECTURES
- TRANSFER LEARNING
- SEMANTIC SEGMENTATION
- YOLO
- SIAMESE NETWORKS
- OBJECT AND FACE RECOGNITION

MODULE 10: NATURAL LANGUAGE PROCESSING (5 WEEKS) - DL 103

- TEXT EXTRACTION TECHNIQUES
- BAG OF WORDS, TERM FREQUENCY - INVERSE DOCUMENT FREQUENCY (TF-IDF), N-GRAMS
- WORD2VEC, GLOBAL VECTORS (GloVe)
- RECURRENT NEURAL NETWORK (RNN)
- LONG SHORT - TERM MEMORY (LSTM)
- TEXT TO SPEECH
- SPEECH TO TEXT

PROJECT (3 MONTHS)