

Advanced Master's Degree Virtual Reality and Computer Vision





Advanced Master's Degree Virtual Reality and Computer Vision

- » Modality: online
- » Duration: 2 years
- » Certificate: TECH Technological University
- » Schedule: at your own pace
- » Exams: online

Website: www.techitute.com/us/information-technology/advanced-master-degree/advanced-master-degree-virtual-reality-computer-vision

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01

Introduction

Virtual Reality and Computer Vision are no longer futuristic concepts but have become key tools in our current reality. These technologies not only transform the way we interact with digital environments, but also open up new possibilities in multiple sectors. In medicine, they facilitate more precise diagnoses and innovative procedures. In education, they revolutionize learning methods through immersive and personalized experiences. In entertainment, they redefine the way we consume content and create more immersive and realistic experiences. Mastering these technologies today means being at the forefront of technological and professional innovation. For this reason, TECH has developed one of the most comprehensive programs, designed to specialize leaders in addressing the challenges of this field. This approach seeks not only to train experts, but also to foster the creation of solutions that can transform our society.



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Position yourself in a booming industry, with the best program in the university landscape that only TECH can offer you”

Virtual Reality transports us to immersive worlds, allowing experiences ranging from the simulation of complex surgeries to architectural design in real time. The impact of this discipline transcends the technological sphere, as it is shaping the way we live, work and learn. Its constant evolution not only demands professionals trained to implement these tools, but also visionaries capable of expanding their applications to new horizons.

Computer Vision gives machines the ability to interpret and analyze images and videos, enabling the development of advanced technologies. These include autonomous vehicles, which are revolutionizing transportation, and medical diagnostic platforms, which improve accuracy and efficiency in healthcare. In addition, recent advances in this field, such as multitasking models and generative technologies, are opening up new possibilities in the creation of innovative solutions. Integration with edge computing has also facilitated real-time data processing, which further expands the applications of Computer Vision. For all these reasons, being a professional trained in these disciplines not only opens doors in a technology sector in constant growth, but also allows you to be part of projects that have a real impact on daily life. It also contributes to the development of technologies that continue to transform the way we interact with the world and improve our quality of life.

The TECH curriculum, together with its 100% online methodology and Relearning learning approach, allows the student to fully concentrate on the key subjects to specialize in these technological areas. In addition, the graduate will have the support of the most specialized faculty and the most updated research in the university field. All this without timetables and from anywhere in the world, which allows students to adapt their studies to their own pace, without interfering with their personal or work commitments.

This **Advanced Master's Degree in Virtual Reality and Computer Vision** contains the most complete and up-to-date program on the market. The most important features include:

- ♦ Practical cases presented by experts in IT
- ♦ 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 in Virtual Reality and Computer Vision
- ♦ 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



The combination of creativity and technology is waiting for you to start developing great solutions with a global impact"

“

Become the best in Virtual Reality and Computer Vision, at your own pace, without schedules and from anywhere in the world”

Its teaching staff includes professionals from the field of journalism, who bring to this program the experience of their work, as well as renowned specialists from reference 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 an immersive learning experience designed to prepare for real-life situations.

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

Master these technologies with the didactic tools that TECH offers you and start changing lives.

Develop applications and live the most exciting challenges in the world's largest online university.



02

Why Study at TECH?

TECH is the world's largest online university. With an impressive catalog of more than 14,000 university programs, available in 11 languages, it is positioned as a leader in employability, with a 99% job placement rate. In addition, it has a huge faculty of more than 6,000 professors of the highest international prestige.



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Study at the largest online university in the world and ensure your professional success. The future begins at TECH”

The world's best online university, according to FORBES

The prestigious Forbes magazine, specialized in business and finance, has highlighted TECH as "the best online university in the world" This is what they have recently stated in an article in their digital edition in which they echo the success story of this institution, "thanks to the academic offer it provides, the selection of its teaching staff, and an innovative learning method oriented to form the professionals of the future"

Forbes
Mejor universidad
online del mundo

Plan
de estudios
más completo

The most complete syllabuses on the university scene

TECH offers the most complete syllabuses on the university scene, with programs that cover fundamental concepts and, at the same time, the main scientific advances in their specific scientific areas. In addition, these programs are continuously updated to guarantee students the academic vanguard and the most demanded professional skills. and the most in-demand professional competencies. In this way, the university's qualifications provide its graduates with a significant advantage to propel their careers to success.

The best top international faculty

TECH's faculty is made up of more than 6,000 professors of the highest international prestige. Professors, researchers and top executives of multinational companies, including Isaiah Covington, performance coach of the Boston Celtics; Magda Romanska, principal investigator at Harvard MetaLAB; Ignacio Wistumba, chairman of the department of translational molecular pathology at MD Anderson Cancer Center; and D.W. Pine, creative director of TIME magazine, among others.

Profesorado
TOP
Internacional



La metodología
más eficaz

A unique learning method

TECH is the first university to use Relearning in all its programs. This is the best online learning methodology, accredited with international teaching quality certifications, provided by prestigious educational agencies. In addition, this innovative academic model is complemented by the "Case Method", thereby configuring a unique online teaching strategy. Innovative teaching resources are also implemented, including detailed videos, infographics and interactive summaries.

The world's largest online university

TECH is the world's largest online university. We are the largest educational institution, with the best and widest digital educational catalog, one hundred percent online and covering most areas of knowledge. We offer the largest selection of our own degrees and accredited online undergraduate and postgraduate degrees. In total, more than 14,000 university programs, in ten different languages, making us the largest educational institution in the world.

nº1
Mundial
Mayor universidad
online del mundo

The official online university of the NBA

TECH is the official online university of the NBA. Thanks to our agreement with the biggest league in basketball, we offer our students exclusive university programs, as well as a wide variety of educational resources focused on the business of the league and other areas of the sports industry. Each program is made up of a uniquely designed syllabus and features exceptional guest hosts: professionals with a distinguished sports background who will offer their expertise on the most relevant topics.

Leaders in employability

TECH has become the leading university in employability. Ninety-nine percent of its students obtain jobs in the academic field they have studied within one year of completing any of the university's programs. A similar number achieve immediate career enhancement. All this thanks to a study methodology that bases its effectiveness on the acquisition of practical skills, which are absolutely necessary for professional development.



Google Premier Partner

The American technology giant has awarded TECH the Google Premier Partner badge. This award, which is only available to 3% of the world's companies, highlights the efficient, flexible and tailored experience that this university provides to students. The recognition not only accredits the maximum rigor, performance and investment in TECH's digital infrastructures, but also places this university as one of the world's leading technology companies.

The top-rated university by its students

Students have positioned TECH as the world's top-rated university on the main review websites, with a highest rating of 4.9 out of 5, obtained from more than 1,000 reviews. These results consolidate TECH as the benchmark university institution at an international level, reflecting the excellence and positive impact of its educational model."

03 Syllabus

The Advanced Master's Degree curriculum in Virtual Reality and Computer Vision is designed as a comprehensive and advanced academic opportunity in these two key disciplines. The program begins with a solid foundation in the fundamentals of programming, applied mathematics and image processing. Throughout the course, students will delve into the development of virtual environments using state-of-the-art tools. In addition, they will explore advanced simulation and interaction techniques in immersive environments.



“

Join TECH and you will begin to transform entertainment with immersive experiences in Computer Vision”

Module 1. Computer Vision

- 1.1. Human Perception
 - 1.1.1. Human Visual System
 - 1.1.2. The Color
 - 1.1.3. Visible and Non-Visible Frequencies
- 1.2. Chronicle of the Computer Vision
 - 1.2.1. Principles
 - 1.2.2. Evolution
 - 1.2.3. The Importance of Computer Vision
- 1.3. Digital Image Composition
 - 1.3.1. The Digital Image
 - 1.3.2. Types of Images
 - 1.3.3. Color Spaces
 - 1.3.4. RGB
 - 1.3.5. HSV and HSL
 - 1.3.6. CMY-CMYK
 - 1.3.7. YCbCr
 - 1.3.8. Indexed Image
- 1.4. Image Acquisition Systems
 - 1.4.1. Operation of a Digital Camera
 - 1.4.2. The Correct Exposure for Each Situation
 - 1.4.3. Depth of Field
 - 1.4.4. Resolution
 - 1.4.5. Image Formats
 - 1.4.6. HDR Mode
 - 1.4.7. High Resolution Cameras
 - 1.4.8. High-Speed Cameras
- 1.5. Optical Systems
 - 1.5.1. Optical Principles
 - 1.5.2. Conventional Lenses
 - 1.5.3. Telecentric Lenses
 - 1.5.4. Types of Autofocus Lenses
 - 1.5.5. Focal Length

- 1.5.6. Depth of Field
- 1.5.7. Optical Distortion
- 1.5.8. Calibration of an Image
- 1.6. Illumination Systems
 - 1.6.1. Importance of Illumination
 - 1.6.2. Frequency Response
 - 1.6.3. LED Illumination
 - 1.6.4. Outdoor Lighting
 - 1.6.5. Types of Lighting for Industrial Applications. Effects
- 1.7. 3D Capture Systems
 - 1.7.1. Stereo Vision
 - 1.7.2. Triangulation
 - 1.7.3. Structured Light
 - 1.7.4. Time of Flight
 - 1.7.5. Lidar
- 1.8. Multispectrum
 - 1.8.1. Multispectral Cameras
 - 1.8.2. Hyperspectral Cameras
- 1.9. Non-Visible Near Spectrum
 - 1.9.1. IR Cameras
 - 1.9.2. UV Cameras
 - 1.9.3. Converting From Non-Visible to Visible by Illumination
- 1.10. Other Band Spectrums
 - 1.10.1. X-Ray
 - 1.10.2. Terahertz

Module 2. Applications and State-of-the-Art

- 2.1. Industrial Applications
 - 2.1.1. Machine Vision Libraries
 - 2.1.2. Compact Cameras
 - 2.1.3. PC-Based Systems
 - 2.1.4. Industrial Robotics
 - 2.1.5. Pick and Place 2D
 - 2.1.6. *Bin Picking*

- 2.1.7. Quality Control
- 2.1.8. Presence Absence of Components
- 2.1.9. Dimensional Control
- 2.1.10. Labeling Control
- 2.1.11. Traceability
- 2.2. Autonomous Vehicles
 - 2.2.1. Driver Assistance
 - 2.2.2. Autonomous Driving
- 2.3. Computer Vision for Content Analysis
 - 2.3.1. Filtering by Content
 - 2.3.2. Visual Content Moderation
 - 2.3.3. Tracking Systems
 - 2.3.4. Brand and Logo Identification
 - 2.3.5. Video Labeling and Classification
 - 2.3.6. Scene Change Detection
 - 2.3.7. Text or Credits Extraction
- 2.4. Medical Application
 - 2.4.1. Disease Detection and Localization
 - 2.4.2. Cancer and X-Ray Analysis
 - 2.4.3. Advances in Computer Vision given Covid19
 - 2.4.4. Assistance in the Operating Room
- 2.5. Spatial Applications
 - 2.5.1. Satellite Image Analysis
 - 2.5.2. Computer Vision for the Study of Space
 - 2.5.3. Mission to Mars
- 2.6. Commercial Applications
 - 2.6.1. Stock Control
 - 2.6.2. Video Surveillance, Home Security
 - 2.6.3. Parking Cameras
 - 2.6.4. Population Control Cameras
 - 2.6.5. Speed Cameras

- 2.7. Vision Applied to Robotics
 - 2.7.1. Drones
 - 2.7.2. AGV
 - 2.7.3. Vision in Collaborative Robots
 - 2.7.4. The Eyes of the Robots
- 2.8. Augmented Reality
 - 2.8.1. Operation
 - 2.8.2. Devices
 - 2.8.3. Applications in the Industry
 - 2.8.4. Commercial Applications
- 2.9. Cloud Computing
 - 2.9.1. Cloud Computing Platforms
 - 2.9.2. From Cloud Computing to Production
- 2.10. Research and State-of-the-Art
 - 2.10.1. Commercial Applications
 - 2.10.2. What's Cooking
 - 2.10.3. The Future of Computer Vision

Module 3. Digital Image Processing

- 3.1. Computer Vision Development Environment
 - 3.1.1. Computer Vision Libraries
 - 3.1.2. Programming Environment
 - 3.1.3. Visualization Tools
- 3.2. Digital image Processing
 - 3.2.1. Pixel Relationships
 - 3.2.2. Image Operations
 - 3.2.3. Geometric Transformations
- 3.3. Pixel Operations
 - 3.3.1. Histogram
 - 3.3.2. Histogram Transformations
 - 3.3.3. Operations on Color Images

- 3.4. Logical and Arithmetic Operations
 - 3.4.1. Addition and Subtraction
 - 3.4.2. Product and Division
 - 3.4.3. And/Nand
 - 3.4.4. Or/Nor
 - 3.4.5. Xor/Xnor
- 3.5. Filters
 - 3.5.1. Masks and Convolution
 - 3.5.2. Linear Filtering
 - 3.5.3. Non-Linear Filtering
 - 3.5.4. Fourier Analysis
- 3.6. Morphological Operations
 - 3.6.1. Erosion and Dilation
 - 3.6.2. Closing and Opening
 - 3.6.3. Top_hat and Black hat
 - 3.6.4. Contour Detection
 - 3.6.5. Skeleton
 - 3.6.6. Hole Filling
 - 3.6.7. Convex Hull
- 3.7. Image Analysis Tools
 - 3.7.1. Edge Detection
 - 3.7.2. Detection of Blobs
 - 3.7.3. Dimensional Control
 - 3.7.4. Color Inspection
- 3.8. Object Segmentation
 - 3.8.1. Image Segmentation
 - 3.8.2. Classical Segmentation Techniques
 - 3.8.3. Real Applications
- 3.9. Image Calibration
 - 3.9.1. Image Calibration
 - 3.9.2. Methods of Calibration
 - 3.9.3. Calibration Process in a 2D Camera/Robot System

- 3.10. Image Processing in a Real Environment
 - 3.10.1. Problem Analysis
 - 3.10.2. Image Processing
 - 3.10.3. Feature Extraction
 - 3.10.4. Final Results

Module 4. Advanced Digital Image Processing

- 4.1. Optical Character Recognition (OCR)
 - 4.1.1. Image Pre-Processing
 - 4.1.2. Text Detection
 - 4.1.3. Text Recognition
- 4.2. Code Reading
 - 4.2.1. 1D Codes
 - 4.2.2. 2D Codes
 - 4.2.3. Applications
- 4.3. Pattern Search
 - 4.3.1. Pattern Search
 - 4.3.2. Patterns Based on Gray Level
 - 4.3.3. Patterns Based on Contours
 - 4.3.4. Patterns Based on Geometric Shapes
 - 4.3.5. Other Techniques
- 4.4. Object Tracking with Conventional Vision
 - 4.4.1. Background Extraction
 - 4.4.2. Meanshift
 - 4.4.3. Camshift
 - 4.4.4. Optical Flow
- 4.5. Facial Recognition
 - 4.5.1. Facial Landmark Detection
 - 4.5.2. Applications
 - 4.5.3. Facial Recognition
 - 4.5.4. Emotion Recognition

- 4.6. Panoramic and Alignment
 - 4.6.1. Stitching
 - 4.6.2. Image Composition
 - 4.6.3. Photomontage
- 4.7. High Dynamic Range (HDR) and Photometric Stereo
 - 4.7.1. Increasing the Dynamic Range
 - 4.7.2. Image Compositing for Contour Enhancement
 - 4.7.3. Techniques for the Use of Dynamic Applications
- 4.8. Image Compression
 - 4.8.1. Image Compression
 - 4.8.2. Types of Compressors
 - 4.8.3. Image Compression Techniques
- 4.9. Video Processing
 - 4.9.1. Image Sequences
 - 4.9.2. Video Formats and Codecs
 - 4.9.3. Reading a Video
 - 4.9.4. Frame Processing
- 4.10. Real Application of Image Processing
 - 4.10.1. Problem Analysis
 - 4.10.2. Image Processing
 - 4.10.3. Feature Extraction
 - 4.10.4. Final Results

Module 5. 3D Image Processing

- 5.1. 3D Imaging
 - 5.1.1. 3D Imaging
 - 5.1.2. 3D Image Processing Software and Visualizations
 - 5.1.3. Metrology Software
- 5.2. Open3D
 - 5.2.1. Library for 3D Data Processing
 - 5.2.2. Features
 - 5.2.3. Installation and Use

- 5.3. The Data
 - 5.3.1. Depth Maps in 2D Image
 - 5.3.2. Pointclouds
 - 5.3.3. Normal
 - 5.3.4. Surfaces
- 5.4. Visualization
 - 5.4.1. Data Visualization
 - 5.4.2. Controls
 - 5.4.3. Web Display
- 5.5. Filters
 - 5.5.1. Distance Between Points, Eliminate Outliers
 - 5.5.2. High Pass Filter
 - 5.5.3. Downsampling
- 5.6. Geometry and Feature Extraction
 - 5.6.1. Extraction of a Profile
 - 5.6.2. Depth Measurement
 - 5.6.3. Volume
 - 5.6.4. 3D Geometric Shapes
 - 5.6.5. Shots
 - 5.6.6. Projection of a Point
 - 5.6.7. Geometric Distances
 - 5.6.8. Kd Tree
 - 5.6.9. 3D Features
- 5.7. Registration and Meshing
 - 5.7.1. Concatenation
 - 5.7.2. ICP
 - 5.7.3. Ransac 3D
- 5.8. 3D Object Recognition
 - 5.8.1. Searching for an Object in the 3d Scene
 - 5.8.2. Segmentation
 - 5.8.3. Bin Picking

- 5.9. Surface Analysis
 - 5.9.1. Smoothing
 - 5.9.2. Orientable Surfaces
 - 5.9.3. Octree
- 5.10. Triangulation
 - 5.10.1. From Mesh to Point Cloud
 - 5.10.2. Depth Map Triangulation
 - 5.10.3. Triangulation of Unordered PointClouds

Module 6. Deep Learning

- 6.1. Artificial Intelligence
 - 6.1.1. Machine Learning
 - 6.1.2. Deep Learning
 - 6.1.3. The Explosion of Deep Learning. Why Now
- 6.2. Neural Networks
 - 6.2.1. The Neural Network
 - 6.2.2. Uses of Neural Networks
 - 6.2.3. Linear Regression and Perception
 - 6.2.4. Forward Propagation
 - 6.2.5. Backpropagation
 - 6.2.6. Feature Vectors
- 6.3. Loss Functions
 - 6.3.1. Loss Functions
 - 6.3.2. Types of Loss Functions
 - 6.3.3. Choice of Loss Functions
- 6.4. Activation Functions
 - 6.4.1. Activation Function
 - 6.4.2. Linear Functions
 - 6.4.3. Non-Linear Functions
 - 6.4.4. Output vs. Hidden Layer Activation Functions
- 6.5. Regularization and Normalization
 - 6.5.1. Regularization and Normalization
 - 6.5.2. Overfitting and Data Augmentation
 - 6.5.3. Regularization Methods: L1, L2 and Dropout
 - 6.5.4. Normalization Methods: Batch, Weight, Layer
- 6.6. Optimization
 - 6.6.1. Gradient Descent
 - 6.6.2. Stochastic Gradient Descent
 - 6.6.3. Mini Batch Gradient Descent
 - 6.6.4. Momentum
 - 6.6.5. Adam
- 6.7. Hyperparameter Tuning and Weights
 - 6.7.1. Hyperparameters
 - 6.7.2. Batch Size vs. Learning Rate vs. Step Decay
 - 6.7.3. Weights
- 6.8. Evaluation Metrics of a Neural Network
 - 6.8.1. Accuracy
 - 6.8.2. Dice Coefficient
 - 6.8.3. Sensitivity vs. Specificity/Recall Vs. Precision
 - 6.8.4. ROC Curve (AUC)
 - 6.8.5. F1-Score
 - 6.8.6. Matrix Confusion
 - 6.8.7. Cross-Validation
- 6.9. Frameworks and Hardware
 - 6.9.1. Tensor Flow
 - 6.9.2. Pytorch
 - 6.9.3. Caffe
 - 6.9.4. Keras
 - 6.9.5. Hardware for the Training Phase
- 6.10. Creation of a Neural Network-Training and Validation
 - 6.10.1. Dataset
 - 6.10.2. Network Construction
 - 6.10.3. Evaluation
 - 6.10.4. Visualization of Results

Module 7. Convolutional Neural Networks and Image Classification

- 7.1. Convolutional Neural Networks
 - 7.1.1. Introduction
 - 7.1.2. Convolution
 - 7.1.3. CNN Building Blocks
- 7.2. Types of CNN Layers
 - 7.2.1. Convolutional
 - 7.2.2. Activation
 - 7.2.3. Batch Normalization
 - 7.2.4. Pooling
 - 7.2.5. Fully Connected
- 7.3. Metrics
 - 7.3.1. Matrix Confusion
 - 7.3.2. Accuracy
 - 7.3.3. Precision
 - 7.3.4. Recall
 - 7.3.5. F1 Score
 - 7.3.6. ROC Curve
 - 7.3.7. AUC
- 7.4. Main Architectures
 - 7.4.1. AlexNet
 - 7.4.2. VGG
 - 7.4.3. Resnet
 - 7.4.4. GoogleLeNet
- 7.5. Image Classification
 - 7.5.1. Introduction
 - 7.5.2. Analysis of Data
 - 7.5.3. Data Preparation
 - 7.5.4. Model Training
 - 7.5.5. Model Validation

- 7.6. Practical Considerations for CNN Training
 - 7.6.1. Optimizer Selection
 - 7.6.2. Learning Rate Scheduler
 - 7.6.3. Check Training Pipeline
 - 7.6.4. Training with Regularization
- 7.7. Best Practices in Deep Learning
 - 7.7.1. Transfer Learning
 - 7.7.2. Fine Tuning
 - 7.7.3. Data Augmentation
- 7.8. Statistical Data Evaluation
 - 7.8.1. Number of Datasets
 - 7.8.2. Number of Labels
 - 7.8.3. Number of Images
 - 7.8.4. Data Balancing
- 7.9. Deployment
 - 7.9.1. Saving and Loading Models
 - 7.9.2. Onnx
 - 7.9.3. Inference
- 7.10. Case Study: Image Classification
 - 7.10.1. Data Analysis and Preparation
 - 7.10.2. Testing the Training Pipeline
 - 7.10.3. Model Training
 - 7.10.4. Model Validation

Module 8. Object Detection

- 8.1. Object Detection and Tracking
 - 8.1.1. Object Detection
 - 8.1.2. Case Studies
 - 8.1.3. Object Tracking
 - 8.1.4. Case Studies
 - 8.1.5. Occlusions, Rigid and Non-Rigid Poses

- 8.2. Assessment Metrics
 - 8.2.1. IOU - Intersection Over Union
 - 8.2.2. Confidence Score
 - 8.2.3. Recall
 - 8.2.4. Precision
 - 8.2.5. Recall-Precision Curve
 - 8.2.6. Mean Average Precision (MAP)
- 8.3. Traditional Methods
 - 8.3.1. Sliding Window
 - 8.3.2. Viola Detector
 - 8.3.3. HOG
 - 8.3.4. Non Maximal Supression (NMS)
- 8.4. Datasets
 - 8.4.1. Pascal VC
 - 8.4.2. MS Coco
 - 8.4.3. ImageNet (2014)
 - 8.4.4. MOTA Challenge
- 8.5. Two Shot Object Detector
 - 8.5.1. R-CNN
 - 8.5.2. Fast R-CNN
 - 8.5.3. Faster R-CNN
 - 8.5.4. Mask R-CNN
- 8.6. Single Shot Object Detector
 - 8.6.1. SSD
 - 8.6.2. YOLO
 - 8.6.3. RetinaNet
 - 8.6.4. CenterNet
 - 8.6.5. EfficientDet
- 8.7. Backbones
 - 8.7.1. VGG
 - 8.7.2. ResNet
 - 8.7.3. Mobilenet
 - 8.7.4. Shufflenet
 - 8.7.5. Darknet

- 8.8. Object Tracking
 - 8.8.1. Classical Approaches
 - 8.8.2. Particulate Filters
 - 8.8.3. Kalman
 - 8.8.4. Sort Tracker
 - 8.8.5. Deep Sort
- 8.9. Deployment
 - 8.9.1. Computing Platform
 - 8.9.2. Choice of Backbone
 - 8.9.3. Choice of Framework
 - 8.9.4. Model Optimization
 - 8.9.5. Model Versioning
- 8.10. Study: People Detection and Tracking
 - 8.10.1. Detection of People
 - 8.10.2. Monitoring of People
 - 8.10.3. Re-Identification
 - 8.10.4. Counting People in Crowds

Module 9. Image Segmentation with Deep Learning

- 9.1. Object Detection and Segmentation
 - 9.1.1. Semantic Segmentation
 - 9.1.1.1. Semantic Segmentation Use Cases
 - 9.1.2. Instantiated Segmentation
 - 9.1.2.1. Instantiated Segmentation Use Cases
- 9.2. Evaluation Metrics
 - 9.2.1. Similarities with Other Methods
 - 9.2.2. Pixel Accuracy
 - 9.2.3. Dice Coefficient (F1 Score)
- 9.3. Cost Functions
 - 9.3.1. Dice Loss
 - 9.3.2. Focal Loss
 - 9.3.3. Tversky Loss
 - 9.3.4. Other Functions

- 9.4. Traditional Segmentation Methods
 - 9.4.1. Threshold Application with Otsu and Riddlen
 - 9.4.2. Self-Organized Maps
 - 9.4.3. GMM-EM Algorithm
- 9.5. Semantic Segmentation Applying Deep Learning: FCN
 - 9.5.1. FCN
 - 9.5.2. Architecture
 - 9.5.3. FCN Applications
- 9.6. Semantic Segmentation Applying Deep Learning: U-NET
 - 9.6.1. U-NET
 - 9.6.2. Architecture
 - 9.6.3. U-NET Application
- 9.7. Semantic Segmentation Applying Deep Learning: Deep Lab
 - 9.7.1. Deep Lab
 - 9.7.2. Architecture
 - 9.7.3. Deep Lab Application
- 9.8. Instantiated Segmentation Applying Deep Learning: Mask RCNN
 - 9.8.1. Mask RCNN
 - 9.8.2. Architecture
 - 9.8.3. Application of a Mask RCNN
- 9.9. Video Segmentation
 - 9.9.1. STFCN
 - 9.9.2. Semantic Video CNNs
 - 9.9.3. Clockwork Convnets
 - 9.9.4. Low-Latency
- 9.10. Point Cloud Segmentation
 - 9.10.1. The Point Cloud
 - 9.10.2. PointNet
 - 9.10.3. A-CNN

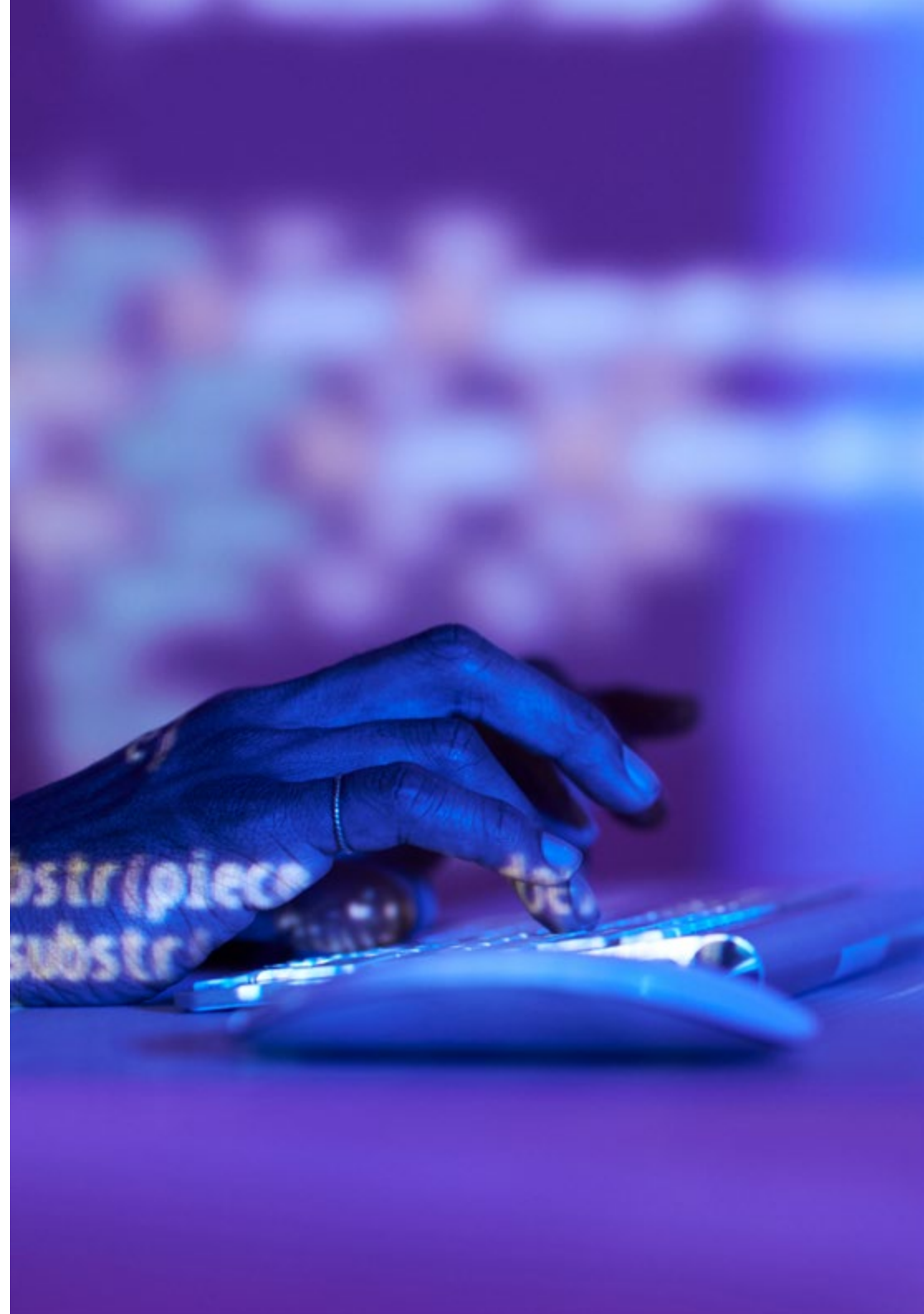
Module 10. Advanced Image Segmentation and Advanced Computer Vision Techniques

- 10.1. Database for General Segmentation Problems
 - 10.1.1. Pascal Context
 - 10.1.2. CelebAMask-HQ
 - 10.1.3. Cityscapes Dataset
 - 10.1.4. CCP Dataset
- 10.2. Semantic Segmentation in Medicine
 - 10.2.1. Semantic Segmentation in Medicine
 - 10.2.2. Datasets for Medical Problems
 - 10.2.3. Practical Applications
- 10.3. Annotation Tools
 - 10.3.1. Computer Vision Annotation Tool
 - 10.3.2. LabelMe
 - 10.3.3. Other Tools
- 10.4. Segmentation Tools Using Different Frameworks
 - 10.4.1. Keras
 - 10.4.2. Tensorflow v2
 - 10.4.3. Pytorch
 - 10.4.4. Others
- 10.5. Semantic Segmentation Project. The Data, Phase 1
 - 10.5.1. Problem Analysis
 - 10.5.2. Input Source for Data
 - 10.5.3. Data Analysis
 - 10.5.4. Data Preparation
- 10.6. Semantic Segmentation Project. Training, Phase 2
 - 10.6.1. Algorithm Selection
 - 10.6.2. Education
 - 10.6.3. Assessment
- 10.7. Semantic Segmentation Project. Results, Phase 3
 - 10.7.1. Fine Tuning
 - 10.7.2. Presentation of The Solution
 - 10.7.3. Conclusions

- 10.8. Autoencoders
 - 10.8.1. Autoencoders
 - 10.8.2. Autoencoder Architecture
 - 10.8.3. Noise Elimination Autoencoders
 - 10.8.4. Automatic Coloring Autoencoder
- 10.9. Generative Adversarial Networks (GANs)
 - 10.9.1. Generative Adversarial Networks (GANs)
 - 10.9.2. DCGAN Architecture
 - 10.9.3. Conditional GAN Architecture
- 10.10. Enhanced Generative Adversarial Networks
 - 10.10.1. Overview of the Problem
 - 10.10.2. WGAN
 - 10.10.3. LSGAN
 - 10.10.4. ACGAN

Module 11. The 3D Industry

- 11.1. 3D Industry in Animation and Video Games
 - 11.1.1. 3D Animation
 - 11.1.2. 3D Industry in Animation and Video Games
 - 11.1.3. 3D Animation Future
- 11.2. 3D in Video Games
 - 11.2.1. Video Games. Limitations
 - 11.2.2. 3D Video Game Development. Difficulties
 - 11.2.3. Solutions to Video Game Development Difficulties
- 11.3. 3D Software for Video Games
 - 11.3.1. Maya. Pros and Cons
 - 11.3.2. 3Ds Max. Pros and Cons
 - 11.3.3. Blender. Pros and Cons
- 11.4. Pipeline in 3D Asset Generation for Video Games
 - 11.4.1. Idea and Assembly from a Modelsheet
 - 11.4.2. Modeling with Low Geometry and High Detailing
 - 11.4.3. Projection of Textured Details



- 11.5. Key Artistic 3D Styles for Video Games
 - 11.5.1. Cartoon Style
 - 11.5.2. Realistic Style
 - 11.5.3. Cel Shading
 - 11.5.4. Motion Capture
- 11.6. 3D Integration
 - 11.6.1. 2D Digital World Integration
 - 11.6.2. 3D Digital World Integration
 - 11.6.3. Real-World Integration (AR, MR/XR)
- 11.7. Key 3D Factors for Different Industries
 - 11.7.1. 3D in Film and Series
 - 11.7.2. 3D in Video Games
 - 11.7.3. 3D in Marketing
- 11.8. Render: Real-time Rendering and Pre-Rendering
 - 11.8.1. Lighting
 - 11.8.2. Shadow Definition
 - 11.8.3. Quality vs. Speed
- 11.9. 3D Asset Generation in 3D Max
 - 11.9.1. 3D Max Software
 - 11.9.2. Interface, Menus, Toolbars
 - 11.9.3. Controls
 - 11.9.4. Scene
 - 11.9.5. Viewports
 - 11.9.6. Basic Shapes
 - 11.9.7. Object Generation, Modification and Transformation
 - 11.9.8. 3D Scene Creation
 - 11.9.9. 3D Professional Asset Modeling for Video Games
 - 11.9.10. Material Editors
 - 11.9.10.1. Creating and Editing Materials
 - 11.9.10.2. Applying Light to Materials
 - 11.9.10.3. UVW Map Modifier. Mapping Coordinates
 - 11.9.10.4. Texture Creation

- 11.10. Workspace Organization and Best Practices
 - 11.10.1. Creation of a Project
 - 11.10.2. Folder Structure
 - 11.10.3. Custom Functionality

Module 12. Art and 3D in the Video Game Industry

- 12.1. 3D VR Projects
 - 12.1.1. 3D Mesh Creation Software
 - 12.1.2. Image Editing Software
 - 12.1.3. Virtual Reality
- 12.2. Typical Problems, Solutions and Project Needs
 - 12.2.1. Project Needs
 - 12.2.2. Possible Problems
 - 12.2.3. Solutions
- 12.3. Aesthetic Line Study for the Artistic Style Generation in Video Games: From Game Design to 3D Art Generation
 - 12.3.1. Choice of Video Game Recipient. Who We Want to Reach
 - 12.3.2. Developer's Artistic Possibilities
 - 12.3.3. Final Definition of the Aesthetic Line
- 12.4. Aesthetic Benchmarking and Competitor Analysis
 - 12.4.1. Pinterest and Similar Sites
 - 12.4.2. Modelsheet Creation
 - 12.4.3. Competitor Search
- 12.5. Bible Creation and Briefing
 - 12.5.1. Bible Creation
 - 12.5.2. Bible Development
 - 12.5.3. Briefing Development
- 12.6. Scenarios and Assets
 - 12.6.1. Production Asset Planning at Production Levels
 - 12.6.2. Scenario Design
 - 12.6.3. Asset Design
- 12.7. Asset Integration in Levels and Tests
 - 12.7.1. Integration Process at All Levels
 - 12.7.2. Texture.
 - 12.7.3. Final Touches

- 12.8. Characters
 - 12.8.1. Character Production Planning
 - 12.8.2. Character Design
 - 12.8.3. Character Asset Design
- 12.9. Character Integration in Scenarios and Tests
 - 12.9.1. Character Integration Process in Levels
 - 12.9.2. Project Needs
 - 12.9.3. Animations
- 12.10. 3D Video Game Audio
 - 12.10.1. Project Dossier Interpretation for Sound Identity Generation of Video Games
 - 12.10.2. Composition and Production Processes
 - 12.10.3. Soundtrack Design
 - 12.10.4. Sound Effect Design
 - 12.10.5. Voice Design

Module 13. Advanced 3D

- 13.1. Advanced 3D Modeling Techniques
 - 13.1.1. Interface Configuration
 - 13.1.2. Modeling Observation
 - 13.1.3. Modeling in High
 - 13.1.4. Organic Modeling for Videogames
 - 13.1.5. Advanced 3D Object Mapping
- 13.2. Advanced 3D Texturing
 - 13.2.1. Substance Painter Interfaces
 - 13.2.2. Materials, Alphas and Brush Use
 - 13.2.3. Particle Use
- 13.3. 3D Software and Unreal Engine Export
 - 13.3.1. Unreal Engine Integration in Designs
 - 13.3.2. 3D Model Integration
 - 13.3.3. Unreal Engine Texture Application
- 13.4. Digital Sculpting
 - 13.4.1. Digital Sculpting with ZBrush
 - 13.4.2. First Steps in ZBrush
 - 13.4.3. Interface, Menus and Navigation
 - 13.4.4. Reference Images
 - 13.4.5. Full 3D Modeling of Objects in ZBrush
 - 13.4.6. Base Mesh Use
 - 13.4.7. Part Modeling
 - 13.4.8. 3D Model Export in ZBrush
- 13.5. Polypaint Use
 - 13.5.1. Advanced Brushes
 - 13.5.2. Texture.
 - 13.5.3. Default Materials
- 13.6. Rheopology
 - 13.6.1. Rheopology. Use in the Video Game Industry
 - 13.6.2. Creation of Low-Poly Mesh
 - 13.6.3. Software Use for Rhetopology
- 13.7. 3D Model Positions
 - 13.7.1. Reference Image Viewers
 - 13.7.2. Use of Transpose
 - 13.7.3. Transpose Use for Models Composed of Different Pieces
- 13.8. 3D Model Export
 - 13.8.1. 3D Model Export
 - 13.8.2. Texture Generation for Exportation
 - 13.8.3. 3D Model Configuration with the Different Materials and Textures
 - 13.8.4. Preview of the 3D Model
- 13.9. Advanced Working Techniques
 - 13.9.1. 3D Modeling Workflow
 - 13.9.2. 3D Modeling Work Process Organization
 - 13.9.3. Production Effort Estimates
- 13.10. Model Finalization and Export for Other Programs
 - 13.10.1. Workflow for Model Finalization
 - 13.10.2. Zplugging Exportation
 - 13.10.3. Possible Files. Advantages and Disadvantages

Module 14. 3D Animation

- 14.1. Software Operation
 - 14.1.1. Information Management and Work Methodology
 - 14.1.2. Animation
 - 14.1.3. Timing and Weight
 - 14.1.4. Animation With Basic Objects
 - 14.1.5. Direct and Inverse Cinematics
 - 14.1.6. Inverse Kinematics
 - 14.1.7. Kinematic Chain
- 14.2. Anatomy. Biped vs. Quadruped
 - 14.2.1. Biped
 - 14.2.2. Quadruped
 - 14.2.3. Walking Cycle
 - 14.2.4. Running Cycle
- 14.3. Facial Rig and Morpher
 - 14.3.1. Facial Language. Lip-Sync, Eyes and Focal Points
 - 14.3.2. Sequence Editing
 - 14.3.3. Phonetics. Importance
- 14.4. Applied Animation
 - 14.4.1. 3D Animation for Film and Television
 - 14.4.2. Animation for Video Games
 - 14.4.3. Animation for Other Applications
- 14.5. Motion Capture with Kinect
 - 14.5.1. Motion Capture for Animation
 - 14.5.2. Sequence of Movements
 - 14.5.3. Blender Integration
- 14.6. Skeleton, Skinning and Setup
 - 14.6.1. Interaction Between Skeleton and Geometry
 - 14.6.2. Mesh Interpolation
 - 14.6.3. Animation Weights
- 14.7. Acting
 - 14.7.1. Body Language
 - 14.7.2. Poses
 - 14.7.3. Sequence Editing

- 14.8. Cameras and Plans
 - 14.8.1. The Camera and the Environment
 - 14.8.2. Composition of the Shot and the Characters
 - 14.8.3. Finishes
- 14.9. Visual Special Effects
 - 14.9.1. Visual Effects and Animation
 - 14.9.2. Types of Optical Effects
 - 14.9.3. 3D VFX L
- 14.10. The Animator as an Actor
 - 14.10.1. Expressions
 - 14.10.2. Actors' References
 - 14.10.3. From Camera to Program

Module 15. Unity 3D and Artificial Intelligence Proficiency

- 15.1. Video Games. 3D Unity
 - 15.1.1. Video Games
 - 15.1.2. Video Games. Errors and Hits
 - 15.1.3. Video Game Applications in Other Areas and Industries
- 15.2. Video Game Development. 3D Unity
 - 15.2.1. Production Plan and Development Phases
 - 15.2.2. Development Methodology
 - 15.2.3. Patches and Additional Content
- 15.3. 3D Unity
 - 15.3.1. Unity 3D. Applications
 - 15.3.2. Unity 3D Scripting
 - 15.3.3. Asset Store and Third-Party Plugins
- 15.4. Physics, Inputs
 - 15.4.1. InputSystem
 - 15.4.2. Physics in Unity 3D
 - 15.4.3. Animation and Animator
- 15.5. Unity Prototyping
 - 15.5.1. Blocking and Colliders
 - 15.5.2. Pre-Fabs
 - 15.5.3. Scriptable Objects

- 15.6. Specific Programming Techniques
 - 15.6.1. Singleton Model
 - 15.6.2. Loading of Resources in the Execution of Windows Games
 - 15.6.3. Performance and Profiler
 - 15.7. Video Games for Mobile Devices
 - 15.7.1. Games for Android Devices
 - 15.7.2. Games for IOS Devices
 - 15.7.3. Multiplatform Developments
 - 15.8. Augmented Reality
 - 15.8.1. Types of Augmented Reality Games
 - 15.8.2. ARkit and ARcore
 - 15.8.3. Vuforia Development
 - 15.9. Artificial Intelligence Programming
 - 15.9.1. Artificial Intelligence Algorithms
 - 15.9.2. Finite State Machines
 - 15.9.3. Neural Networks
 - 15.10. Distribution and Marketing
 - 15.10.1. The art of Publishing and Promoting a Video Game
 - 15.10.2. The Responsible for Success
 - 15.10.3. Strategies
- Module 16. 2D and 3D Video Game Development**
- 16.1. Raster Graphic Resources
 - 16.1.1. Sprites
 - 16.1.2. Atlas
 - 16.1.3. Texture
 - 16.2. Interface and Menu Development
 - 16.2.1. Unity GUI
 - 16.2.2. Unity UI
 - 16.2.3. UI Toolkit
 - 16.3. Animation System
 - 16.3.1. Animation Curves and Keys
 - 16.3.2. Applied Animation Events
 - 16.3.3. Modifiers
 - 16.4. Materials and Shaders
 - 16.4.1. Material Components
 - 16.4.2. RenderPass Types
 - 16.4.3. Shaders
 - 16.5. Particles
 - 16.5.1. Particle Systems
 - 16.5.2. Transmitters and Sub-Transmitters
 - 16.5.3. Scripting
 - 16.5.4. Lighting
 - 16.6. Lighting Modes
 - 16.6.1. Light Baking
 - 16.6.2. Light Probes
 - 16.7. Mecanim
 - 16.7.1. State Machines, SubState Machines and Transitions between Animations
 - 16.7.2. Blend Trees
 - 16.7.3. Animation Layers and IK
 - 16.8. Cinematic Finish
 - 16.8.1. Timeline
 - 16.8.2. Post-Processing Effects
 - 16.8.3. Universal Render and High-Definition Render Pipeline
 - 16.9. Advanced VFX
 - 16.9.1. VFX Graph
 - 16.9.2. Shader Graph
 - 16.9.3. Pipeline Tools
 - 16.10. Audio Components
 - 16.10.1. Audio Source and Audio Listener
 - 16.10.2. Audio Mixer
 - 16.10.3. Audio Spatializer

Module 17. Programming, Mechanics Generation and Video Game Prototyping Techniques

- 17.1. Technical Process
 - 17.1.1. Low-Poly and High-Poly Unity Models
 - 17.1.2. Material Settings
 - 17.1.3. High-Definition Render Pipeline
- 17.2. Character Design
 - 17.2.1. Movement
 - 17.2.2. Collider Design
 - 17.2.3. Creation and Behavior
- 17.3. Importing Skeletal Meshes into Unity
 - 17.3.1. Exporting Skeletal Meshes from the 3D Software
 - 17.3.2. Skeletal Meshes in Unity
 - 17.3.3. Anchor Points for Accessories
- 17.4. Importing Animations
 - 17.4.1. Animation Preparation
 - 17.4.2. Importing Animations
 - 17.4.3. Animator and Transitions
- 17.5. Animation Editor
 - 17.5.1. Blend Spaces Creation
 - 17.5.2. Creating Animation Montage
 - 17.5.3. Editing Read-Only Animations
- 17.6. Ragdoll Creation and Simulation
 - 17.6.1. Configuration of a Ragdoll
 - 17.6.2. Ragdoll to an Animation Graph
 - 17.6.3. Simulation of a Ragdoll
- 17.7. Resources for Character Creation
 - 17.7.1. Libraries
 - 17.7.2. Importing and Exporting Library Materials
 - 17.7.3. Handling of Materials
- 17.8. Work Teams
 - 17.8.1. Hierarchy and Work Roles
 - 17.8.2. Version Control Systems
 - 17.8.3. Conflict Resolution

- 17.9. Requirements for Successful Development
 - 17.9.1. Production for Success
 - 17.9.2. Optimal Development
 - 17.9.3. Essential Requirements
- 17.10. Publication Packaging
 - 17.10.1. Player Settings
 - 17.10.2. Build
 - 17.10.3. Installer Creation

Module 18. VR Immersive Game Development

- 18.1. Uniqueness of VR
 - 18.1.1. Traditional Video Games and VR. Differences
 - 18.1.2. Motion Sickness: Smoothness vs. Effects
 - 18.1.3. Unique VR Interactions
- 18.2. Interaction
 - 18.2.1. Events
 - 18.2.2. Physical Triggers
 - 18.2.3. Virtual vs. Real World
- 18.3. Immersive Locomotion
 - 18.3.1. Teletransportation
 - 18.3.2. Arm Swinging
 - 18.3.3. Forward Movement with and without Facing
- 18.4. VR Physics
 - 18.4.1. Grippable and Throwable Objects
 - 18.4.2. Weight and Mass in VR
 - 18.4.3. Gravity in VR
- 18.5. UI in VR
 - 18.5.1. Positioning and Curvature of UI Elements
 - 18.5.2. VR Menu Interaction Modes
 - 18.5.3. Best Practices for Comfortable Experiences
- 18.6. VR Animation
 - 18.6.1. Animated Model Integration in VR
 - 18.6.2. Animated Objects and Characters vs. Physical Objects
 - 18.6.3. Animated vs. Procedural Transitions

- 18.7. Avatars
 - 18.7.1. Avatar Representation from Your Own Eyes
 - 18.7.2. External Representation of Avatars
 - 18.7.3. Inverse Cinematic and Procedural Avatar Animation
- 18.8. Audio
 - 18.8.1. Configuring Audio Sources and Audio Listeners for VR
 - 18.8.2. Effects Available for More Immersive Experiences
 - 18.8.3. VR Audio Spatializer
- 18.9. VR and AR Project Optimization
 - 18.9.1. Occlusion Culling
 - 18.9.2. Static Batching
 - 18.9.3. Quality Settings and Render Pass Types
- 18.10. Practice: VR Escape Room
 - 18.10.1. Experience Design
 - 18.10.2. Scenario Layout
 - 18.10.3. Mechanic Development

Module 19. Professional Audio for 3D VR Video Games

- 19.1. Professional 3D Video Games Audio
 - 19.1.1. Video Game Audio
 - 19.1.2. Audio Style Types in Current Video Games
 - 19.1.3. Spatial Audio Models
- 19.2. Preliminary Material Study
 - 19.2.1. Game Design Documentation Study
 - 19.2.2. Level Design Documentation Study
 - 19.2.3. Complexity and Typology Evaluation to Create Audio Projects
- 19.3. Sound Reference Studio
 - 19.3.1. Main References List by Similarity with the Project
 - 19.3.2. Auditory References from Other Media to Give Video Games Identity
 - 19.3.3. Reference Study and Drawing of Conclusions
- 19.4. Sound Identity Design for Video Games
 - 19.4.1. Main Factors Influencing the Project
 - 19.4.2. Relevant Aspects in Audio Composition: Instrumentation, Tempo, etc.
 - 19.4.3. Voice Definition

- 19.5. Soundtrack Creation
 - 19.5.1. Environment and Audio Lists
 - 19.5.2. Definition of Motif, Themes and Instrumentation
 - 19.5.3. Composition and Audio Testing of Functional Prototypes
- 19.6. Sound Effect Creation (FX)
 - 19.6.1. Sound Effects: FX Types and Complete Lists According to Project Needs
 - 19.6.2. Definition of Motif, Themes and Creation
 - 19.6.3. Sound FX Evaluation and Functional Prototype Testing
- 19.7. Voice Creation
 - 19.7.1. Voice Types and Phrase Listing
 - 19.7.2. Search and Evaluation of Voice Actors and Actresses
 - 19.7.3. Recording Evaluation and Testing of Voices on Functional Prototypes
- 19.8. Audio Quality Evaluation
 - 19.8.1. Elaboration of Listening Sessions with the Development Team
 - 19.8.2. All Audio Integration into Working Prototypes
 - 19.8.3. Testing and Evaluation of the Results Obtained
- 19.9. Project Exporting, Formatting and Importing Audio
 - 19.9.1. Video Game Audio Formats and Compression
 - 19.9.2. Exporting Audio
 - 19.9.3. Importing Project Audio
- 19.10. Preparing Audio Libraries for Marketing
 - 19.10.1. Versatile Sound Library Design for Video Game Professionals
 - 19.10.2. Audio Selection by Type: Soundtrack, FX and Voices
 - 19.10.3. Commercialization of Audio Asset Libraries

Module 20. Video Game Production and Financing

- 20.1. Video Game Production
 - 20.1.1. Cascading Methodologies
 - 20.1.2. Case Studies on Lack of Project Management and Work Plan
 - 20.1.3. Consequences of the Lack of a Production Department in the Video Game Industry
- 20.2. Development Teams
 - 20.2.1. Key Departments in Project Development
 - 20.2.2. Key Profiles in Micro-Management: LEAD and SENIOR
 - 20.2.3. Problems of Lack of Experience in JUNIOR Profiles
 - 20.2.4. Establishment of Training Plan for Low-Experience Profiles

- 20.3. Agile Methodologies in Video Game Development
 - 20.3.1. SCRUM
 - 20.3.2. AGILE
 - 20.3.3. Hybrid Methodologies
- 20.4. Effort, Time and Cost Estimates
 - 20.4.1. Video Game Development Costs: Main Concepts and Expenses
 - 20.4.2. Task Scheduling: Critical Points, Keys and Aspects to Consider
 - 20.4.3. Estimates based on VS Stress Points Calculated in Hours
- 20.5. Prototype Planning Prioritization
 - 20.5.1. Establishment of General Project Objectives
 - 20.5.2. Prioritization of Key Functionalities and Contents: Order and Needs by Department
 - 20.5.3. Grouping of Functionalities and Contents in Production to Constitute Deliverables (Functional Prototypes)
- 20.6. Best Practices in Video Game Production
 - 20.6.1. Meetings, Dailies, Weekly Meetings, End of Sprint Meetings, and ALPHA, BETA and RELEASE Milestone Review Meetings.
 - 20.6.2. Sprint Speed Measurement
 - 20.6.3. Lack of Motivation and Low Productivity Detection and Anticipation of Potential Production Problems
- 20.7. Production Analysis
 - 20.7.1. Preliminary Analysis I: Market Status Review
 - 20.7.2. Preliminary Analysis 2: Establishment of Main Project References (Direct Competitors)
 - 20.7.3. Previous Analyses Conclusions
- 20.8. Development Cost Calculation
 - 20.8.1. Human Resources
 - 20.8.2. Technology and Licensing
 - 20.8.3. External Development Expenses
- 20.9. Investment Search
 - 20.9.1. Types of Investors
 - 20.9.2. Executive Summary
 - 20.9.3. Pitch Deck
 - 20.9.4. Publishers
 - 20.9.5. Self-Financing
- 20.10. Project Post-Mortem Elaboration
 - 20.10.1. Post-Mortem Elaboration Process in the Company
 - 20.10.2. Positive Aspect Analysis of the Project
 - 20.10.3. Negative Aspect Analysis of the Project
 - 20.10.4. Improvement Proposal on the Project's Negative Points and Conclusions



With the TECH curriculum we help you to understand and analyze the world through the eyes of technology”

04

Teaching Objectives

The teaching objectives of this Advanced Master's Degree in Virtual Reality and Computer Vision are aimed at creating highly skilled professionals in the design, development and application of immersive technologies and visual analysis. At the same time, the program seeks to provide students with the knowledge and skills necessary to create advanced Virtual Reality experiences. Using state-of-the-art tools and techniques, students will learn to apply machine learning algorithms, neural networks, among others, facing current and future technological challenges.



“

Open new career doors and turn your ideas into tangible realities with the support you will only find at TECH”



General Objectives

- ♦ Promote a critical understanding of the ethical and social implications of VR and CV technologies, ensuring that students develop a responsible and sustainable approach to working with technologies that directly impact people's daily lives
- ♦ Provide advanced knowledge on the most innovative tools and techniques in VR and CV, such as Unreal Engine, Unity, convolutional neural networks (CNN), and machine learning algorithms, so that students are able to create immersive experiences and smart vision solutions
- ♦ Develop practical skills through the implementation of real projects that allow students to face and solve complex problems, integrating Virtual Reality and Computer Vision in real contexts of industry, medicine, education, and other areas
- ♦ Foster innovation and creativity by encouraging students to propose new applications and technological solutions that improve processes and experiences in emerging sectors such as autonomous driving, medical diagnostics, entertainment, and human-computer interaction





Specific Objectives

Module 1. Computer Vision

- ♦ Delve into the systems and applications in which Computer Vision plays a key role
- ♦ Understand the fundamental algorithms used to process and analyze images or videos

Module 2. Applications and State-of-the-Art

- ♦ Explore the main applications of machine vision in various industries
- ♦ Analyze the most recent advances in the field and their implications for technological innovation

Module 3. Digital Image Processing

- ♦ Manage fundamental image processing techniques
- ♦ Develop skills for image enhancement and image restoration using digital tools

Module 4. Advanced Digital Image Processing

- ♦ Apply advanced algorithms such as color image processing and edge detection
- ♦ Integrate analysis methods for specific tasks, such as pattern recognition

Module 5. 3D Image Processing

- ♦ Delve into the fundamentals of three-dimensional image processing
- ♦ Apply techniques for 3D reconstruction from image data

Module 6. Deep Learning

- ♦ Understand how deep learning is applied in the context of Computer Vision
- ♦ Obtain practical skills to implement deep neural networks

Module 7. Convolutional Neural Networks and Image Classification

- ♦ Apply CNNs to image classification tasks in real-world projects
- ♦ Evaluate the effectiveness and accuracy of neural networks in classification

Module 8. Object Detection

- ♦ Implement models for automatic object detection in images and videos
- ♦ Explore object localization and recognition techniques

Module 9. Image Segmentation with Deep Learning

- ♦ Apply deep learning techniques in image segmentation
- ♦ Implement neural networks to segment relevant areas within images

Module 10. Advanced Image Segmentation and Advanced Computer Vision Techniques

- ♦ Explore state-of-the-art techniques in image segmentation
- ♦ Apply segmentation methods to highly complex images

Module 11. The 3D Industry

- ♦ Understand the impact and applications of 3D in today's industry
- ♦ Explore the processes and tools used in the creation of 3D content for different industries

Module 12. Art and 3D in the Video Game Industry

- ♦ Investigate modeling and texturing techniques applied to the design of video game characters and environments
- ♦ Acquire the skills to integrate 3D art into an interactive video game environment

Module 13. Advanced 3D

- ♦ Apply complex processes for the creation of realistic 3D scenes and characters
- ♦ Integrate state-of-the-art software tools into the 3D creation process

Module 14. 3D Animation

- ♦ Teach the fundamentals of 3D animation
- ♦ Apply animation techniques for characters, objects and environments within a 3D project

Module 15. Unity 3D and Artificial Intelligence Proficiency

- ♦ Teach how to use Unity 3D for the development of interactive projects and video games
- ♦ Create simulation environments and games that include AI for advanced behaviors

Module 16. 2D and 3D Video Game Development

- ♦ Have a comprehensive understanding of 2D and 3D video game development processes
- ♦ Be able to program and design interactive videogames using engines such as Unity

Module 17. Programming, Mechanics Generation and Video Game Prototyping Techniques

- ♦ Approach specific programming techniques for the creation of video game mechanics
- ♦ Develop rapid prototypes for video games and validate interactive mechanics

Module 18. VR Immersive Game Development

- ♦ Delve into the creation of immersive experiences using virtual reality in video game projects
- ♦ Apply best practices for user interaction and experience in virtual reality

Module 19. Professional Audio for 3d VR Video Games

- ♦ Learn audio design and editing techniques to improve immersion in video games
- ♦ Apply 3D sound and dynamic effects for an immersive experience in virtual reality

Module 20. Video Game Production and Financing

- ♦ Understand the key aspects of video game production and project management
- ♦ Analyze the financing strategies available for video game development



Enter into the top management of information systems with an Advanced Master's Degree designed to transform your professional career"

05

Career Opportunities

The Advanced Master's Degree in Virtual Reality and Computer Vision opens several career opportunities in high demand and growth sectors. Graduates will be able to work as developers or specialists in artificial intelligence applied to vision, as well as manage projects in the production and financing of video games, from the design to the commercialization of virtual reality products. The growing demand for experts offers excellent opportunities in the market, allowing graduates to collaborate in the design of immersive experiences with a great impact on the user. In short, this program prepares students for key roles in cutting-edge industries, which demand both creativity and advanced technical knowledge.



“

If you like challenges and want to tackle today's most relevant topics, this Advanced Master's Degree is for you. Join TECH now"

Graduate Profile

The graduate of the Advanced Master's Degree in Virtual Reality and Computer Vision will be a highly trained professional in the most advanced technologies for video game development and visual processing. This comprehensive profile will prepare them to face complex technological challenges and offer innovative solutions in immersive environments and computer vision applications. With a solid knowledge of the video game industry, you will be ready to lead production and financing projects. In addition, you will be able to apply your expertise in various sectors, such as entertainment, education, medicine, automotive and industry. You will become a leader in key technology fields, driving the development of advanced solutions in Virtual Reality and Computer Vision.

With each module you pass, you will be taking a step closer to achieving the professional success you dream of.

- ♦ **Advanced Mastery of Virtual Reality and Computer Vision Technologies:** Ability to design, develop and apply advanced technological solutions in these fields
- ♦ **Creativity and Innovation:** Ability to think creatively and propose disruptive solutions in the design of immersive experiences and computer vision applications
- ♦ **Adaptation and Complex Problem Solving:** Ability to face technological challenges, adapting to new tools and methodologies, and offering innovative solutions
- ♦ **Technological Project Management:** Ability to plan, coordinate and lead development projects in high-tech environments, ensuring compliance with deadlines and objective





After completing the Advanced Master's Degree, you will be able to apply your knowledge and skills in the following positions:

1. **Virtual Reality (VR) Video Game Developer:** professional specialized in the creation of immersive interactive environments, designing video game experiences that take place within three-dimensional virtual environments
2. **Computer Vision Engineer:** expert in the design and implementation of systems that allow machines to analyze and understand images or videos, applying advanced algorithms to interpret visual data in real time
3. **3D Video Game Developer:** professional dedicated to the creation and programming of three-dimensional video games, focusing on modeling, texturing, and animation of objects and characters within three-dimensional environments.
4. **Artificial Intelligence Applied to Vision Specialist:** professional who uses AI and Deep Learning algorithms to develop systems capable of recognizing, analyzing and classifying images in a variety of applications, from security to medical diagnosis
5. **Video Game Production Director:** leader in the management of video game development teams, in charge of coordinating, supervising and optimizing creative and technical processes to ensure the delivery of a quality end-product
6. **Video Game Development Project Manager:** Responsible for the planning, coordination and execution of video game projects, managing time, resources and teams to ensure the successful delivery of products within budget and on time

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Upon completion of this program, you will be a professional with invaluable skills in an increasingly automated and digitized world”

06

Study Methodology

TECH is the world's first university to combine the **case study** methodology with **Relearning**, a 100% online learning system based on guided repetition.

This disruptive pedagogical strategy has been conceived to offer professionals the opportunity to update their knowledge and develop their skills in an intensive and rigorous way. A learning model that places students at the center of the educational process giving them the leading role, adapting to their needs and leaving aside more conventional methodologies.



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TECH will prepare you to face new challenges in uncertain environments and achieve success in your career”

The student: the priority of all TECH programs

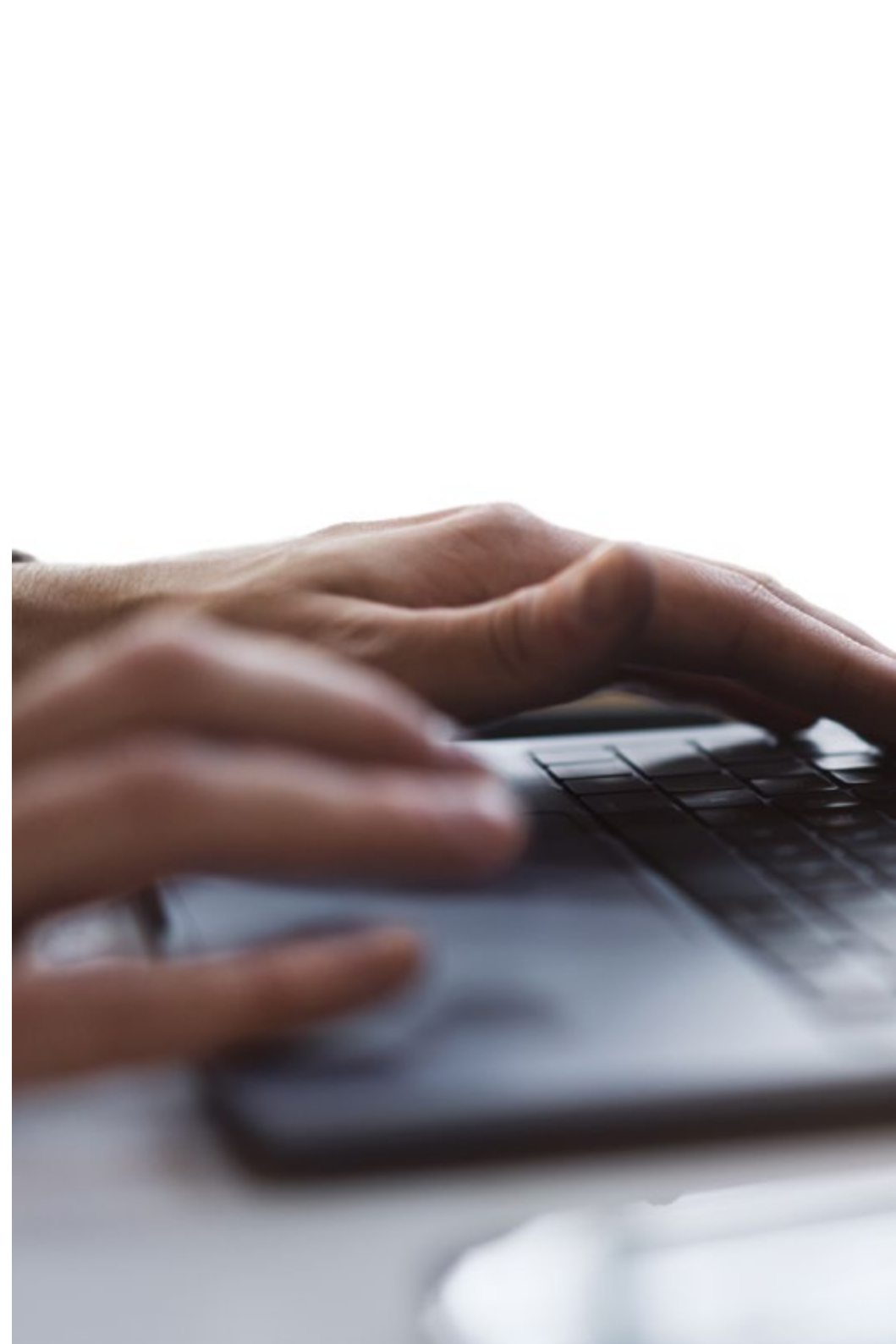
In TECH's study methodology, the student is the main protagonist.

The teaching tools of each program have been selected taking into account the demands of time, availability and academic rigor that, today, not only students demand but also the most competitive positions in the market.

With TECH's asynchronous educational model, it is students who choose the time they dedicate to study, how they decide to establish their routines, and all this from the comfort of the electronic device of their choice. The student will not have to participate in live classes, which in many cases they will not be able to attend. The learning activities will be done when it is convenient for them. They can always decide when and from where they want to study.

“

*At TECH you will NOT have live classes
(which you might not be able to attend)”*



The most comprehensive study plans at the international level

TECH is distinguished by offering the most complete academic itineraries on the university scene. This comprehensiveness is achieved through the creation of syllabi that not only cover the essential knowledge, but also the most recent innovations in each area.

By being constantly up to date, these programs allow students to keep up with market changes and acquire the skills most valued by employers. In this way, those who complete their studies at TECH receive a comprehensive education that provides them with a notable competitive advantage to further their careers.

And what's more, they will be able to do so from any device, pc, tablet or smartphone.

“*TECH's model is asynchronous, so it allows you to study with your pc, tablet or your smartphone wherever you want, whenever you want and for as long as you want*”

Case Studies and Case Method

The case method has been the learning system most used by the world's best business schools. Developed in 1912 so that law students would not only learn the law based on theoretical content, its function was also to present them with real complex situations. In this way, they could make informed decisions and value judgments about how to resolve them. In 1924, Harvard adopted it as a standard teaching method.

With this teaching model, it is students themselves who build their professional competence through strategies such as Learning by Doing or Design Thinking, used by other renowned institutions such as Yale or Stanford.

This action-oriented method will be applied throughout the entire academic itinerary that the student undertakes with TECH. Students will be confronted with multiple real-life situations and will have to integrate knowledge, research, discuss and defend their ideas and decisions. All this with the premise of answering the question of how they would act when facing specific events of complexity in their daily work.



Relearning Methodology

At TECH, case studies are enhanced with the best 100% online teaching method: Relearning.

This method breaks with traditional teaching techniques to put the student at the center of the equation, providing the best content in different formats. In this way, it manages to review and reiterate the key concepts of each subject and learn to apply them in a real context.

In the same line, and according to multiple scientific researches, reiteration is the best way to learn. For this reason, TECH offers between 8 and 16 repetitions of each key concept within the same lesson, presented in a different way, with the objective of ensuring that the knowledge is completely consolidated during the study process.

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



A 100% online Virtual Campus with the best teaching resources

In order to apply its methodology effectively, TECH focuses on providing graduates with teaching materials in different formats: texts, interactive videos, illustrations and knowledge maps, among others. All of them are designed by qualified teachers who focus their work on combining real cases with the resolution of complex situations through simulation, the study of contexts applied to each professional career and learning based on repetition, through audios, presentations, animations, images, etc.

The latest scientific evidence in the field of Neuroscience points to the importance of taking into account the place and context where the content is accessed before starting a new learning process. Being able to adjust these variables in a personalized way helps people to remember and store knowledge in the hippocampus to retain it in the long term. This is a model called Neurocognitive context-dependent e-learning that is consciously applied in this university qualification.

In order to facilitate tutor-student contact as much as possible, you will have a wide range of communication possibilities, both in real time and delayed (internal messaging, telephone answering service, email contact with the technical secretary, chat and videoconferences).

Likewise, this very complete Virtual Campus will allow TECH students to organize their study schedules according to their personal availability or work obligations. In this way, they will have global control of the academic content and teaching tools, based on their fast-paced professional update.



The online study mode of this program will allow you to organize your time and learning pace, adapting it to your schedule”

The effectiveness of the method is justified by four fundamental achievements:

1. Students who follow this method not only achieve the assimilation of concepts, but also a development of their mental capacity, through exercises that assess real situations and the application of knowledge.
2. Learning is solidly translated into practical skills that allow the student to better integrate into the real world.
3. Ideas and concepts are understood more efficiently, given that the example situations are based on real-life.
4. Students like to feel that the effort they put into their studies is worthwhile. This then translates into a greater interest in learning and more time dedicated to working on the course.

The university methodology top-rated by its students

The results of this innovative teaching model can be seen in the overall satisfaction levels of TECH graduates.

The students' assessment of the quality of teaching, quality of materials, course structure and objectives is excellent. Not surprisingly, the institution became the best rated university by its students on the Global Score review platform, obtaining a 4.9 out of 5.

Access the study contents from any device with an Internet connection (computer, tablet, smartphone) thanks to the fact that TECH is at the forefront of technology and teaching.

You will be able to learn with the advantages that come with having access to simulated learning environments and the learning by observation approach, that is, Learning from an expert.



As such, the best educational materials, thoroughly prepared, will be available in this program:



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.

This content is then adapted in an audiovisual format that will create our way of working online, with the latest techniques that allow us to offer you high quality in all of the material that we provide you with.



Practicing Skills and Abilities

You will carry out activities to develop specific competencies and skills in each thematic field. Exercises and activities to acquire and develop the skills and abilities that a specialist needs to develop within the framework of the globalization we live in.



Interactive Summaries

We present the contents attractively and dynamically in multimedia lessons that include audio, videos, images, diagrams, and concept maps in order to reinforce knowledge.

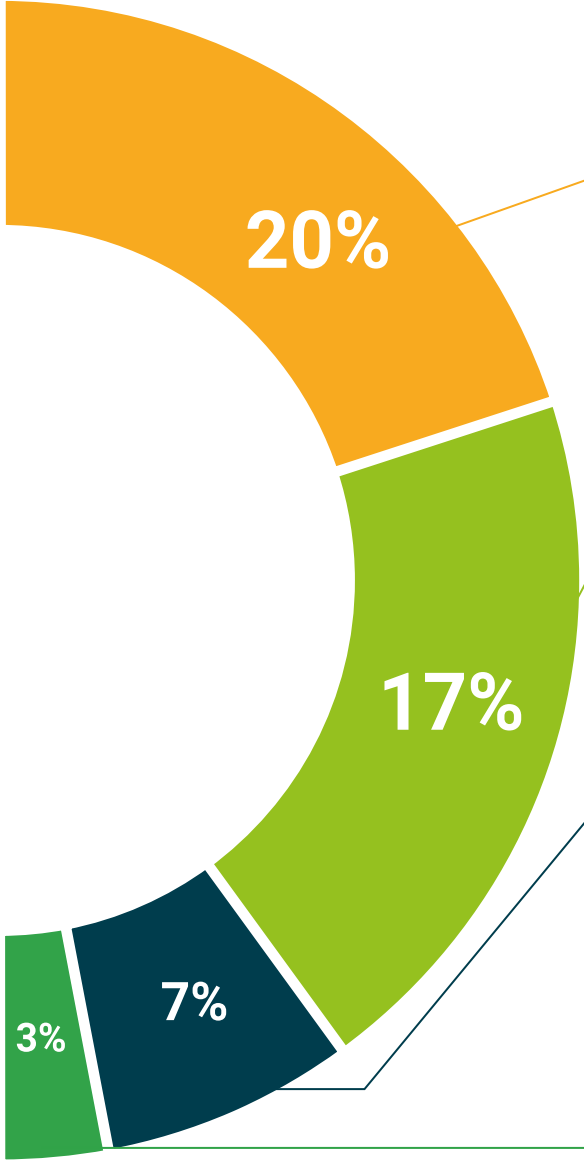
This exclusive educational system for presenting multimedia content was awarded by Microsoft as a "European Success Story".



Additional Reading

Recent articles, consensus documents, international guides... In our virtual library you will have access to everything you need to complete your education.





Case Studies

Students will complete a selection of the best case studies in the field. Cases that are presented, analyzed, and supervised by the best specialists in the world.



Testing & Retesting

We periodically assess and re-assess your knowledge throughout the program. We do this on 3 of the 4 levels of Miller's Pyramid.



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 for future difficult decisions.



Quick Action Guides

TECH offers the most relevant contents of the course in the form of worksheets or quick action guides. A synthetic, practical and effective way to help students progress in their learning.



07

Teaching Staff

This program has a high-level teaching staff made up of active professionals who develop their careers in the field of Virtual Reality and Computer Vision, as well as with extensive experience in 3D design of all types of virtual projects. In this way, the computer scientist who enrolls in this Advanced Master's Degree will be able to access all the keys in this field and apply everything learned directly in their work even before completing the program.





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The best support for you to become a leader in one of the most promising and revolutionary areas of technology”

Management



Mr. Redondo Cabanillas, Sergio

- ◆ Specialist in Machine Vision Research and Development at BCN Vision
- ◆ Development and Backoffice Team Leader at BCN Vision
- ◆ Project and Development Director of Machine Vision Solutions
- ◆ Sound Technician at Media Arts Studio
- ◆ Technical Engineering in Telecommunications with specialization in Image and Sound by the Polytechnic University of Catalonia
- ◆ Degree in Artificial Intelligence applied to Industry from the Autonomous University of Barcelona
- ◆ Higher Grade Training Cycle in Sound by CP Villar



Mr. Horischnik Arbo, Manuel

- ◆ CEO at Ibercover Studio
- ◆ Director of Commercial Management and Marketing at Corporación CRN Televisión SL.
- ◆ Degree in Business Administration and Management
- ◆ Master's Degree in 3D Modeling and Animation

Professors

Mr. Gutiérrez Olabarría, José Ángel

- ♦ Project Management, Software Analysis and Design and C Programming of Quality Control and Industrial Informatics Applications
- ♦ Specialist Engineer in Machine Vision and Sensors
- ♦ Market Manager of the Iron and Steel Sector, performing functions of Customer Contact, Recruitment, Market Plans and Strategic Accounts
- ♦ Computer Engineer by the University of Deusto
- ♦ Master's Degree in Robotics and Automation from ETSII/IT of Bilbao
- ♦ Diploma in Advanced Studies in Automation and Electronics Doctorate Program by ETSII/IT of Bilbao

Mr. Enrich Llopart, Jordi

- ♦ Chief Technology Officer of Bcvision - Machine Vision
- ♦ Project and application engineer Bcvision - Machine Vision
- ♦ Project and application engineer PICVISA Machine Vision
- ♦ Degree 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 in Project Management. La Salle University - Ramon Llull University

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)

Ms. Riera i Marín, Meritxell

- ♦ Deep Learning Systems Developer at Sycal Medical
- ♦ Researcher at Centre National de la Recherche Scientifique (CNRS), France
- ♦ Software Engineer at Zhilabs
- ♦ IT Technician, Mobile World Congress
- ♦ Software Engineer at Avanade
- ♦ Engineering of Telecommunications by the Polytechnic University of Catalonia
- ♦ *Master of Science*: Signal, Image, Embedded Systems and Automation Specialization (SISEA) at IMT Atlantique, France
- ♦ Master's Degree in of Telecommunications Engineering from the Polytechnic University of Catalonia

Mr. González González, Diego Pedro

- ♦ Software Architect for Artificial Intelligence based systems
- ♦ Deep Learning and Machine Learning Application Developer
- ♦ Software architect for embedded systems for railway safety applications
- ♦ Linux driver developer
- ♦ Systems engineer for railway track equipment
- ♦ Embedded Systems Engineer
- ♦ Deep Learning Engineer
- ♦ Official Master's Degree in Artificial Intelligence from the International University of La Rioja
- ♦ Industrial Engineer by Miguel Hernández University

Mr. Higón Martínez, Felipe

- ♦ Electronics, Telecommunications and Computer Engineer
- ♦ Validation and Prototyping Engineer
- ♦ Applications Engineer
- ♦ Support Engineer
- ♦ Master's Degree in Advanced and Applied Artificial Intelligence by IA3
- ♦ Technical Engineer in Telecommunications
- ♦ Degree in Electronic Engineering from the University of Valencia.

Mr. Rodríguez Cabrera, Jonathan

- ♦ Designer of branding, 3D product, 3D clothing, advertising and production plans for Riding Solutia, Mudwar and Assault Bike Wear
- ♦ Character Designer and Developer for Ultras City The Game
- ♦ Creator and Management of the school of new technologies at Tooning 3D School
- ♦ Professor in Video Game Production programs
- ♦ Degree in Industrial Design at the European Institute of Design (IED)
- ♦ Master's Degree in 3D Design and Animation at CICE Madrid

Mr. Delgado Gonzalo, Guillem

- ♦ Computer Vision and Artificial Intelligence Researcher at Vicomtech
- ♦ Computer Vision and Artificial Intelligence Engineer at Gestooos
- ♦ Junior Engineer at Sogeti
- ♦ Graduated in Audiovisual Systems Engineering at the Polytechnic University of Catalonia.
- ♦ MSc in Computer Vision at Universitat Autònoma de Barcelona
- ♦ Degree in Computer Science at Aalto University
- ♦ Degree in Audiovisual Systems UPC - ETSETB Telecom BCN



**Ms. García Moll, Clara**

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

Mr. Alcalá Zamora, Jorge

- ♦ Art Director at Ibercover Studio and Enne Entertainment
- ♦ 3D Artist and Video and Projection Technician at 3D Scenica
- ♦ 3D Artist at Revistronic and Virtual Toys
- ♦ Master's Degree in 3D, Animation and Discrete Postproduction
- ♦ Master's Degree in Videogames
- ♦ Unity 3D and Unreal Engine Expert

Mr. Carmena García-Bermejo, Carlos

- ♦ 3D Artist at Ibercover Studio
- ♦ 3D Artist at Assault Bike Wear
- ♦ Degree in Fine Arts from the Autonomous University of Madrid
- ♦ Master's Degree in 3D Modeling with ZBrush from the Professional School of New Technologies CICE
- ♦ Master's Degree in 3D Max Design
- ♦ Expert in the creation of photorealistic 3D images
- ♦ Expert in Unreal Engine 4 for Scenario Design

08

Certificate

The Advanced Master's Degree in Virtual Reality and Computer Vision guarantees students, in addition to the most rigorous and up-to-date education, access to an Advanced Master's Degree diploma issued by TECH Technological University.



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

This **Advanced Master's Degree in Virtual Reality and Computer Vision** contains the most complete and up-to-date program on the market.

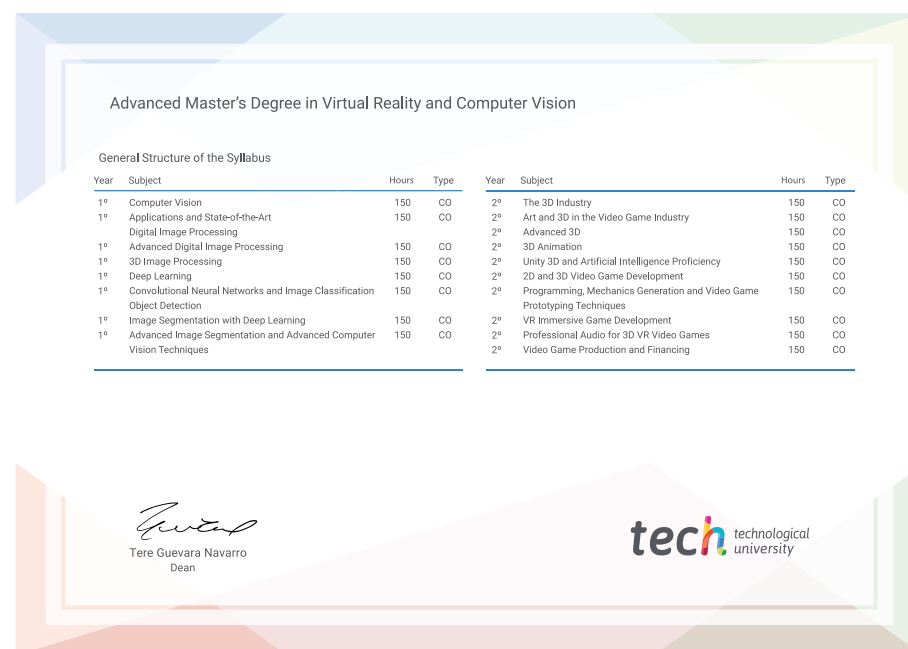
After the student has passed the assessments, they will receive their corresponding **Advanced Master's Degree** diploma issued by **TECH Technological University** via tracked delivery*.

The diploma issued by **TECH Technological University** will express the qualification obtained in the Advanced Master's Degree, and meets the requirements commonly demanded by labor exchanges, competitive examinations, and professional career evaluation committees.

Title: **Advanced Master's Degree in Virtual Reality and Computer Vision**

Modality: **online**

Duration: **2 years**



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



Advanced Master's Degree

Virtual Reality and Computer Vision

- » Modality: **online**
- » Duration: **2 years**
- » Certificate: **TECH Technological University**
- » Schedule: **at your own pace**
- » Exams: **online**

Advanced Master's Degree Virtual Reality and Computer Vision