Postgraduate Diploma

2D and 3D Image Processing

tech global university

Postgraduate Diploma
2D and 3D Image Processing

- » Modality: **online**
- » Duration: **6 months**
- » Certificate: **TECH Global University**
- » Credits: **18 ECTS**
- » Schedule: **at your own pace**
- » Exams: **online**

Website: **www.techtitute.com/us/information-technology/postgraduate-diploma/postgraduate-diploma-2d-3d-image-processing**

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01
Introduction

In the field of computer vision, image processing is one of the fundamental tasks that must be mastered in order to achieve the objectives proposed in each project. Therefore, this program focuses on this aspect, delving into the differences between 2D and 3D processing, so that the computer scientist can access the latest and most updated knowledge in this area. It also offers the latest advances in such areas as pixel operations, object tracking with conventional vision and facial recognition. All this, following a 100% online teaching system that guarantees that the computer scientists can combine their professional career with their studies.

Apply 2D and 3D Image Processing to your computer vision projects with great efficiency thanks to this Postgraduate Diploma"

Among the many branches of artificial intelligence are subspecialties such as machine learning, deep learning and computer vision. The latter is responsible for the optical processing of images perceived by a machine or an AI device. And for such processing to be correct, in-depth and novel knowledge is required, abounding in the characteristics of this process when applied to 2D or 3D images.

This Postgraduate Diploma in 2D and 3D Image Processing provides the engineer or computer scientist with the best tools to effectively perform this essential task in the field of computer vision. To this end, we offer an in-depth study of issues such as Fourier analysis, object segmentation, the library for 3D data processing, 2D image depth maps and image compression.

In this way, this program is presented through an innovative online learning methodology with which the professional will be able to decide how, when and where to study, while being guided by the best teachers in this field. In addition, this program offers numerous multimedia teaching resources such as practical exercises, explanatory videos with advanced techniques, master classes or interactive summaries, among many others.

This **Postgraduate Diploma in 2D and 3D Image Processing** contains the most complete and up-to-date educational program on the market. Its most notable features are:

- The development of case studies presented by experts in computer science and computer vision

- 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

Process 2D and 3D images in the field of computer vision and progress professionally in one of the world's largest technology companies"

"With this program, you will master image processing, which is one of the fundamental tasks in the field of computer vision, and you will position yourself as one of the most important members of your company"

This Postgraduate Diploma offers you the latest knowledge in 2D and 3D Image Processing, making you a great specialist in the field.

Access to the latest techniques in image processing, delving into optical character recognition.

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.

The multimedia content, developed with the latest educational technology, will provide the professional with situated and contextual learning, i.e., a simulated environment that will provide immersive education programmed to learn in real situations.

This program is designed around Problem-Based Learning, whereby the professional must try to solve the different professional practice situations that arise during the academic year. For this purpose, the student will be assisted by an innovative interactive video system created by renowned and experienced experts.

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Objectives

The main objective of this Postgraduate Diploma in 2D and 3D Image Processing is to offer computer scientists the latest tools in this field, so that they can incorporate them directly into their profession. This will lead to immediate career advancement, improving your future prospects in the technology industry through your mastery of one of the most important and complex tasks in the area of Computer Vision.
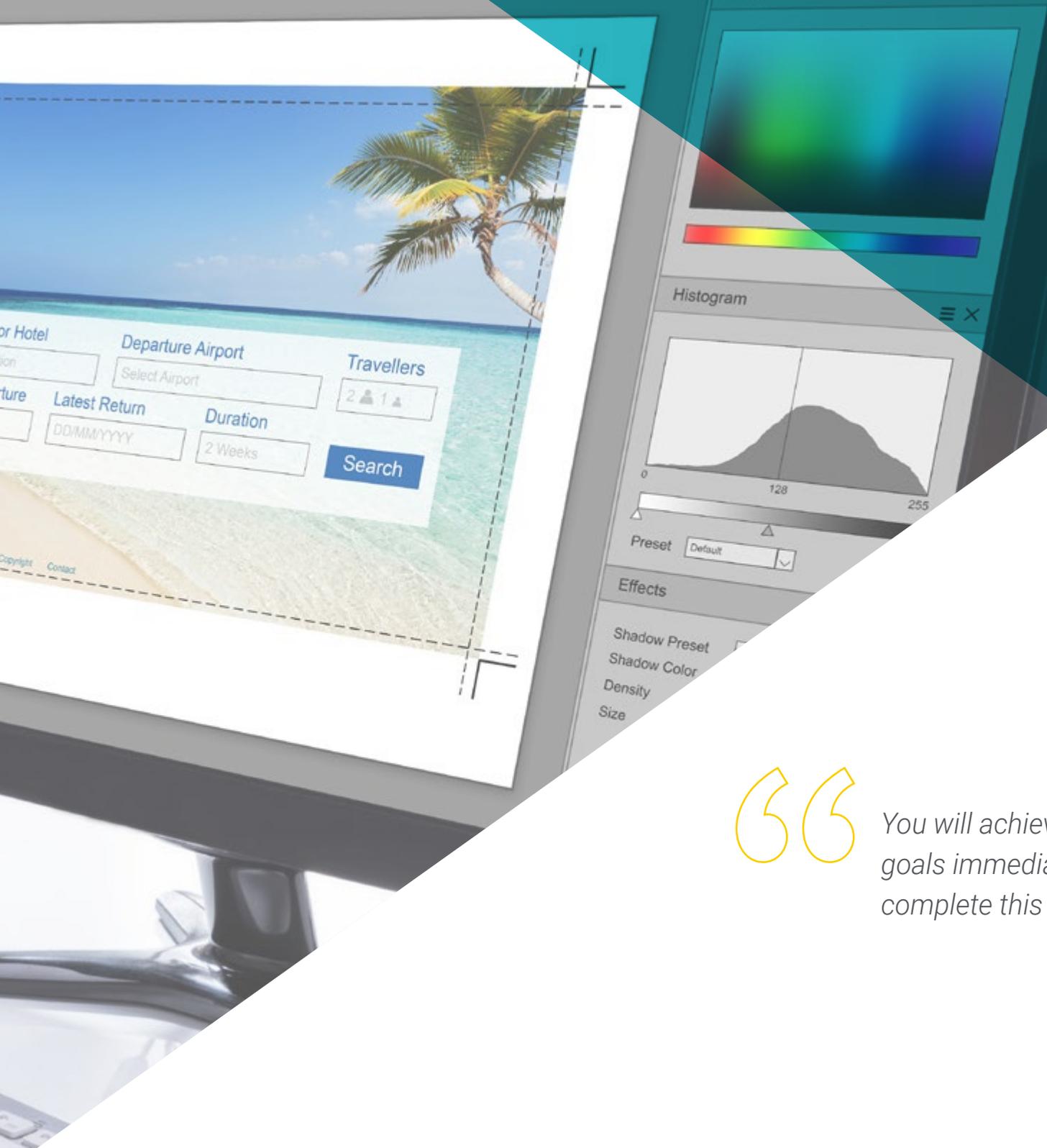
You will achieve all of your career goals immediately once you complete this specialized program"

General Objectives

- Determine how a 3D image is formed and its characteristics

- Introducing the open 3D library

- Analyze the advantages and difficulties of working in 3D instead of 2D

- Establish methods for the processing of 3D images

- Analyze advanced image processing techniques

- Develop tools that combine different computer vision techniques

- Establish problem analysis rules

- Demonstrate how functional solutions can be created to address industrial, commercial, and other problems

- Examine the different digital image processing libraries available on the market

- Establish a solid foundation in the understanding of digital image processing algorithms and techniques

- Examine filtering algorithms, morphology, pixel modification, etc

- Assess fundamental computer vision techniques
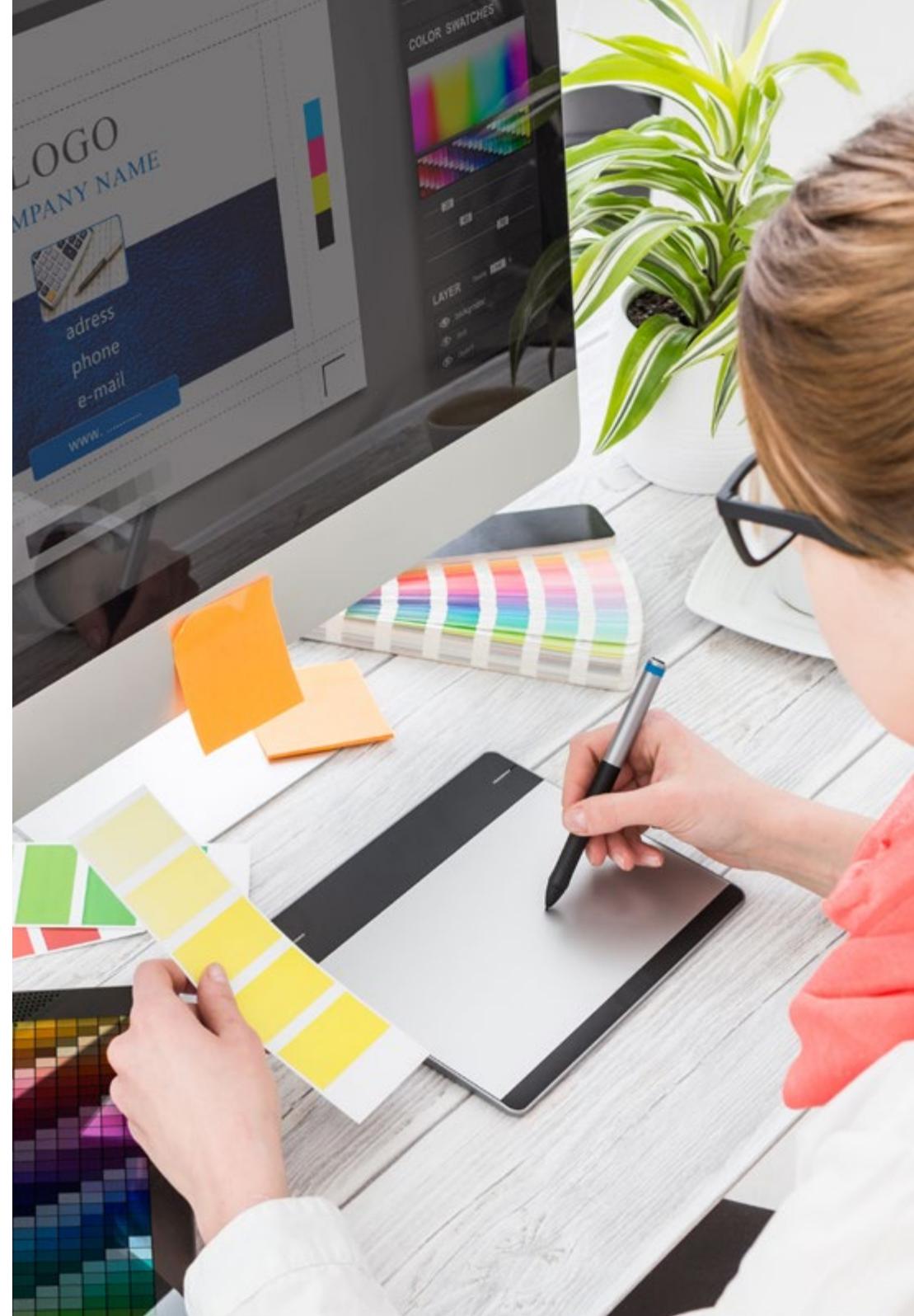
Specific Objectives

Module 1. Digital Image Processing

- Examine commercial and open-source digital image processing libraries.
- Determine what a digital image is and evaluate the fundamental operations to be able to work with them
- Introduce image filters
- Analyze the importance and use of histograms
- Present tools to modify images pixel by pixel
- Propose image segmentation tools
- Analyze morphological operations and their applications
- Determine the methodology in image calibration
- Evaluate methods for segmenting images with conventional vision

Module 2. Advanced Digital Image Processing

- Examine advanced digital image processing filters
- Determine contour extraction and analysis tools
- Analyze object search algorithms
- Demonstrate how to work with calibrated images
- Analyze mathematical techniques for geometry analysis
- Evaluate different options in image compositing
- Develop user interface

Module 3. 3D Image Processing

- Examine a 3D image
- Analyze the software used for 3D data processing
- Developing open3D
- Determine the relevant data in a 3D image
- Demonstrate visualization tools
- Establish denoising filters
- Propose geometric calculation tools
- Analyze object detection methodologies
- Evaluate triangulation and scene reconstruction methods

Machine vision is the present and the future of AI. Specialize now in 2D and 3D Image Processing and experience a professional breakthrough"

03
Course Management

This Postgaduate Diploma in 2D and 3D Image Processing has a high-level faculty that knows the most innovative techniques in this optical procedure. This way, throughout the program, the computer scientist or engineer who has enrolled will be able to enjoy the most advanced knowledge in this area, transmitted by teachers who are up to date with the latest advances in computer vision and AI.
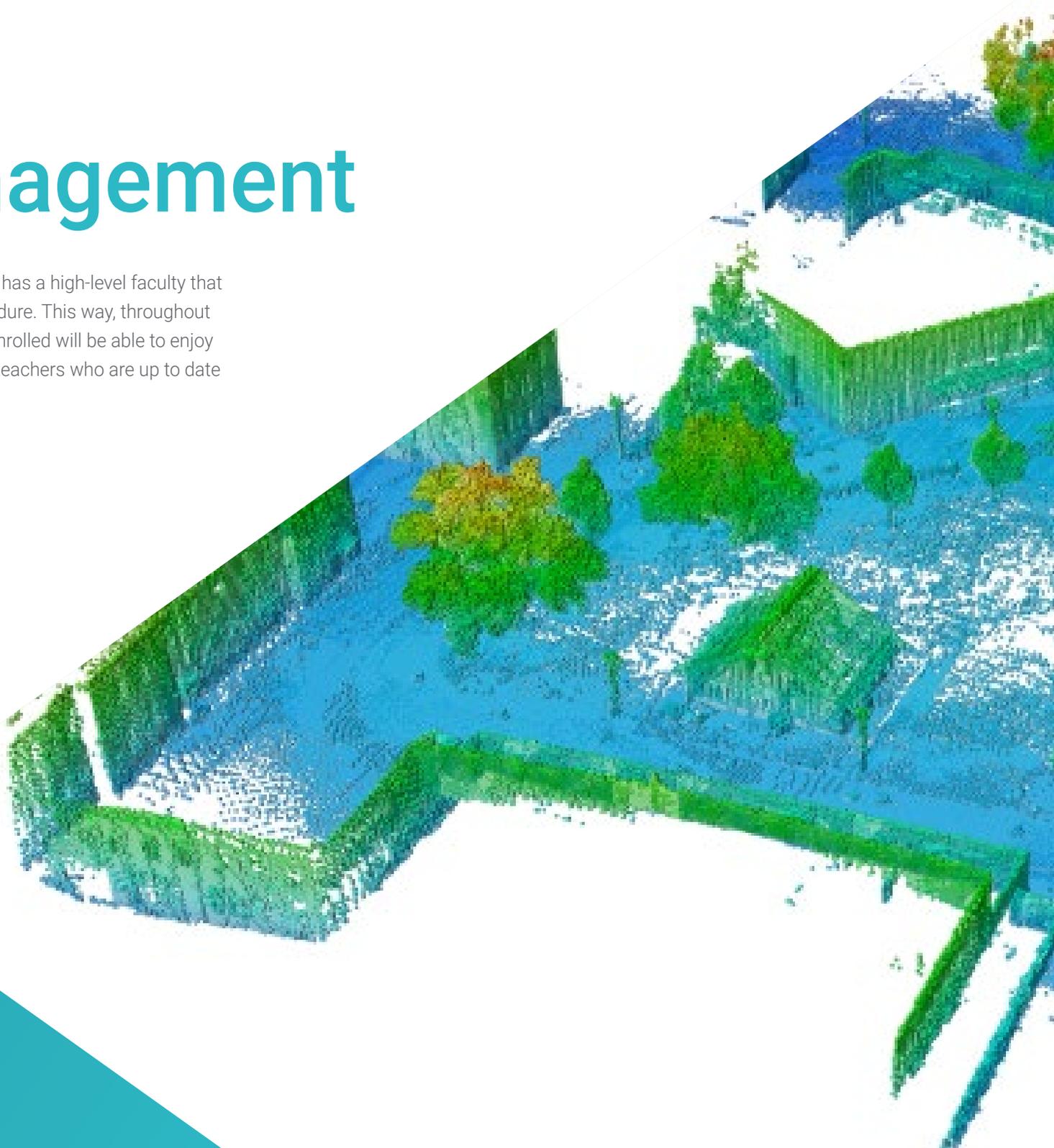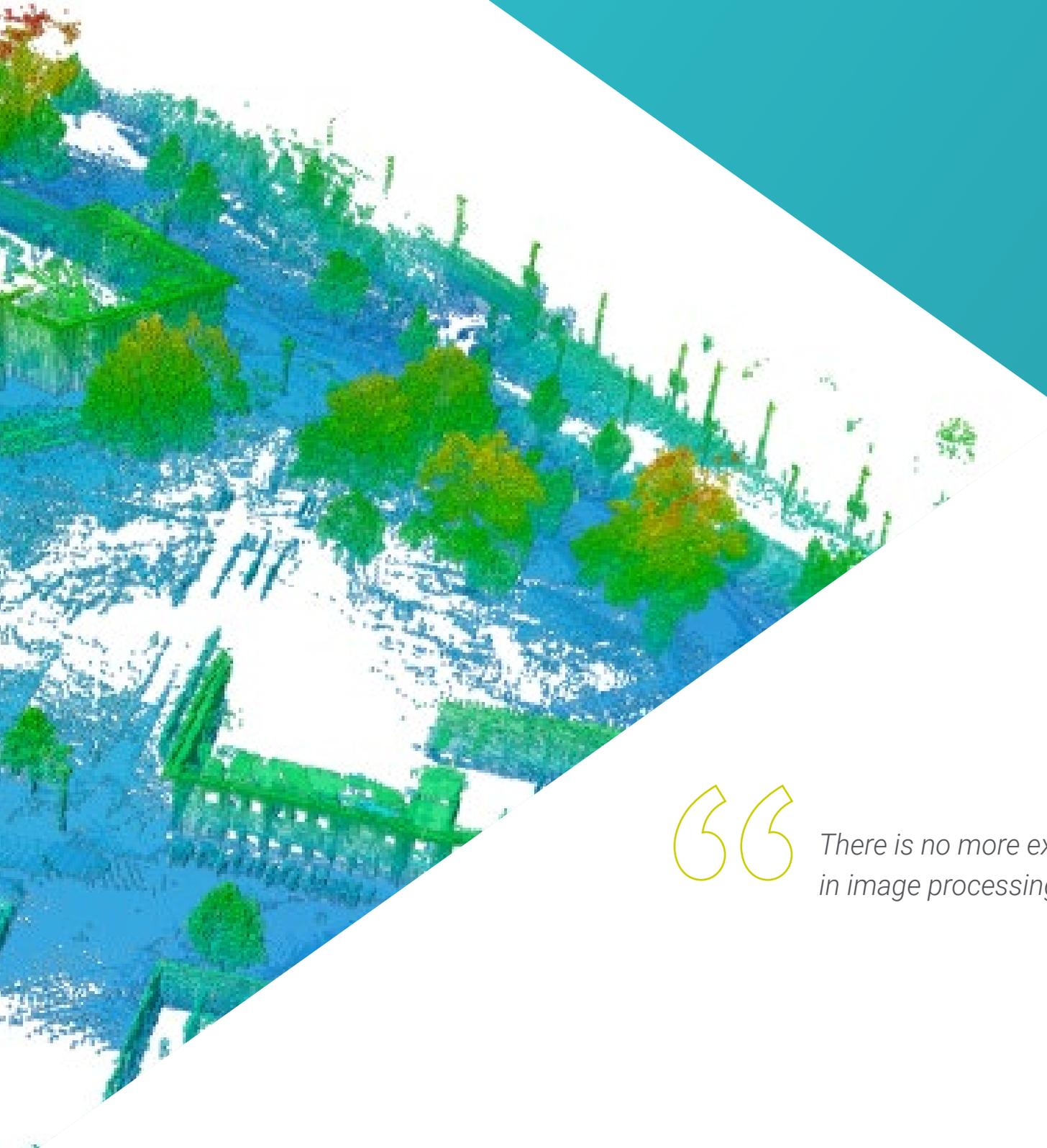
There is no more expert faculty than this one in image processing for computer vision"

Management

Mr. Redondo Cabanillas, Sergio

- Head of Bcnvision's R&D Department
- Project and development manager at Bcnvision
- Machine vision applications engineer at Bcnvision
- Technical Engineering in Telecommunications. Specialization in Image and Sound at the Polytechnic University of Catalonia
- Graduate in Telecommunications. Specialization in Image and Sound by the Polytechnic University of Catalonia
- Lecturer in Cognex vision training for Bcnvision customers
- Teacher in internal courses at Bcnvision to the technical department on vision and advanced development in c#

Professors

Mr. Enrich Llopart, Jordi

- Technical Director Bcnvision. Computer Vision
- Project and application engineer. Bcnvision. Computer Vision
- Project and application engineer. PICVISA Machine Vision
- Graduated in Telecommunications Technical Engineering. Specialization in Image and Sound by the University School of Engineering of Terrassa (EET) / Polytechnic University of Catalonia (UPC)
- MPM - Master's Degree in Project Management. La Salle University - Ramon Llull University
- Lecturer in programming training for Cognex computer vision systems

Ms. García Moll, Clara

- Computer Vision Engineer. Satellogic
- Full Stack Developer. Catfons
- Audiovisual Systems Engineering. Pompeu Fabra University (Barcelona)
- Master's Degree in Computer Vision. Autonomous University of Barcelona

Mr. Bigata Casademunt, Antoni

- Perception Engineer at Computer Vision Center (CVC)
- Machine Learning Engineer at Visium SA, Switzerland
- Degree in Microtechnology from Ecole Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland
- Master's degree in Robotics from the Ecole Polytechnique Fédérale de Lausanne (EPFL)

04

Structure and Content

This educational program is composed of 3 specialized modules through which students will be able to delve into aspects such as pixel operations, logical and arithmetic operations, masks and convolution, optical character recognition, facial and emotion recognition, and video processing. Thanks to this new knowledge, computer scientists and engineers will have the best tools and skills to successfully carry out this work.

Delve into aspects such as calibration methods or the increase of the dynamic range applied to image processing in this Postgraduate Diploma"

Module 1. Digital Image Processing

1.1. Computer Vision Development Environment
  1.1.1. Computer Vision Libraries
  1.1.2. Programming Environment
  1.1.3. Visualization Tools
1.2. Digital image Processing
  1.2.1. Relationships Between Pixels
  1.2.2. Image Operations
  1.2.3. Geometric Transformations
1.3. Pixel Operations
  1.3.1. Histogram
  1.3.2. Histogram Transformations
  1.3.3. Operations on Color Images
1.4. Logical and Arithmetic Operations
  1.4.1. Addition and Subtraction
  1.4.2. Product and Division
  1.4.3. And/Nand
  1.4.4. Or/Nor
  1.4.5. Xor/Xnor
1.5. Filters
  1.5.1. Masks and Convolution
  1.5.2. Linear Filtering
  1.5.3. Non-Linear Filtering
  1.5.4. Fourier Analysis
1.6. Morphological Operations
  1.6.1. Erosion and Dilation
  1.6.2. Closing and Opening
  1.6.3. Top-Hat and Black-Hat
  1.6.4. Contour Detection
  1.6.5. Skeleton
  1.6.6. Hole Filling
  1.6.7. Convex Hull

1.7. Image Analysis Tools
  1.7.1. Edge Detection
  1.7.2. Detection of Blobs
  1.7.3. Dimensional Control
  1.7.4. Color Inspection
1.8. Object Segmentation
  1.8.1. Image Segmentation
  1.8.2. Classical Segmentation Techniques
  1.8.3. Real Applications
1.9. Image Calibration
  1.9.1. Image Calibration
  1.9.2. Methods of Calibration
  1.9.3. Calibration Process in a 2D Camera/Robot System
1.10. Image Processing in a Real Environment
  1.10.1. Problem Analysis
  1.10.2. Image Processing
  1.10.3. Feature Extraction
  1.10.4. Final Results

Module 2. Advanced Digital Image Processing

2.1. Optical Character Recognition (OCR)
  2.1.1. Image Pre-Processing
  2.1.2. Text Detection
  2.1.3. Text Recognition
2.2. Code Reading
  2.2.1. 1D Codes
  2.2.2. 2D Codes
  2.2.3. Applications

"
This program has the best teaching methodology, the best faculty and the most innovative content. What are you waiting for? Enroll now!"

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.

01 learning from evidence

02 relearning from evidence

03 testing

04 learning from an expert

05 neurocognitive context dependent learning

06 Von-Restorff effect

07 case based learning through storytelling

08 competencies testing (retesting)

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:
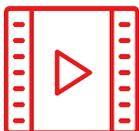
Study Material

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.

30%

10%

8%

20%

25%

4%

3%
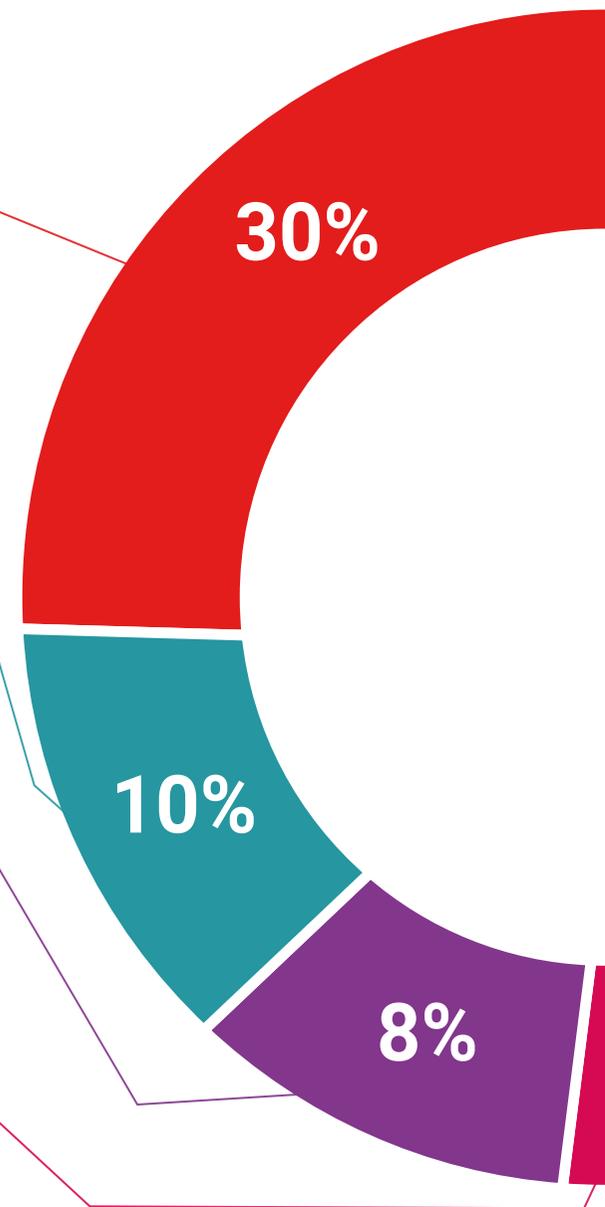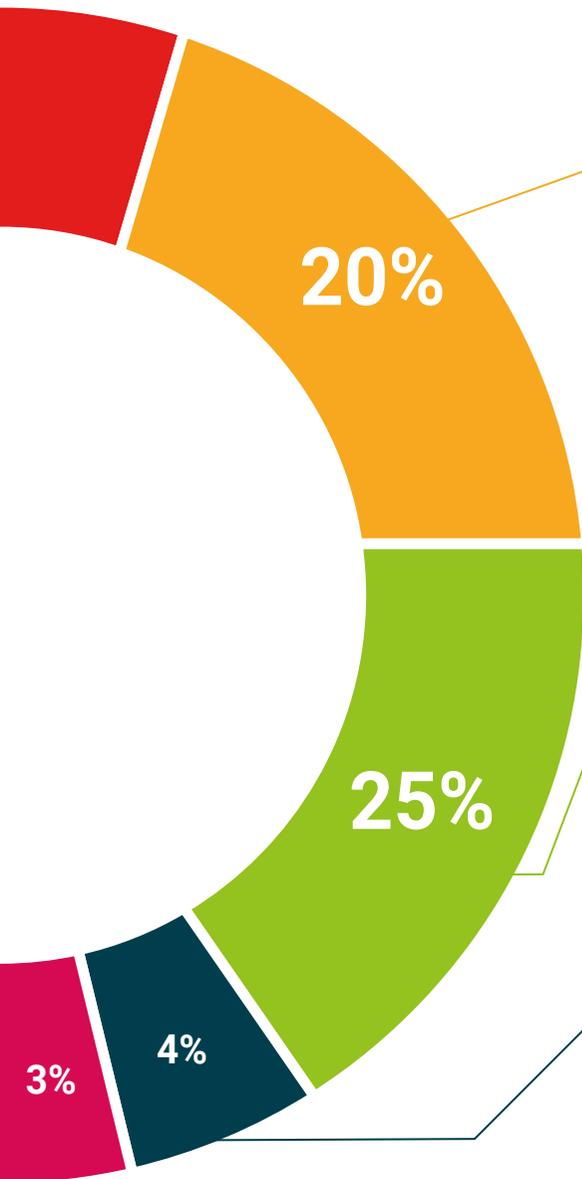
Case Studies

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.

Certificate

The Postgraduate Diploma in 2D and 3D Image Processing 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 university qualification without having to travel or fill out laborious paperwork"

This program will allow you to obtain your **Postgraduate Diploma in 2D and 3D Image Processing** 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.
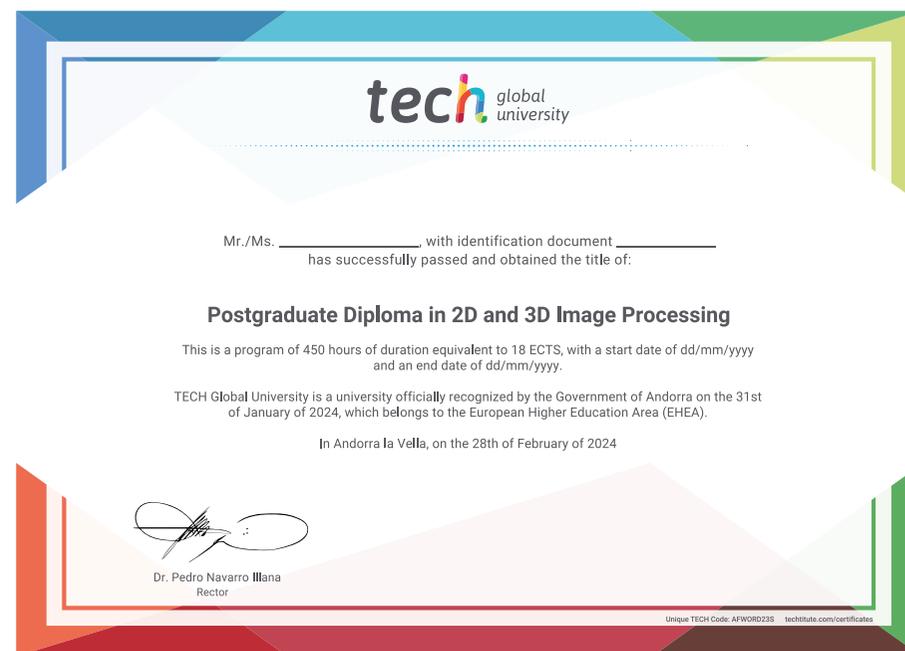
This **TECH Global University** title is a European program of continuing education and professional updating that guarantees the acquisition of competencies in its area of knowledge, providing a high curricular value to the student who completes the program.

Title: **Postgraduate Diploma in 2D and 3D Image Processing**

Modality: **online**

Duration: **6 months**

Accreditation: **18 ECTS**

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tech global university

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

Postgraduate Diploma in 2D and 3D Image Processing

This is a program of 450 hours of duration equivalent to 18 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

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*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.

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2D and 3D Image Processing

» Modality: **online**
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