Postgraduate Diploma
Robot Navigation Systems

tech global university

Postgraduate Diploma
Robot Navigation Systems

- » Modality: **online**
- » Duration: **6 months**
- » Certificate: **TECH Global University**
- » Credits: **24 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: www.techtitute.com/us/information-technology/postgraduate-diploma/postgraduate-diploma-robot-navigation-systems

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01
Introduction

Robotics and Machine Vision techniques are currently experiencing an expansive period due to the maturity of both branches of knowledge and technological evolution. In this scenario, Artificial Intelligence, the development of algorithms and the mastery of techniques play a very important role for the continuous development of this sector. This 100% online education provides the IT professional with an attractive postgraduate diploma due to its cutting-edge content, its wide range of multimedia resources and for being taught by experts in the field of Robotics with a long career in this industry. You will have access to all this at any time of the day through an electronic device with internet connection.

Industry 4.0 is waiting for you. Enroll now and develop your robot by mastering the latest tools used in the sector"

Industry 4.0 is currently experiencing its best moment, so Robotics and the field of artificial vision have opened very attractive professional fields for the future of those professionals in these sectors, including computer scientists.

This Postgraduate Diploma is aimed at graduates who wish to specialize in the field of Robot Navigation Systems for which the expert teaching team has prepared a syllabus that provides students with all the knowledge in this area so that upon completing this 6-month diploma course they will be able to master the main techniques and tools currently used in the development of Robotics.

Thus, this online program delves into the vision techniques used in Robotics, the development and understanding of algorithms, the improvement of the technique of image processing and analysis, as well as visual SLAM, Robot localization and Simultaneous Mapping using the latest techniques of Artificial Vision used.

The IT professional who wishes to progress in this field has an excellent opportunity to achieve their goals in a comfortable and flexible way, since this program allows access without fixed schedules to the entire content of the syllabus In this way, you can distribute the teaching load of the modules of this this syllabus, according to your needs. This allows you to combine your personal responsibilities with quality learning.

This **Postgraduate Diploma in Robot Navigation Systems** contains the most complete and up-to-date program on the market. The most important features include:

- Development of case studies presented by experts in robotic engineering
- The graphic, schematic, and practical contents with which they are created, provide scientific and practical information on the disciplines that are essential for professional practice
- Practical exercises where self-assessment can be used to improve learning
- Its special emphasis on innovative methodologies
- Theoretical lessons, questions to the expert, debate forums on controversial topics, and individual reflection assignments
- Content that is accessible from any fixed or portable device with an Internet connection

"Organizing shelves in a warehouse, parking an autonomous car or delivering a package by steering a drone in an unfamiliar environment, all this can be achieved with Slam Visual and this Postgraduate Diploma. Click and sign up"

You are one step away from obtaining a postgraduate diploma that will make you grow. Access to all the knowledge in Robotics with professionals of the sector"

Enroll now and don't miss the opportunity to be able to create alternative trajectories for Mobile Robots.

Master 3D Vision systems and launch your next project with this Postgraduate Diploma.

The program's teaching staff includes professionals from the sector who contribute their work experience to this educational program, as well as renowned specialists from leading societies and prestigious universities.

Its multimedia content, developed with the latest educational technology, will allow the professional a situated and contextual learning, that is, a simulated environment that will provide an immersive education programmed to prepare in real situations.

This program is designed around Problem-Based Learning, whereby the professionals must try to solve the different professional practice situations that arise throughout the program. This will be done with the help of an innovative system of interactive videos made by renowned experts.

02

Objectives

The teaching team of this program has developed a syllabus with the aim that upon its completion, students will be able to develop the main mathematical foundations for the creation of projects in Robotics. In this case, applied to navigation systems. Thus, the IT professional will develop specialized knowledge in the use of Robot Operating System technology, will be able to examine the pros and cons of the different planning techniques and establish the limits and capabilities of visual SLAM. Case studies provided by the teaching team will facilitate the understanding and direct application of this knowledge.

With the Relearning system, learning will be faster, and you will save many hours of study"

General Objectives

- Understand the mathematical foundations for kinematic and dynamic modeling of robots
- Delve into the use of specific technologies for the creation of robot architectures, robot modeling and simulation
- Generate specialized knowledge on Artificial Intelligence
- Develop the technologies and devices most commonly used in industrial automation
- Identify the limits of current techniques to identify bottlenecks in robotic applications

"Reach your goals, create bio-inspired, aerial, terrestrial, aquatic robots. Everything at the click of a button. Enroll now"

Specific Objectives

Module 1. Robotics. Robot Design and Modeling

- Delve into the use of Gazebo Simulation Technology
- Master the use of the URDF Robot Modeling language
- Develop specialized knowledge in the use of Robot Operating System technology
- Model and simulate manipulator robots, land mobile robots, air mobile robots and model and simulate aquatic mobile robots

Module 2. Robot Planning Algorithms

- Establish the different types of planning algorithms
- Analyze the complexity of motion planning in robotics
- Develop techniques for environment modeling
- Examine the pros and cons of different planning techniques
- Analyze centralized and distributed algorithms for robot coordination
- Identify the different elements in decision theory
- Propose learning algorithms for solving decision problems

Module 3. Artificial Vision Techniques in Robotics: Image Processing and Analysis

- Analyze and understand the importance of vision systems in robotics
- Establish the characteristics of the different perception sensors in order to choose the most appropriate ones according to the application
- Determine the techniques for extracting information from sensor data
- Apply visual information processing tools
- Design digital image processing algorithms
- Analyze and predict the effect of parameter changes on algorithm performance
- Assess and validate the developed algorithms in terms of results

Module 4. Visual SLAM. Robot Localization and Simultaneous Mapping by Computer Vision Techniques

- Specify the basic structure of a Simultaneous Localization and Mapping (SLAM) system
- Identify the basic sensors used in Simultaneous Localization and Mapping (visual SLAM)
- Establish the boundaries and capabilities of visual SLAM
- Compile the basic notions of projective and epipolar geometry to understand imaging projection processes
- Identify the main visual SLAM technologies: Gaussian Filters, Optimization and Loop Closure Detection
- Describe in detail the operation of the main visual SLAM algorithms
- Analyze how to carry out the tuning and parameterization of SLAM algorithms

03

Course Management

The mastery of Robotics is in the hands of highly qualified professionals. That is why, in this postgraduate diploma TECH has included a teaching team with a high academic education and long experience in the field of engineering, and more specifically in the area covered by this program. In this way, students will acquire learning according to the demands of the sector and tailored to their professional objectives.

Achieve success thanks to the teaching team with a long trajectory in Robotics. They are your great ally in TECH"

International Guest Director

Seshu Motamarri is an expert in automation and robotics with more than 20 years of experience in various industries such as e-commerce, automotive, oil and gas, food and pharmaceutical. Throughout his career, he has specialized in engineering management and innovation and in the implementation of new technologies, always looking for scalable and efficient solutions. He has also made important contributions in the introduction of products and solutions that optimize both safety and productivity in complex industrial environments.

He has also held key positions, including Senior Director of Automation and Robotics at 3M, where he leads cross-functional teams to develop and implement advanced automation solutions. At Amazon, his role as Technical Lead led him to manage projects that significantly improved the global supply chain, such as the "SmartPac" semi-automated bagging system and the robotic smart picking and stowage solution. His skills in project management, operational planning and product development have enabled him to generate great results in large-scale projects.

Internationally, he is recognized for his achievements in IT. He has been awarded the prestigious Amazon Door Desk Award by Jeff Bezos, and has received the Excellence in Manufacturing Safety Award, reflecting his hands-on engineering approach. In addition, he has been a "Bar Raiser" at Amazon, participating in over 100 interviews as an objective evaluator in the hiring process.

In addition, he has several patents and publications in electrical engineering and functional safety, reinforcing his impact on the development of advanced technologies. His projects have been implemented globally, with highlights in regions such as North America, Europe, Japan and India, where he has driven the adoption of sustainable solutions in the industrial and e-commerce sectors.

Mr. Motamarri, Seshu

- Senior Director of Global Manufacturing Technology at 3M, Arkansas, United States
- Director of Automation and Robotics at Tyson Foods
- Hardware Development Manager III at Amazon
- Automation Leader at Corning Incorporated
- Founder and member of Quest Automation LLC
- Master of Science (MS), Electrical and Electronics Engineering at University of Houston
- Bachelor of Engineering (B.E.), Electrical and Electronics Engineering, University of Andhra
- Certification in Machinery, TÜV Rheinland Group

Thanks to TECH, you will be able to learn with the best professionals in the world”

Management

Dr. Ramón Fabresse, Felipe

- Senior Software Engineer at Acurable
- NLP Software Engineer at Intel Corporation
- Software Engineer in CATEC, Indisys
- Researcher in Aerial Robotics at the University of Seville
- PhD Cum Laude in Robotics, Autonomous Systems and Telerobotics at the University of Seville
- Degree in Computer Engineering at the University of Seville
- Professional Master's Degree in Robotics, Automation and Telematics at the University of Seville

Professors

Dr. Íñigo Blasco, Pablo

- Software Engineer at PlainConcepts
- Founder of Intelligent Behavior Robots
- Robotics Engineer at CATEC Advanced Center for Aerospace Technologies
- Developer and consultant at Syderis
- PhD in Industrial Informatics Engineering at the University of Seville
- Degree in Computer Engineering at the University of Seville
- Master's Degree in Software Engineering and Technology

Dr. Alejo Teissière, David

- Telecommunications Engineer.with Specialization in Robotics
- Postdoctoral researcher in the European projects SIAR and NIx ATEX at Pablo de Olavide University
- Systems developer at Aertec
- PhD in Automation, Robotics and Telematics at the University of Seville
- Graduated in Telecommunication Engineering at the University of Seville
- Master's Degree in Automation, Robotics and Telematics from the University of Seville

Dr. Pérez Grau, Francisco Javier

- Head of the Perception and Software Unit at Centro Avanzado de Tecnologías
- Aeroespaciales (CATEC)
- Associate Professor at the University of Cadiz and the International University of Andalucia
- Researcher in the Robotics and Perception group at the University of Zurich
- Researcher at the Australian Centre for Field Robotics at the University of Sydney
- PhD in Automation, Robotics and Telematics at the University of Seville
- Graduate in Telecommunications Engineering and Computer and Network Engineering from the University of Seville

Dr. Caballero Benítez, Fernando

- Full Professor of Systems Engineering and Automatics at the University of Seville
- Researcher in the European projects COMETS, AWARE, ARCAS and SIAR
- Associate editor of the journal Robotics and Automation Letters
- Degree in Telecommunications Engineering from the University of Seville
- PhD in Telecommunications Engineering at the University of Seville

04

Structure and Content

The syllabus of this Postgraduate Diploma has been structured in four modules, in which the teaching team has used the Relearning methodology, which allows the acquisition of learning in a progressive and natural way throughout the program. This is possible thanks to the reiteration of key concepts related to Robotics, so the student will be able to assimilate concepts more efficiently and quickly. In this way, the student will reach a high degree of specialization in the 600 teaching hours foreseen for this course.

Solves the main problems in the localization of Robots with a teaching team specialized in this area"

Module 1. Robotics. Robot Design and Modeling

1.1. Robotics and Industry 4.0
    1.1.1. Robotics and Industry 4.0
    1.1.2. Application Fields and Use Cases
    1.1.3. Sub-Areas of Specialization in Robotics
1.2. Robot Hardware and Software Architectures
    1.2.1. Hardware Architectures and Real-Time
    1.2.2. Robot Software Architectures
    1.2.3. Communication Models and Middleware Technologies
    1.2.4. Robot Operating System (ROS) Software Integration
1.3. Mathematical Modeling of Robots
    1.3.1. Mathematical Representation of Rigid Solids
    1.3.2. Rotations and Translations
    1.3.3. Hierarchical State Representation
    1.3.4. Distributed Representation of the State in ROS (TF Library)
1.4. Robot Kinematics and Dynamics
    1.4.1. Kinematics
    1.4.2. Dynamics
    1.4.3. Underactuated Robots
    1.4.4. Redundant Robots
1.5. Robot Modeling and Simulation
    1.5.1. Robot Modeling Technologies
    1.5.2. Robot Modeling with URDF
    1.5.3. Robot Simulation
    1.5.4. Modeling with Gazebo Simulator
1.6. Robot Manipulators
    1.6.1. Types of Manipulator Robots
    1.6.2. Kinematics
    1.6.3. Dynamics
    1.6.4. Simulation
1.7. Terrestrial Mobile Robots
    1.7.1. Types of Terrestrial Mobile Robots
    1.7.2. Kinematics
    1.7.3. Dynamics
    1.7.4. Simulation
1.8. Aerial Mobile Robots
    1.8.1. Types of Aerial Mobile Robots
    1.8.2. Kinematics
    1.8.3. Dynamics
    1.8.4. Simulation
1.9. Aquatic Mobile Robots
    1.9.1. Types of Aquatic Mobile Robots
    1.9.2. Kinematics
    1.9.3. Dynamics
    1.9.4. Simulation
1.10. Bioinspired Robots
    1.10.1. Humanoids
    1.10.2. Robots with Four or More Legs
    1.10.3. Modular Robots
    1.10.4. Robots with Flexible Parts (Soft-Robotics)

Module 2. Planning Algorithms in Robots

2.1. Classical Planning Algorithms
    2.1.1. Discrete Planning: State Space
    2.1.2. Planning Problems in Robotics. Robotic Systems Models
    2.1.3. Classification of Planners
2.2. The Trajectory Planning Problem in Mobile Robots
    2.2.1. Forms of Environment Representation: Graphs
    2.2.2. Search Algorithms in Graphs
    2.2.3. Introduction of Costs in Networks
    2.2.4. Search Algorithms in Heavy Networks
    2.2.5. Algorithms with any Angle Approach

2.3. Planning in High Dimensional Robotic Systems
- 2.3.1. High Dimensionality Robotics Problems: Manipulators
- 2.3.2. Direct/Inverse Kinematic Model
- 2.3.3. Sampling Planning Algorithms PRM and RRT
- 2.3.4. Planning Under Dynamic Constraints

2.4. Optimal Sampling Planning
- 2.4.1. Problem of Sampling-Based Planners
- 2.4.2. RRT* Probabilistic Optimality Concept
- 2.4.3. Reconnection Step: Dynamic Constraints
- 2.4.4. CForest. Parallelizing Planning

2.5. Real Implementation of a Motion Planning System
- 2.5.1. Global Planning Problem. Dynamic Environments
- 2.5.2. Cycle of Action, Sensorization. Acquisition of Information from the Environment
- 2.5.3. Local and Global Planning

2.6. Coordination in Multi-Robot Systems I: Centralized System
- 2.6.1. Multirobot Coordination Problem
- 2.6.2. Collision Detection and Resolution: Trajectory Modification with Genetic Algorithms
- 2.6.3. Other Bio-Inspired Algorithms: Particle Swarm and Fireworks
- 2.6.4. Collision Avoidance by Choice of Maneuver Algorithm

2.7. Coordination in Multi-Robot Systems II: Distributed Approaches I
- 2.7.1. Use of Complex Objective Functions
- 2.7.2. Pareto Front
- 2.7.3. Multi-Objective Evolutionary Algorithms

2.8. Coordination in Multi-Robot Systems III: Distributed Approaches II
- 2.8.1. Order 1 Planning Systems
- 2.8.2. ORCA Algorithm
- 2.8.3. Addition of Kinematic and Dynamic Constraints in ORCA

2.9. Decision Planning Theory
- 2.9.1. Decision Theory
- 2.9.2. Sequential Decision Systems
- 2.9.3. Sensors and Information Spaces
- 2.9.4. Planning for Uncertainty in Sensing and Actuation

2.10. Reinforcement Learning Planning Systems
- 2.10.1. Obtaining the Expected Reward of a System
- 2.10.2. Mean Reward Learning Techniques
- 2.10.3. Inverse Reinforcement Learning

Module 3. Artificial Vision Techniques in Robotics: Image Processing and Analysis

3.1. Computer Vision
- 3.1.1. Computer Vision
- 3.1.2. Elements of a Computer Vision System
- 3.1.3. Mathematical Tools

3.2. Optical Sensors for Robotics
- 3.2.1. Passive Optical Sensors
- 3.2.2. Active Optical Sensors
- 3.2.3. Non-Optical Sensors

3.3. Image Acquisition
- 3.3.1. Image Representation
- 3.3.2. Color Space
- 3.3.3. Digitizing Process

3.4. Image Geometry
- 3.4.1. Lens Models
- 3.4.2. Camera Models
- 3.4.3. Camera Calibration

3.5. Mathematical Tools
- 3.5.1. Histogram of an Image
- 3.5.2. Convolution
- 3.5.3. Fourier Transform

3.6. Image Preprocessing
- 3.6.1. Noise Analysis
- 3.6.2. Image Smoothing
- 3.6.3. Image Enhancement

3.7. Image Segmentation
- 3.7.1. Contour-Based Techniques
- 3.7.3. Histogram-Based Techniques
- 3.7.4. Morphological Operations

3.8. Image Feature Detection
 3.8.1. Point of Interest Detection
 3.8.2. Feature Descriptors
 3.8.3. Feature Matching
3.9. 3D Vision Systems
 3.9.1. 3D Perception
 3.9.2. Feature Matching between Images
 3.9.3. Multiple View Geometry
3.10. Computer Vision based Localization
 3.10.1. The Robot Localization Problem
 3.10.2. Visual Odometry
 3.10.3. Sensory Fusion

Module 4. Visual SLAM. Robot Localization and Simultaneous Mapping by Computer Vision Techniques

4.1. Simultaneous Localization and Mapping (SLAM)
 4.1.1. Simultaneous Localization and Mapping. SLAM
 4.1.2. SLAM Applications
 4.1.3. SLAM Operation
4.2. Projective Geometry
 4.2.1. Pin-Hole Model
 4.2.2. Estimation of Intrinsic Parameters of a Chamber
 4.2.3. Homography, Basic Principles and Estimation
 4.2.4. Fundamental Matrix, Principles and Estimation
4.3. Gaussian Filters
 4.3.1. Kalman Filter
 4.3.2. Information Filter
 4.3.3. Adjustment and Parameterization of Gaussian Filters
4.4. Stereo EKF-SLAM
 4.4.1. Stereo Camera Geometry
 4.4.2. Feature Extraction and Search
 4.4.3. Kalman Filter for Stereo SLAM
 4.4.4. Stereo EKF-SLAM Parameter Setting

- 4.5. Monocular EKF-SLAM
    - 4.5.1. EKF-SLAM Landmark Parameterization
    - 4.5.2. Kalman Filter for Monocular SLAM
    - 4.5.3. Monocular EKF-SLAM Parameter Tuning
- 4.6. Loop Closure Detection
    - 4.6.1. Brute Force Algorithm
    - 4.6.2. FABMAP
    - 4.6.3. Abstraction Using GIST and HOG
    - 4.6.4. Deep Learning Detection
- 4.7. Graph-SLAM
    - 4.7.1. Graph-SLAM
    - 4.7.2. RGBD-SLAM
    - 4.7.3. ORB-SLAM
- 4.8. Direct Visual SLAM
    - 4.8.1. Analysis of the Direct Visual SLAM Algorithm
    - 4.8.2. LSD-SLAM
    - 4.8.3. SVO
- 4.9. Visual Inertial SLAM
    - 4.9.1. Integration of Inertial Measurements
    - 4.9.2. Low Coupling: SOFT-SLAM
    - 4.9.3. High Coupling: Vins-Mono
- 4.10. Other SLAM Technologies
    - 4.10.1. Applications Beyond Visual SLAM
    - 4.10.2. Lidar-SLAM
    - 4.10.2. Range-Only SLAM

05
Methodology

This academic program offers students a different way of learning. Our methodology uses a cyclical learning approach: **Relearning.**
This teaching system is used, for example, in the most prestigious medical schools in the world, and major publications such as the **New England Journal of Medicine** have considered it to be one of the most effective.

Discover Relearning, a system that abandons conventional linear learning, to take you through cyclical teaching systems: a way of learning that has proven to be extremely effective, especially in subjects that require memorization"

Case Study to contextualize all content

Our program offers a revolutionary approach to developing skills and knowledge. Our goal is to strengthen skills in a changing, competitive, and highly demanding environment.

At TECH, you will experience a learning methodology that is shaking the foundations of traditional universities around the world"

You will have access to a learning system based on repetition, with natural and progressive teaching throughout the entire syllabus.

The student will learn to solve complex situations in real business environments through collaborative activities and real cases.

A learning method that is different and innovative

This TECH program is an intensive educational program, created from scratch, which presents the most demanding challenges and decisions in this field, both nationally and internationally. This methodology promotes personal and professional growth, representing a significant step towards success. The case method, a technique that lays the foundation for this content, ensures that the most current economic, social and professional reality is taken into account.

"Our program prepares you to face new challenges in uncertain environments and achieve success in your career"

The case method has been the most widely used learning system among the world's leading Information Technology schools for as long as they have existed. The case method was developed in 1912 so that law students would not only learn the law based on theoretical content. It consisted of presenting students with real-life, complex situations for them to make informed decisions and value judgments on how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

What should a professional do in a given situation? This is the question that you are presented with in the case method, an action-oriented learning method. Throughout the course, students will be presented with multiple real cases. They will have to combine all their knowledge and research, and argue and defend their ideas and decisions.

Relearning Methodology

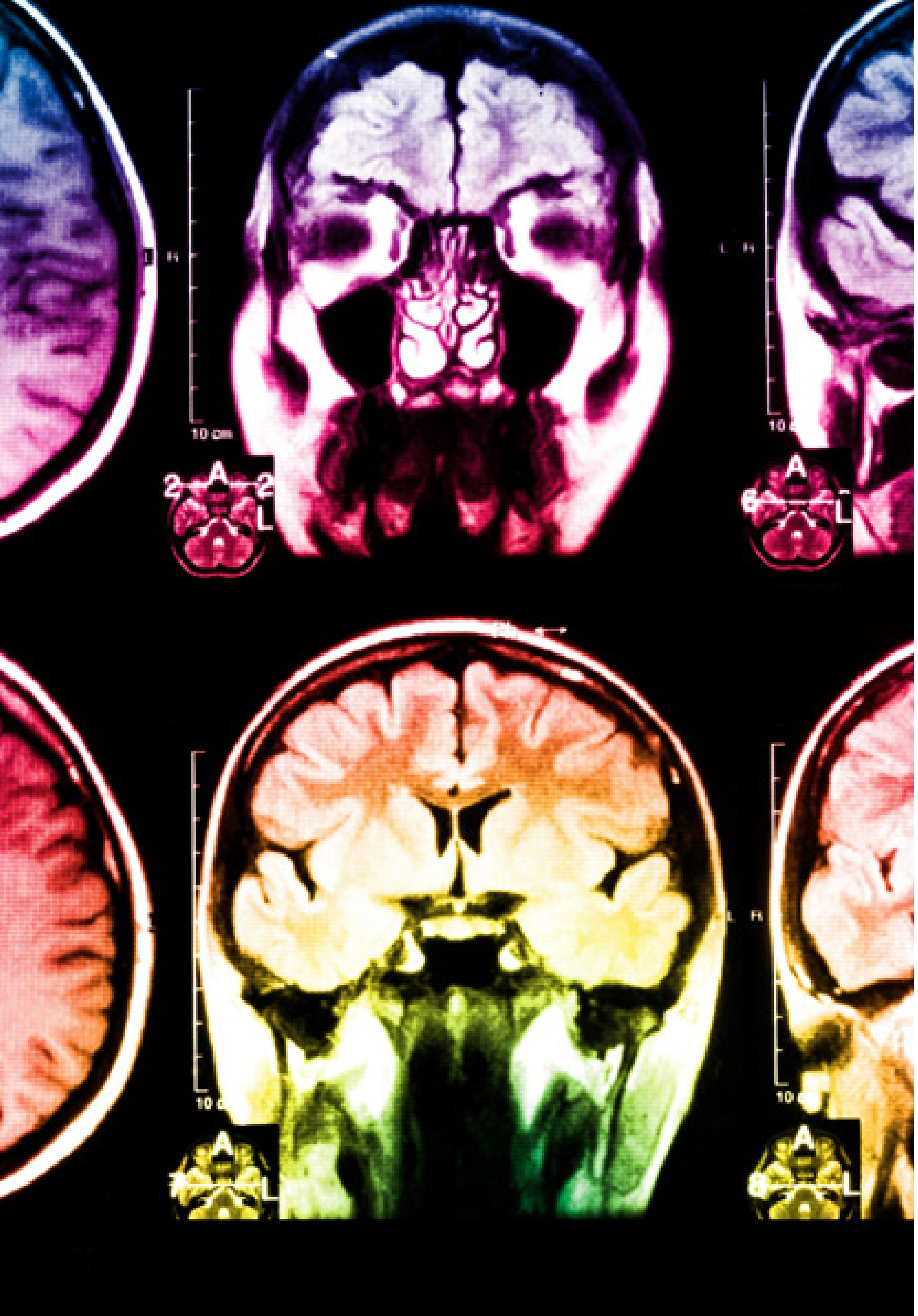
TECH effectively combines the Case Study methodology with a 100% online learning system based on repetition, which combines different teaching elements in each lesson.

We enhance the Case Study with the best 100% online teaching method: Relearning.

In 2019, we obtained the best learning results of all online universities in the world.

At TECH you will learn using a cutting-edge methodology designed to train the executives of the future. This method, at the forefront of international teaching, is called Relearning.

Our university is the only one in the world authorized to employ this successful method. In 2019, we managed to improve our students' overall satisfaction levels (teaching quality, quality of materials, course structure, objectives...) based on the best online university indicators.



In our program, learning is not a linear process, but rather a spiral (learn, unlearn, forget, and re-learn). Therefore, we combine each of these elements concentrically. This methodology has trained more than 650,000 university graduates with unprecedented success in fields as diverse as biochemistry, genetics, surgery, international law, management skills, sports science, philosophy, law, engineering, journalism, history, and financial markets and instruments. All this in a highly demanding environment, where the students have a strong socio-economic profile and an average age of 43.5 years.

Relearning will allow you to learn with less effort and better performance, involving you more in your training, developing a critical mindset, defending arguments, and contrasting opinions: a direct equation for success.

From the latest scientific evidence in the field of neuroscience, not only do we know how to organize information, ideas, images and memories, but we know that the place and context where we have learned something is fundamental for us to be able to remember it and store it in the hippocampus, to retain it in our long-term memory.

In this way, and in what is called neurocognitive context-dependent e-learning, the different elements in our program are connected to the context where the individual carries out their professional activity.

This program offers the best educational material, prepared with professionals in mind:

Study Material

All teaching material is produced by the specialists who teach the course, specifically for the course, so that the teaching content is highly specific and precise.

These contents are then applied to the audiovisual format, to create the TECH online working method. All this, with the latest techniques that offer high quality pieces in each and every one of the materials that are made available to the student.

Classes

There is scientific evidence suggesting that observing third-party experts can be useful.

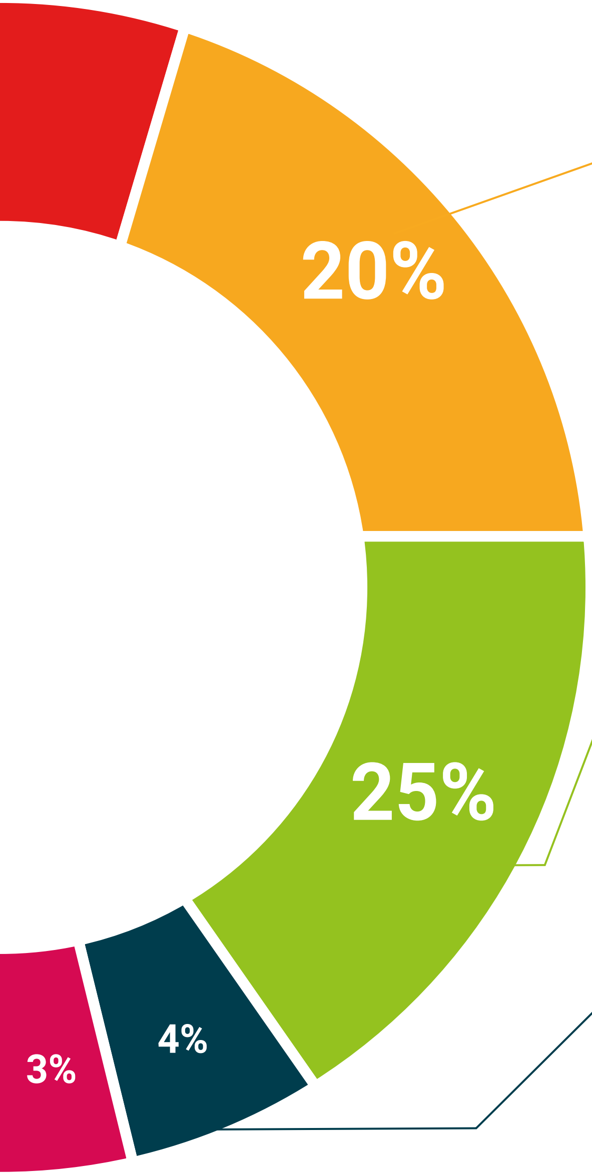
Learning from an Expert strengthens knowledge and memory, and generates confidence in future difficult decisions.

Practising Skills and Abilities

They will carry out activities to develop specific skills and abilities in each subject area. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop in the context of the globalization that we are experiencing.

Additional Reading

Recent articles, consensus documents and international guidelines, among others. In TECH's virtual library, students will have access to everything they need to complete their course.



Case Studies

Students will complete a selection of the best case studies chosen specifically for this program. Cases that are presented, analyzed, and supervised by the best specialists in the world.

Interactive Summaries

The TECH team presents the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".

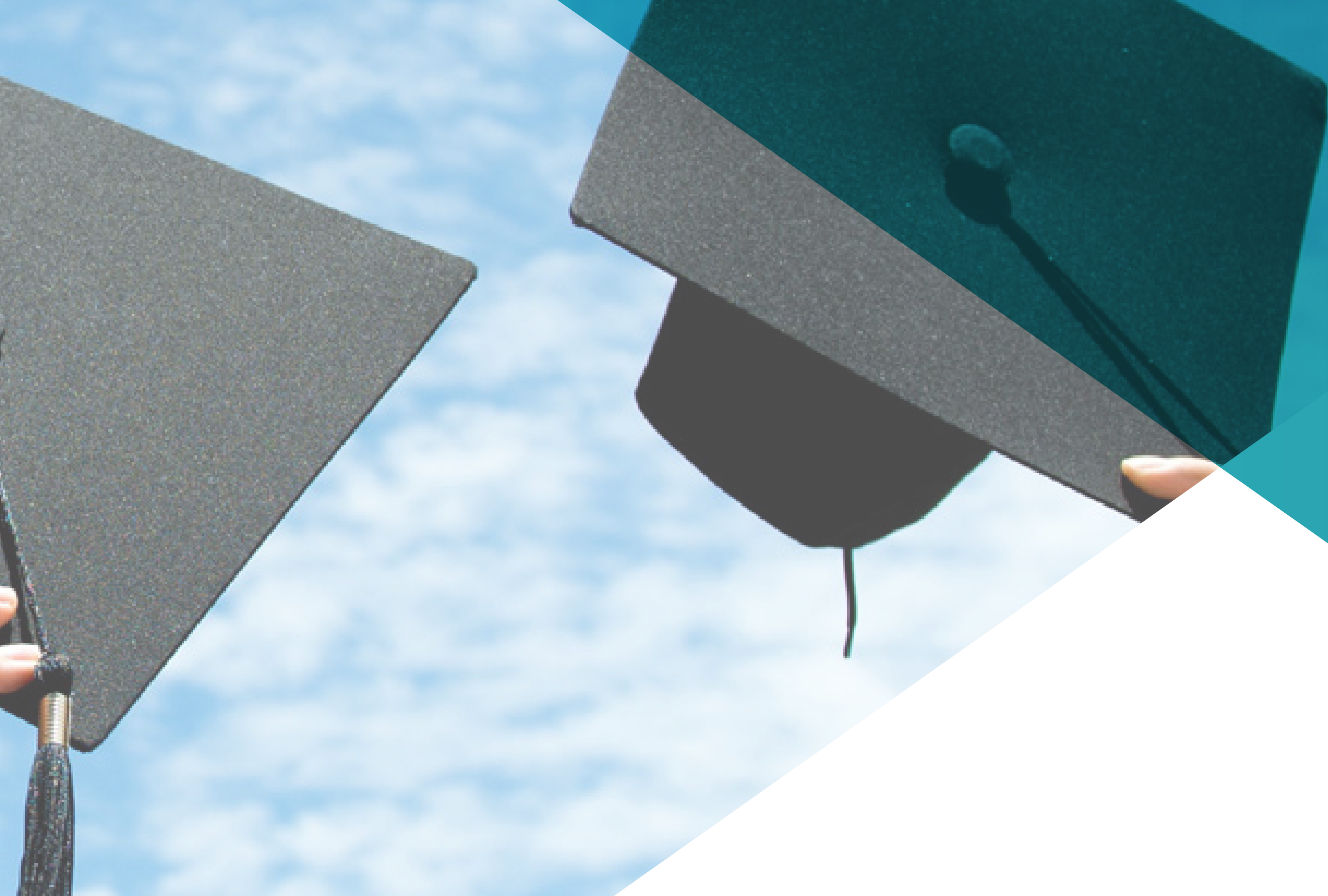
Testing & Retesting

We periodically evaluate and re-evaluate students' knowledge throughout the program, through assessment and self-assessment activities and exercises, so that they can see how they are achieving their goals.

06

Certificate

The Postgraduate Diploma in Robot Navigation Systems guarantees students, in addition to the most rigorous and up-to-date education, access to a Postgraduate Diploma issued by TECH Global University.



Successfully complete this program and receive your degree without having to travel or fill out laborious paperwork"

This program will allow you to obtain your **Postgraduate Diploma in Blockchain Technology** endorsed by **TECH Global University**, the world's largest online university.

TECH Global University is an official European University publicly recognized by the Government of Andorra (***official bulletin***). Andorra is part of the European Higher Education Area (EHEA) since 2003. The EHEA is an initiative promoted by the European Union that aims to organize the international training framework and harmonize the higher education systems of the member countries of this space. The project promotes common values, the implementation of collaborative tools and strengthening its quality assurance mechanisms to enhance collaboration and mobility among students, researchers and academics.

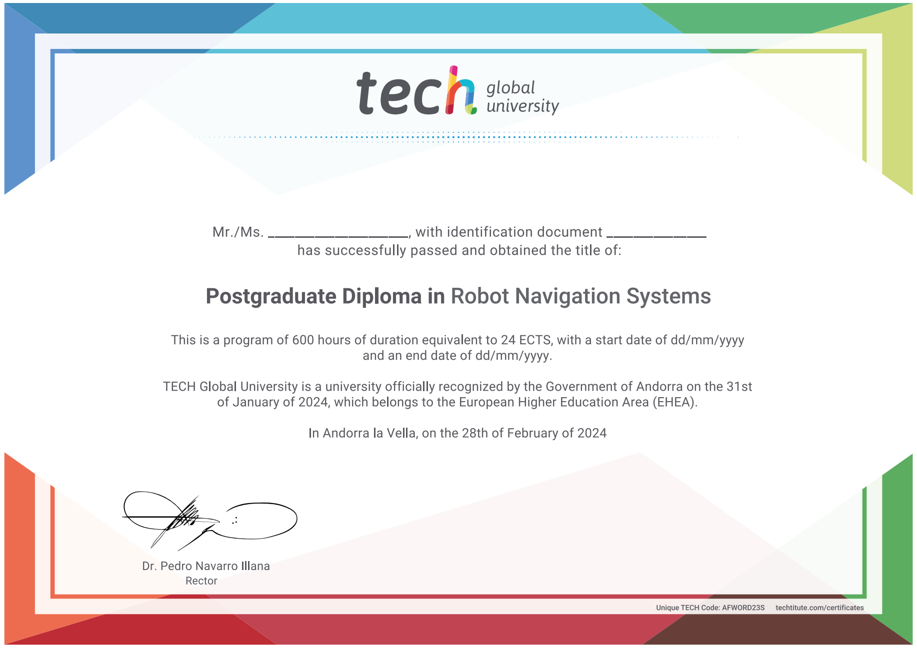
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Diploma in Robot Navigation Systems**

Modality: **online**

Duration: **6 months**

Accreditation: **24 ECTS**



tech global university

Mr./Ms. ________________, with identification document ____________
has successfully passed and obtained the title of:

Postgraduate Diploma in Robot Navigation Systems

This is a program of 600 hours of duration equivalent to 24 ECTS, with a start date of dd/mm/yyyy and an end date of dd/mm/yyyy.

TECH Global University is a university officially recognized by the Government of Andorra on the 31st of January of 2024, which belongs to the European Higher Education Area (EHEA).

In Andorra la Vella, on the 28th of February of 2024

Dr. Pedro Navarro Illana
Rector

Unique TECH Code: AFWORD23S techtitute.com/certificates

*Apostille Convention. In the event that the student wishes to have their paper diploma issued with an apostille, TECH Global University will make the necessary arrangements to obtain it, at an additional cost.

tech global university

Postgraduate Diploma

Robot Navigation Systems

- Modality: **online**
- Duration: **6 months**
- Certificate: **TECH Global University**
- Credits: **24 ECTS**
- Schedule: **at your own pace**
- Exams: **online**

Postgraduate Diploma
Robot Navigation Systems