Publication date : 05/24/2024

Course : Artificial Intelligence, useful algorithms applied to robotics

Practical course - 3d - 21h - Ref. IAG
Price : 2470 CHF E.T.

4,4 / 5

In charge of robotics projects, you would like to perfect your knowledge of Artificial Intelligence and algorithms to add software capabilities to your projects: image analysis, object recognition, reinforcement learning, genetic algorithms, Machine Learning, Deep Learning...

Teaching objectives

At the end of the training, the participant will be able to:

- Découvrir les algorithmes et solutions de Machine Learning et Deep Learning utiles à la robotique
- Know how to use optical character, face and QR code recognition tools
- Learn how to create software robotic interactions based on scenarios, chatbot
- Virtualize your environment: maps, digital twins, simulations
- Discover frameworks and software toolkits useful for your robotics project

Intended audience

Robotics integrators, robotics engineers, technical project managers, developers.

Prerequisites

Knowledge of a programming language such as C, C++ or Python.

Course schedule

PARTICIPANTS

Robotics integrators, robotics engineers, technical project managers, developers.

PREREQUISITES

Knowledge of a programming language such as C, C++ or Python.

TRAINER QUALIFICATIONS

The experts leading the training are specialists in the covered subjects. They have been approved by our instructional teams for both their professional knowledge and their teaching ability, for each course they teach. They have at least five to ten years of experience in their field and hold (or have held) decision-making positions in companies.

ASSESSMENT TERMS

The trainer evaluates each participant's academic progress throughout the training using multiple choice, scenarios, hands-on work and more.
Participants also complete a placement test before and after the course to measure the skills they've developed.

1 Introduction

- History and culture of robotics, IoT.
- Artificial Intelligence and its Machine Learning and Deep Learning families.
- New technology applications and developments.
- From algorithm to circuit board.

2 Algorithms and Artificial Intelligence

- Definitions and examples of useful algorithms.
- Scenarios, graphs, decision trees.
- Machine Learning, supervised and unsupervised learning.
- Deep Learning, principles.
- Reinforcement learning, genetic algorithms.

Hands-on work

Robotic scenario implementation, automatic decision-making, anomaly detection and prevention.

3 Image analysis

- QR Codes, barcodes: creation and reading.
- Optical character recognition: OCR.
- Identification and authentication of objects and faces.
- Track points, objects and paths.

Hands-on work

Detect and track objects, react to QR codes or faces.

4 Sound, speech recognition, chatbot and NLP

- Use cases, possibilities and limits.
- From voice to text.
- API, connected and unconnected mode.
- Chatbot, closed scenario, open scenario (TAL, NLP).
- Text To Speech.

Hands-on work

Create a chatbot that interacts with its environment.

5 2D and 3D mapping and robotic virtualization

- Transform a map into a graph.
- Finding your way: Dijkstra, A-Star, optimizing map reading.
- Photogrammetry algorithms.
- Real-time mapping: sonar, lidar, camera.
- Virtual robotic environment and digital twin.

Hands-on work

Use data captured by a robot to reconstruct a map, find the shortest path between two points, and test the solution.

TEACHING AIDS AND TECHNICAL RESOURCES

• The main teaching aids and instructional methods used in the training are audiovisual aids, documentation and course material, hands-on application exercises and corrected exercises for practical training courses, case studies and coverage of real cases for training seminars.
• At the end of each course or seminar, ORSYS provides participants with a course evaluation questionnaire that is analysed by our instructional teams.
• A check-in sheet for each half-day of attendance is provided at the end of the training, along with a course completion certificate if the trainee attended the entire session.

TERMS AND DEADLINES

Registration must be completed 24 hours before the start of the training.

ACCESSIBILITY FOR PEOPLE WITH DISABILITIES

Do you need special accessibility accommodations? Contact Mrs. Fosse, Disability Manager, at psh-accueil@orsys.fr to review your request and its feasibility.

6 Robotic communication

- The main protocols: 4G, 5G, Lifi, Wifi, Bluetooth.
- Electronic and computer communication: serial, TOR, multiplexing, demultiplexing.
- Real-time video and audio streams.
- Cryptography, transmission encryption.

Hands-on work
Control robotic accessories: ethernet relays, WiFi, servomotors, cameras.

7 Frameworks and toolboxes

- Arduino, Raspberry Pi: presentations.
- Graphics libraries: OpenCV, BoofCV.
- ROS: Robot Operating System.
- Tensorflow, Keras, OpenAI, CNTK.
- Scratch: elementary brick programming.
- Simulation: Unity, Blender, Bullet.

Hands-on work
Test different frameworks on the examples seen above.

Dates and locations

REMOTE CLASS
2026 : 18 Mar., 24 June, 4 Nov.