CYENS
CENTRE OF EXCELLENCE

Internship Projects

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MRG: SMART NETWORKED SYSTEMS (SNS)

Internship Title	IoT Testbed Setup
Description of Internship	This topic deals with the set-up, installation and configuration of an IoT testbed at CYENS. This includes both the hardware connectivity and the testbed management platform set-up. All the components will already be available.
Required Skills	Computer Networks, Network protocols, Basic Programming
Internship Objectives	To set up an IoT testbed and make it operational
Expected Deliverables	Testbed

Internship Title	Internet of Things Intrusion Detection
Description of Internship	Every sensor and embedded device is prone to error failure which can be caused by natural causes such as environmental effects, battery discharging or by malicious invasion to the network. A fault in a node can decrease network performance and/or in the worst case scenario,dissolution of the network. Diagnosing faults in the network at an early stage can decrease the possibilities of tear down the network. Fault diagnosis can help identify the nature of the error; whether the error is a result of malicious intervention or of natural causes. The goal of the current project is to create faults so that to train a diagnosis tool. The tool will evaluate a set of data that will be considered crucial to identify the presence of fault or malicious intervention in the network. Data gathered in a controlled environment will be profiled as normalbehavior, that is, behavior with no faults present in the network. Data will also be taken in simulations where faults, or attacks are present. Both benign and malicious data will be used to establish boundaries that will identify the presence of malicious attack of failure. The recognition and classification of the activity will be based on one or more techniques from Statistical Analysis, Machine Learning and Computational Intelligence. Implementation of monitoring at the gateway node and creation and evaluation of new types of attacks, related to the types of protocols most used in IoT (RPL, CoAP, MQTT etc).

Required Skills	Computer Networks, Network protocols, Basic Programming, basic understanding of AI/ML
Internship Objectives	To create new intrusion detection techniques, or the extensive evaluation of existing techniques.
Expected Deliverables	Final Report, Simulation Scripts

Internship Title	**Implementation of direct communication between smartphones**
Description of Internship	As part of ongoing work on Device-to-Device communication there is a need to implement and experiment with different types of technologies enabling direct communication. There are two modes of operation: interchanging files (ftp like) and sharing communication resources (one acts as a relay/router for the other). Work in this topics includes programming for Android phones (android studio or similar) to implement the two communication modes in WIFI-direct and LTE Direct.
Required Skills	Computer Networks, Network protocols, Basic Programming, Android programming
Internship Objectives	To implement a direct communication solutions between smartphones
Expected Deliverables	Final Report, Testbed

Internship Title	**Smart Parking**
Description of Internship	Gather information for parkings in Nicosia in order to update our smart parking database. Also create an AI module that will use java and rest services to interoperate with smart parking application that it will predict the % of usage of a parking, given a specific time and date. The

Neural Network will be trained using data that will be gathered by the researcher. Prior work exists here. |

Required Skills	Computer Networks, Network protocols, Basic Programming, basic understanding of AI/ML
Internship Objectives	To extend the Smart Parking solution with predictions
Expected Deliverables	Final Report, App with new features

Internship Title	**Smart Parking Application UI/UX Design**
Description of Internship	Work on the UI and UX aspects of an existing Web and Mobile app
Required Skills	Graphic Design, UI, UX
Internship Objectives	Cretae visual identity of Smart Parking application and create a user-friendly interface
Expected Deliverables	App with new design

MRG: ADAPTIVE VIDEO PROCESSING, ANALYTICS AND COMMUNICATIONS FOR REAL-TIME APPLICATIONS (VIDEOMICS)

Internship Title	**Comparative Performance Evaluation of Video Codecs**
Description of Internship	Video compression is the core technology in video streaming applications. With global video traffic surpassing 82% of all Internet traffic in 2022, there is a strong need to develop efficient compression algorithms to accommodate future growth. The internship will conduct performance evaluation of - Emerging (AV2, EVC, LCEVC), recently standardized (VVC, AV1), earlier (HEVC), and legacy but widespread (H.264, VP9) video codecs. - Objective video quality assessment will leverage PSNT, SSIM, and VMAF metrics. - Subjective video quality assessment experiments of >10 participants will be further scheduled (optional). - Netflix, LIVE, and Medical video datasets will be used. - The implementation philosophy and source-code implementation guidelines will be provided.
Required Skills	- Good Programming Skills (Python and Bash Scripting for implementation; optional C and C++ for logic comprehension) - Basic understanding of Image/ Video processing - Basic understanding of Machine Learning Algorithms
Reading	- G. Esakki, A. S. Panayides, V. Jalta and M. S. Pattichis, "Adaptive Video Encoding for Different Video Codecs," in *IEEE Access*, vol. 9, pp. 68720-68736, 2021. doi: 10.1109/ACCESS.2021.3077313. - A. S. Panayides, M. S. Pattichis, M. Pantziaris, C.S. Pattichis, "The Battle of the Video Codecs in the Healthcare Domain - A Comparative Performance Evaluation Study Leveraging VVC and AV1," in *IEEE Access*, vol. 8, pp. 11469-11481, 2020. doi: 10.1109/ACCESS.2020.2965325

Internship Title	**Comparative Performance Evaluation of Video Codecs for 360o Videos**
Description of Internship	Adaptive video streaming for 360º videos is much more computationally demanding and bandwidth-hungry than traditional 2D videos. The internship will compare: - Recently standardized VVC and AV1 as well as earlier HEVC video codecs and examine their performance in terms of encoding complexity, bandwidth demands, and video quality. - Objective video quality assessment will leverage PSNR and VMAF metrics. - Subjective video quality assessment experiments of >10 participants will be further scheduled (optional). - Open-source 360o video datasets will be used. - The implementation philosophy and source-code implementation guidelines will be provided.
Required Skills	- Good Programming Skills (Python and Bash Scripting for implementation; optional C and C++ for logic comprehension) - Basic understanding of Image/ Video processing - Basic understanding of Machine Learning Algorithms

Reading	- G. Esakki, A. S. Panayides, V. Jalta and M. S. Pattichis, "Adaptive Video Encoding for Different Video Codecs," in *IEEE Access*, vol. 9, pp. 68720-68736, 2021.
	  doi: 10.1109/ACCESS.2021.3077313.
	- A. S. Panayides, M. S. Pattichis, M. Pantziaris, C.S. Pattichis, "The Battle of the Video Codecs in the Healthcare Domain - A Comparative Performance Evaluation Study Leveraging VVC and AV1," in *IEEE Access*, vol. 8, pp. 11469-11481, 2020.
	  doi: 10.1109/ACCESS.2020.2965325

Internship Title	**Video Analytics using Deep Learning Methods: How Compression comes into Play**
Description of Internship	Video analysis pipelines using deep learning (DL) methods rarely address the compression ratio of the acquired video feed. The internship will examine edge scenarios aiming at identifying the breaking point of the video analysis outcome by: - Varying the compression levels of different video codecs supported by the DL model - Examining different, lightweight single-shot detector networks (i.e., YOLO, Mask R-CNN) - Investigating diverse video datasets
Required Skills	- Good Programming Skills (Python, C, C++) - Basic understanding of Image/ Video processing - Basic understanding of Machine Learning Algorithms
Reading	- G. Esakki, A. S. Panayides, V. Jalta and M. S. Pattichis, "Adaptive Video Encoding for Different Video Codecs," in *IEEE Access*, vol. 9, pp. 68720-68736, 2021. doi: 10.1109/ACCESS.2021.3077313.

	- A. S. Panayides, M. S. Pattichis, M. Pantziaris, C.S. Pattichis, "The Battle of the Video Codecs in the Healthcare Domain - A Comparative Performance Evaluation Study Leveraging VVC and AV1," in *IEEE Access*, vol. 8, pp. 11469-11481, 2020. doi: 10.1109/ACCESS.2020.2965325

Internship Title	**Adaptive 360° Video Streaming Simulations & Emulations**
Description of Internship	Adaptive video encoding can be formulated as a multi-objective optimization process where video quality, bitrate demands, and encoding rate are jointly optimized, going beyond the standard video encoding approaches that focus on rate control targeting specific bandwidths. The latter approach is applicable for industry-level adaptive video streaming solutions. The internship will use a python implementation of the afore-described approach and examine the use of different: - Video codecs (i.e., VVC, AV1, HEVC, H.264) to verify the codec-agnostic nature of the employed algorithms - Video quality assessment metrics (i.e., PSNR, SSIM, VMAF) - 3G/4G/5G network traces to simulate the adaptation efficacy of the approach in a variety of real-time video communication scenarios - Buffer fullness algorithms to showcase the applicability of the methods over various industry implementation setups
Required Skills	- Good Programming Skills (Python and Bash Scripting for implementation; optional C and C++ for logic comprehension) - Basic understanding of Image/ Video processing - Basic understanding of Statistics and Linear Regression - Basic understanding of Machine Learning Algorithms
Reading	- G. Esakki, A. S. Panayides, V. Jalta and M. S. Pattichis, "Adaptive Video Encoding for Different Video Codecs," in *IEEE Access*, vol. 9, pp. 68720-68736, 2021. doi: 10.1109/ACCESS.2021.3077313. - A. S. Panayides, M. S. Pattichis, M. Pantziaris, C.S. Pattichis, "The Battle of the Video Codecs in the Healthcare Domain - A Comparative Performance Evaluation Study Leveraging VVC and AV1," in *IEEE Access*, vol. 8, pp. 11469-11481, 2020. doi: 10.1109/ACCESS.2020.2965325

Internship Title	**Privacy Preserving Mechanisms for the Use of Robotic Vision Technologies in Indoor Spaces**
Description of Internship	Robotic vision can be used for a diverse set of tasks ranging from safe and autonomous navigation, to localization, and floor mapping, among others. The internship will investigate best-practise setups involving human and object -aware navigation using video camera feed analysed using contemporary deep learning models. The objective will be to develop privacy-preserving mechanisms building on top of these approaches, towards mitigating privacy concerns for the use of robotic vision technologies in sensitive indoor spaces, such as hospitals.
Required Skills	- Good Programming Skills (Python, C, C++) - Basic understanding of Image/ Video processing - Basic understanding of Machine Learning Algorithms - Basic understanding of Robot Operating System (ROS)
Reading	- Eftychios G. Christoforou, Sotiris Avgousti, Nacim Ramdani, Cyril Novales, and Andreas S. Panayides, "The Upcoming Role for Nursing and Assistive Robotics: Opportunities and Challenges Ahead," *Frontiers in Digital Health*, vol. 2. pp. 39, Dec. 2020. https://doi.org/10.3389/fdgth.2020.585656 - N. Ramdani, A. S. Panayides, M. Karamousadakis, *et al.*, "A Safe, Efficient and Integrated Indoor Robotic Fleet for Logistic Applications in Healthcare and Commercial Spaces: The ENDORSE Concept," *2019 20th IEEE International Conference on Mobile Data Management (MDM)*, Hong Kong, Hong Kong, 2019, pp. 425-430. - https://www.endorse-project.eu/ - http://www.project-respect.eu/

Internship Title	**Collaborative Robotic Vision Technologies for Indoor Spaces Applications**
Description of Internship	Robotic vision can be used for a diverse set of tasks ranging from safe and autonomous navigation, to localization, and floor mapping, among others. The internship will investigate best-practise setups involving collaborative robotic vision technologies for applications such as floor mapping and object detection and characterization. The idea is that fusing views coming from different robots and hence angles can provide a more accurate prediction of the objects in the robots' field of view.
Required Skills	- Good Programming Skills (Python, C, C++) - Basic understanding of Image/ Video processing - Basic understanding of Machine Learning Algorithms - Basic understanding of Robot Operating System (ROS)
Reading	- Eftychios G. Christoforou, Sotiris Avgousti, Nacim Ramdani, Cyril Novales, and Andreas S. Panayides, "The Upcoming Role for Nursing and Assistive Robotics: Opportunities and Challenges Ahead," *Frontiers in Digital Health*, vol. 2. pp. 39, Dec. 2020. https://doi.org/10.3389/fdgth.2020.585656

	- N. Ramdani, A. S. Panayides, M. Karamousadakis, *et al.*, "A Safe, Efficient and Integrated Indoor Robotic Fleet for Logistic Applications in Healthcare and Commercial Spaces: The ENDORSE Concept," *2019 20th IEEE International Conference on Mobile Data Management (MDM)*, Hong Kong, Hong Kong, 2019, pp. 425-430.
	- https://www.endorse-project.eu/
	- http://www.project-respect.eu/

Internship Title	**Remote Ultrasound Examination using a Tele-Operated Robot**
Description of Internship	Tele-operated robots are increasingly used in healthcare clinical settings to mitigate the shortage of specialized medical experts in remote and rural areas and increase the provided quality of care levels. The internship will conduct performance evaluation of - End-to-end mobile tele-ultrasonography platform using a production grade mobile robot - Emerging video delivery algorithms that guarantee the clinical capacity of the communicated medical video - Current and emerging 4G/ 5G/ and beyond wireless networks in the transmission of real-time ultrasound video The implementation philosophy and source-code implementation guidelines will be provided.
Required Skills	- Good Programming Skills (Python and Bash Scripting for implementation; optional C and C++ for logic comprehension) - Basic understanding of Image/ Video Processing - Basic understanding of Wireless Networks - Basic understanding of Machine Learning Algorithms
Reading	- Avgousti, S., Panayides, A. S., Jossif, A. P., Christoforou, E. G., Vieyres, P., Novales, C., ... & Pattichis, C. S. (2016). Cardiac ultrasonography over 4G wireless networks using a tele-operated robot. *Healthcare technology letters*, *3*(3), 212-217. - G. Esakki, A. S. Panayides, V. Jalta and M. S. Pattichis, "Adaptive Video Encoding for Different Video Codecs," in *IEEE Access*, vol. 9, pp. 68720-68736, 2021. doi: 10.1109/ACCESS.2021.3077313. - A. S. Panayides, M. S. Pattichis, M. Pantziaris, C.S. Pattichis, "The Battle of the Video Codecs in the Healthcare Domain - A Comparative Performance Evaluation Study Leveraging VVC and AV1," in *IEEE Access*, vol. 8, pp. 11469-11481, 2020. doi: 10.1109/ACCESS.2020.2965325

Internship Title	**AI-guided Cardiac Ultrasound Examination in the ED and ICU**
Description of Internship	Ultrasound is increasingly used to examine and assess the health status of patients in various settings, including the Emergency Department and the Intensive Care Unit, due to its non-invasive, rapid, and cost-effective nature. The internship will perform a systematic review on - The use of cardiac ultrasound in ED and ICU settings - The use of AI-guided ultrasound examination where real-time ultrasound image analysis is used to identify the current position of the ultrasound probe and provide navigation instructions (guidance) for non-specialized personnel to perform and capture complex cardiac ultrasound images/ videos

	Systematic review guidelines, philosophy and structure will be provided.
Required Skills	- Basic Programming Skills (Python and Bash Scripting for implementation; optional C and C++ for logic comprehension) - Basic understanding of Image/ Video Processing - Basic understanding of Machine Learning Algorithms
Reading	- Narang A, Bae R, Hong H, et al. Utility of a Deep-Learning Algorithm to Guide Novices to Acquire Echocardiograms for Limited Diagnostic Use. JAMA Cardiol. 2021;6(6):624–632. doi:10.1001/jamacardio.2021.0185

MRG: BIOMETRICS FOR SMART HUMAN-CENTRED EMERGING TECHNOLOGIES (BIO-SCENT)

Internship Title	**Interactive Applications for Smart Classes**
Description of Internship	The work aims to develop interactive applications utilizing state-of-the-art techniques in AI and emerging technologies aiming to enhance the experience of students/educators in smart classes. As part of this project interns will be expected to use techniques related to AI, and/or mixed reality, and/or computer vision.
Required Skills	Interns working in this project should have technical skills that include: - Computer Programming Skills - Basic knowledge in image processing or computer vision - Development of virtual/mixed reality applications (preferably using UNITY3D)
Level of required Skills	Good
Internship Objectives	The objectives of the Internship are: - To review the literature on the use of emerging technologies in Smart Classes - To design, implement, and evaluate a novel AI-empowered interactive application for enhancing the experience of students/educators. - To publish/present the work at a related local/international conference.

Internship Title	**Interactive Virtual Reality Applications for raising awareness about social challenges**
Description of Internship	his project aims to investigate how immersive Virtual Reality applications can be used to address today's challenges such as bullying, harassment or sustainability. As part of this project interns are expected to design, develop, and evaluate an interactive VR prototype application that aims through perspective change to raise awareness and enhance readiness to deal with specific challenges. Ideally, the VR application will incorporate AI techniques to enhance the user experience/interaction.

Required Skills	Interns working on this project should have technical and/or creative skills that include: - VR applications development using dedicated game engines (i.e. UNITY3D or UnReal Engine)
Level of required Skills	Good
Internship Objectives	The objectives of this internship are: - To review the literature regarding how VR can be used to raise awareness about social challenges - To design, develop, and implement an AI-empowered VR application for the selected social challenge - To publish/present the work at a related local/international conference

Internship Title	**Generative AI Tools in Everyday Life**
Description of Internship	Recent achievements and the "democratization" of Artificial Intelligence (AI) have led to its daily interaction with humans. This work aims to investigate how AI Generative tools can be used effectively for current social and political issues. As part of this project interns are expected to adopt a content analysis methodology to study the impact of the AI generative data on humans and society.
Required Skills	The intern should be familiar with: - quantitative and qualitative research methods and tools - AI generative tools
Level of required Skills	Good
Internship Objectives	The objectives of the Internship are: - To review the literature on the use of AI generative Tools in everyday life - To analyse the data created through AI generative tools and study and how they can be used efficiently by humans. - To publish/present the work at a related local/international conference.

MRG: THE NEXT GENERATION OF SMART CAMERAS (DEEPCAMERA)

Internship Title	**Image quality evaluation tool**
Description of Internship	Deep Camera has developed an internal tool for subjective image and video quality evaluation. The tool provides a series of functionalities that accelerate and make less tedious the subjective evaluation process. The tool is developed using python, relying on an underline C/C++ SDK of a High Dynamic Range (HDR) monitor. In this project, the intern will be required to develop a serie of functionalities to linearize the input image/video following specific standards.
Required Skills	• Programming skills in Python
Level of required Skills	Good level
Internship Objectives	• Develop linearization approaches, based on existing standards, for the image/video input to the HDR monitor • Integrate these approaches into the existing tool • Testing that these new functionalities are correctly working.

MRG: COGNITIVE ARTIFICIAL INTELLIGENCE AND ROBOTICS (CAIR)

Internship Title	Safe Autonomous Mobile Robot Navigation
Description of Internship	This internship project aims to investigate safe autonomous navigation for mobile robots using ROS/ROS2 with a TurtleBot4 and Unitree A1 quadruped robot. The project will explore the capabilities of these two robots, including their sensors, actuators, and software frameworks. The focus will be on developing navigation algorithms that can ensure the safe operation of these robots in different environments. The project will also involve testing and evaluation of the developed algorithms on both robots in simulated and real-world scenarios. Objectives: - Familiarize with the ROS/ROS2 framework and the TurtleBot4 and Unitree A1 robots. - Review the literature on safe autonomous navigation for mobile robots. - Develop navigation algorithms for safe robot operation, considering the capabilities of the robots and their sensors. - Implement the developed algorithms using ROS/ROS2 and test them in simulated environments using Gazebo or Nvidia IsaacSim - Deploy the algorithms on both robots and test them in real-world scenarios, including indoor and outdoor environments. - Evaluate the performance of the developed algorithms based on various metrics, such as accuracy, efficiency, and safety.
Required Skills	Good programming skills (C++, Python) Some experience with robotics (ROS/ROS2, robotics simulators e.g., Gazebo)

Internship Title	Deep Reinforcement Learning for Advanced Quadrupedal Locomotion from Vision
Description of Internship	Deep reinforcement learning has demonstrated great potential for learning robust quadrupedal robotic locomotion controllers [1,2]. These approaches typically rely on simulation, where privileged (ground truth) information (e.g., local terrain profile, friction coefficients etc.) is leveraged to train adaptive policies that do not use this information. The resulting controllers are then transferred on real robots making them capable of effectively handling certain real world environments. However, such controllers are "blind" - they do not use any information from the robot's camera. This disadvantage would make them fail in

	settings that require careful placement of their feet [3], or even simple obstacle avoidance. Enhancing simulation with such information [4-7] would make quadrupedal robots capable of autonomously handling an even greater diversity of environments, opening up new avenues for potential application. Project aims: - Develop challenging simulated environments for training quadruped robots using camera depth information, in addition to other sensors. - Implement deep RL algorithms and conduct experiments for robot training. - Evaluate the ability of the simulated robots to use appropriate gaits in any given situation.
Required Skills	Very good programming skills (C++ or Python). Experience with robotic simulation. Knowledge of machine learning (including deep learning and reinforcement learning) and computer vision. Interest in legged robots.
Reading	[1] Lee, J., Hwangbo, J., Wellhausen, L., Koltun, V., & Hutter, M. (2020). Learning quadrupedal locomotion over challenging terrain. Science robotics, 5(47). [2] Kumar, A., Fu, Z., Pathak, D., & Malik, J. (2021). Rma: Rapid motor adaptation for legged robots. arXiv preprint arXiv:2107.04034. [3] Tsounis, V., Alge, M., Lee, J., Farshidian, F., & Hutter, M. (2020). Deepgait: Planning and control of quadrupedal gaits using deep reinforcement learning. IEEE Robotics and Automation Letters, 5(2), 3699-3706. [4] Choromanski, K., Jain, D., Parker-Holder, J., Song, X., Likhosherstov, V., Santara, A., ... & Weller, A. (2021). Unlocking Pixels for Reinforcement Learning via Implicit Attention. arXiv preprint arXiv:2102.04353. [5] Shi, H., Zhou, B., Zeng, H., Wang, F., Dong, Y., Li, J., ... & Meng, M. Q. H. (2021). Reinforcement Learning with Evolutionary Trajectory Generator: A General Approach for Quadrupedal Locomotion. arXiv preprint arXiv:2109.06409. [6] Imai, C. S., Zhang, M., Zhang, Y., Kierebinski, M., Yang, R., Qin, Y., & Wang, X. (2021). Vision-Guided Quadrupedal Locomotion in the Wild with Multi-Modal Delay Randomization. arXiv preprint arXiv:2109.14549. [7] Sorokin, M., Tan, J., Liu, C. K., & Ha, S. (2021). Learning to Navigate Sidewalks in Outdoor Environments. arXiv preprint arXiv:2109.05603. [8] Loquercio, A., Kaufmann, E., Ranftl, R., Müller, M., Koltun, V., & Scaramuzza, D. (2021). Learning high-speed flight in the wild. Science Robotics, 6(59), eabg5810.

Internship Title	**Quality-Diversity Optimization and Deep Learning for Unsupervised Robotic Skill Discovery**
Description of Internship	Quality diversity (QD) optimization [1] is an emerging field that has shown great promise in automatically producing a diversity of high-quality robotic skills. However, one of their limitations is the need to hard-code a low-dimensional skill descriptor which often requires domain knowledge and causes delays in experiments. A recent study [2] used simple dimensionality reduction techniques to automatically extract the skill descriptor from high-dimensional information. While promising, that study did not

	focus on the temporal nature of the data streams, suggesting that the use of recurrent neural networks [3] or more advanced models, such as Transformers [4], for encoding and decoding the data streams would offer greater benefits. Project aims: - Develop a QD optimization framework for the automatic discovery of robotic skills using sequence-to-sequence models [3] or Transformers [4]. - Evaluate the framework using hand-crafted skill descriptors, and simple dimensionality reduction techniques (Principal Components Analysis, Autoencoders).
Required Skills	Very good programming skills (C++ or Python). Knowledge of machine learning and deep learning (including frameworks such as Tensorflow, PyTorch or JAX). Interest in robot learning and evolutionary computation.
Reading	[1] Chatzilygeroudis, K., Cully, A., Vassiliades, V., & Mouret, J. B. (2021). Quality-Diversity Optimization: a novel branch of stochastic optimization. In Black Box Optimization, Machine Learning, and No-Free Lunch Theorems (pp. 109-135). Springer, Cham. [2] Grillotti, L., & Cully, A. (2021). Unsupervised Behaviour Discovery with Quality-Diversity Optimisation. arXiv preprint arXiv:2106.05648. [3] Sutskever, I., Vinyals, O., & Le, Q. V. (2014). Sequence to sequence learning with neural networks. In Advances in neural information processing systems (pp. 3104-3112). [4] Vaswani, A., Shazeer, N., Parmar, N., Uszkoreit, J., Jones, L., Gomez, A. N., ... & Polosukhin, I. (2017). Attention is all you need. In Advances in neural information processing systems (pp. 5998-6008).

Internship Title	**AI Interactive Storyteller**
Description of Internship	The goal of this project is to create an interactive storyteller tool by combining the following AI technologies: large language models (LLMs), text2image, text2speech, and text2music models. Large language models are AI algorithms that are trained on a massive dataset of text and are capable of generating human-like text. They can be used to generate stories that are coherent and engaging. Text2image models are AI algorithms that are trained to generate images based on a given text description, while text2speech models are trained to generate audio from text. Text2music models are trained to generate music that is consistent with the mood and tone of the story. By combining these four types of models, it is possible to create an AI system that can generate interactive multimedia stories by synthesizing text, images, audio, and music. The intern would be responsible for selecting appropriate open-source LLMs, text2image models, text2speech models, and text2music models, training and fine-tuning them, and implementing a user interface that allows users to interact with the story generator and influence the direction of the story. Project aims: - Research and select appropriate open-source LLMs, text2image models, text2speech models and text2music models - Implement a server-side application that can receive requests from clients, process them using the models, and return the generated results - Design and implement an API that exposes the functionality of the models to clients - Design and implement the front-end user interface of the application - Test and evaluate the performance of the application
Required Skills	Strong software engineering skills (full-stack). Experience working in a Linux environment. Experience with machine learning (incl. deep learning and reinforcement learning), computer vision, natural language or audio processing will be considered an advantage.

Internship Title	**Data-driven Deep Reinforcement Learning for Healthcare/Transportation/Energy/Agriculture**
Description of Internship	The availability of large datasets has enabled the success of deep neural networks trained with supervised learning in various fields. However, reinforcement learning (RL), which has seen impressive applications in games, animation, and robotics, has yet to be as successful as supervised learning. In this internship project, the intern will select one of the following sectors: healthcare, transportation, energy, or agriculture, and investigate how to use RL algorithms effectively on large datasets to enable better decision-making systems. The project will involve exploring the potential applications of RL in the chosen sector, selecting relevant datasets, designing and implementing appropriate RL algorithms, and evaluating the performance of the developed algorithms.

	Objectives: - Familiarize with the RL framework and in particular, the literature on offline RL. - Select one of the following sectors: healthcare, transportation, energy, or agriculture and explore the potential applications of RL in the chosen sector. - Collect and preprocess relevant datasets for the selected sector. - Design and implement RL algorithms that can effectively use the collected datasets to make better decisions. - Evaluate the performance of the developed algorithms using various metrics. - Compare the developed algorithms with existing approaches and analyze their strengths and weaknesses.
Required Skills	Good programming skills (Python). Experience with machine learning including reinforcement learning.

MRG: SMART, UBIQUITOUS, AND PARTICIPATORY TECHNOLOGIES FOR HEALTHCARE INNOVATION (HEALTHXR)

Internship Title	**Chatbots Enhance personalised European Healthcare Curricula (CEPEH)**
Description of Internship	Personalized Healthcare education is more than ever needed nowadays. There is growing evidence around chatbots, machine conversation systems, that these programs have the potential to change the way students learn and search for information. Chatbots can quiz existing knowledge, enable higher student engagement with a learning task or support higher-order cognitive activities. In large-scale learning scenarios with more than 100 students per lecturer, chatbots can solve the problem of individual student support and contribute to personalised learning. However, limited examples of chatbots in European Healthcare Curricula have been utilized to combine both the continuum of cognitive processes with the idea that some repetitive tasks can be done with a chatbot to provide greater access or to scale faculty time. Thus, CEPEH, an ERASMUS+ strategic partnership will co-create open access chatbots utilizing artificial intelligence promoting innovative practices in digital era, by supporting current curricula and fostering open education.
Required Skills	The successful candidate will be responsible for the development of the chatbot application. Therefore, the successful candidate should have a bachelor or master's degree in one of the following areas or a related area: computer science, computer graphics/graphic design, digital arts, cognitive systems. The successful candidate should have programming skills and familiarity with engines such as python. The ability to create applications using Python.
Level of required Skills	Advanced.
Internship Objectives	The successful candidate will be responsible for the development of the chatbot application.

Internship Title	**Augmented Reality in Medical Education**
Description of Internship	Augmented reality seems to be ubiquitous recently and most associated with gaming technology, but when we zoom out, AR has the capacity to positively influence several industries, one being healthcare. AR applications enable medical professionals to recreate real-world images of anatomical structures virtually, an image they can then project onto the surgical site in real-time using the HMD technology. Essentially this is a form of data visualization—a high-resolution projection of patient vitals and other relevant information that the surgeon would normally have to divert attention to obtain. Medical students can undergo the stress of mid-surgery mishaps and experience the pressure of reacting logically in unfavorable scenarios without real-life implications. This project aims to explore the use of Augmented Reality as an application for medical student's practice.
Required Skills	The successful candidate will be responsible for the development of the Augmented Reality application. Therefore, the successful candidate should have a bachelor or master's degree in one of the following areas or a related area: computer science, computer graphics/graphic design, digital arts, cognitive systems. The successful candidate should have programming skills and familiarity with python.
Level of required Skills	Advanced.
Internship Objectives	The successful candidate will be responsible for the development of the Augmented Reality application.

Internship Title	**Combine and unify applications**
Description of Internship	Having several applications of 360 videos, VR and chatbots. We need to combine everything and make a unified application
Required Skills	The successful candidate will be responsible for the development of the application. Therefore, the successful candidate should have a bachelor or master's degree in one of the following areas or a related area: computer science, computer graphics/graphic design, digital arts, cognitive systems. The successful candidate should have programming skills and familiarity with python. Programming skills in C++ or C#, and familiarity with game engines such as Unity3D and Unreal Engine. Experience with VR development.

Level of required Skills	Advanced.
Internship Objectives	The successful candidate will be responsible for the development of the application.

Internship Title	**CoViRR Project**
Description of Internship	CoViRR Project aims to co-create virtual reality reusable e-resources promoting innovative practices in the digital era, by supporting current curricula and fostering open education in the healthcare sector Simulation based training is identified as a valid teaching/learning strategy. Yet, little evidence exists for the design and use of virtual reality reusable e-resources, especially in healthcare education. To this extent, there is no development framework for the co-creation for virtual reality reusable e-resources utilising stakeholder participation.
Required Skills	• Bachelor or master's degree in one of the following areas or a related area: computer science, graphic design, digital arts, cognitive systems. • Programming skills in C++ or C#, and familiarity with game engines such as Unity3D and Unreal Engine. Experience with VR development. • Ability to create 3D models to be used in VR applications. Proficiency in 3DS Max, Maya or other 3D modeling software and Photoshop. Knowledge and ability to implement the full game asset pipeline, with experience in Substance Design a plus.

Internship Title	**Dementia Project**
Description of Internship	People with dementia residing in long-term care are usually facing numerous motor and cognitive impairments and go through therapeutic physical and cognitive training. In recent years, there have been a growing research interests towards designing non-pharmacological interventions aiming to improve the quality of life for people with dementia within long-term care. We are currently exploring the use of Virtual Reality for patients with mild, moderate, and severe dementia in collaboration with the Archangelos Michael Elderly People NursingHome / Rehabilitation Centre for Patients with Alzheimer. We are exploring the appeal of using VR for people with dementia, and the observed impact such interaction has on their physical and cognitive trainings. Moreover, we are investigating the design opportunities, pitfalls, and recommendations for future deployment in healthcare services. Using a user-centred design approach, we are carrying out multisite trials to evaluate the effectiveness of the virtual reality system that will be developed and to improve its usability.
Required Skills	• Bachelor or master's degree in one of the following areas or a related area: computer science, graphic design, digital arts, cognitive systems. • Programming skills in C++ or C#, and familiarity with game engines such as Unity3D and Unreal Engine. Experience with VR development. • Ability to create 3D models to be used in VR applications. Proficiency in 3DS Max, Maya or other 3D modeling software and Photoshop.Knowledge and ability to implement the full game asset pipeline, with experience in Substance Design a plus. • Bio-signals Analysis skills, preferably in Electrocardiography (ECG), Photoplethysmogram (PPG), Electromyography (EMG), Electrodermal Activity (EDA).
Internship Objectives	The successful candidate will be: (1) designing and developing Virtual Reality environments; (2) programming tracking devices (such as Arduinos), and or bio-signal devices (such as myo armband) suitable to the needs of a people with dementia and cancer patients; and (3) analysing bio-signals.

Internship Title	**Cancer Project**
Description of Internship	Cancer project proposes to design a low-cost mobile VR system to complement patients' physiotherapy and psychotherapy. The system willbe able to accurately monitor the physical training performed by the patent on a daily basis. In addition, the system will assess in real-time the patient's performance and will provide guidance to improve the training tasks accuracy. The system will also serve as a virtual platform to facilitate remote psychotherapy for the cancer patients and their psychotherapists. To do so, it leverages on a few state-of-the-art technologies: *(1) Virtual Reality,* through the use of low-cost Head-Mounted Display (HMD) systems, which will surround the user's vision completely. The VR-HMDs include head-tracking machinery to track the motion of the user's head and present a 360° Virtual Environment; and *(2) Interactivity Devices,* to enhance the user's engagement into the Virtual Environment and to monitor and correct the user's movement. These interactive devices will include Arduinos, which will facilitate more natural movements and navigations in the Virtual Environment.

Required Skills	• Bachelor or master's degree in one of the following areas or a related area: computer science, graphic design, digital arts, cognitive systems. • Programming skills in C++ or C#, and familiarity with game engines such as Unity3D and Unreal Engine. Experience with VR development. • Ability to create 3D models to be used in VR applications. Proficiency in 3DS Max, Maya or other 3D modeling software and Photoshop.Knowledge and ability to implement the full game asset pipeline, with experience in Substance Design a plus. • Bio-signals Analysis skills, preferably in Electrocardiography (ECG), Photoplethysmogram (PPG), Electromyography (EMG), Electrodermal Activity (EDA).
Internship Objectives	The successful candidate will be: (1) designing and developing Virtual Reality environments; (2) programming tracking devices (such as Arduinos), and or bio-signal devices (such as myo armband) suitable to the needs of a people with dementia and cancer patients; and (3) analysing bio-signals.

Internship Title	**STTech Project**
Description of Internship	Safe Transfer Techniques (STTech) is an Erasmus+ funded project. The overall goal of the project is to reduce transfer related works accidents as well as attrition among caregivers of Today´s Health Care Sector. The outputs of the project will be: Guidelines and toolkit Digital tools - e-learning and Virtual Reality Interactive Handbook. These will be free and accessible tools at the project's website, as we develop them.
Required Skills	•Bachelor or master's degree in one of the following areas or a related area: computer science, graphic design, digital arts, cognitive systems. •Programming skills in C++ or C#, and familiarity with game engines such as Unity3D and Unreal Engine. Experience with VR development. •Ability to create 3D models to be used in VR applications. Proficiency in 3DS Max, Maya or other 3D modeling software and Photoshop.Knowledge and ability to implement the full game asset pipeline, with experience in Substance Design a plus. •Bio-signals Analysis skills, preferably in Electrocardiography (ECG), Photoplethysmogram (PPG), Electromyography (EMG), Electrodermal Activity (EDA).

Internship Title	**Virtual Reality for Cognitive Training in People with Dementia**
Description of Internship	People with dementia residing in long-term care are usually facing numerous cognitive impairments and go through several therapeutic cognitive trainings. In recent years, there have been a growing research interests towards designing non-pharmacological interventions aiming to improve the quality of life for people with dementia within long-term care. We are currently exploring the use of Virtual Reality for patients with mild, moderate, and severe dementia. With this project aims to

	explore the appeal of using Virtual Reality for people with dementia, and the observed impact such interaction has on their cognitive trainings.
Required Skills	The successful candidate will be responsible for the development of the Virtual Reality application. Therefore, the successful candidate should have a bachelor or master's degree in one of the following areas or a related area: computer science, computer graphics/graphic design, digital arts, cognitive systems. The successful candidate should have programming skills and familiarity with game engines such as unity3d and unreal engine.
Level of required Skills	Advanced.
Internship Objectives	The successful candidate will be responsible for the development of the Virtual Reality application.
Internship Title	Virtual Reality for Psychotherapy in Breast Cancer Patients
Description of Internship	In recent years there have been a growing research interest towards designing computer-assisted health interventions aiming to improve mental health services. Digital technologies are becoming common methods for diagnosis, therapy, education, and training. With the advent of lower-cost Virtual Reality Head-Mounted-Displays (HMDs) and high internet data transfer capacity, there is a new opportunity for applying immersive Virtual Reality tools to augment existing interventions. Covid19 has enhanced the need of developing tools that can aid recovery for the patient from their personal space. This project aims to explore the use of Virtual Reality as a therapeutic medium for breast cancer patients dealing with body image dissatisfaction due to lymphedema body shape concerns. The goal of the study is to examine the opportunities Virtual Reality could offer for interventions, capitalising on the success of past Virtual Reality-based therapies.
Required Skills	The successful candidate will be responsible for the development of the Virtual Reality application. Therefore, the successful candidate should have a bachelor or master's degree in one of the following areas or a related area: computer science, computer graphics/graphic design, digital arts, cognitive systems. The successful candidate should have programming skills and familiarity with game engines such as unity3d and unreal engine. The ability to create 3d models to be used in Virtual Reality applications, proficiency in 3ds max, maya or other 3d modelling software and photoshop, as well as knowledge to implement the full game asset pipeline, with experience in substance design will considered as a plus.

Level of required Skills	Advanced.
Internship Objectives	The successful candidate will be responsible for the development of the Virtual Reality application.

MRG: FAIRNESS AND ETHICS IN AI – HUMAN INTERACTION (FAIRE)

Internship Title	Incentivize community participation in data sharing platforms
Description of Internship	Community in online settings could be seen as a means for people to engage with, and contribute to, different activities of their interest, share knowledge and data, and collaborate on common tasks. Currently, there are many platforms (e.g., social media, knowledge sharing, etc.) that support online communication, engagement, and data sharing between people. However, these platforms do not account for people coming from different cultures, living, and working in different contexts, and interact with heterogenous resources. Furthermore, the data people are sharing through these platforms are usually kept centrally, managed by large corporations, and stored in centralized data centers that people cannot have access, manage, or have control over the use of their data. We invite applications for internship projects that shall investigate the complex elements and processes involved in building and maintaining an online community in a data sharing platform. Projects should focus on investigating motivational and incentive providing approaches for engaging people and facilitate the sense of community in the long term. The element of diversity at different levels (cultural, language, knowledge, personality etc.) should be central to the work.
Required Skills	- An interest in online communities, collaboration between people in social networks - Excellent communication skills (verbal and written) in the English language. - Ability to organize and carry out research work. - Basic command of applied statistics. - Programming Skills - A concern with social issues, cultural aspects, and diversity in social entities. - Ability to work and communicate in an interdisciplinary environment

	• Utilize theories from social sciences and psychology to inform computational mechanisms/frameworks.
Level of required Skills	Basic to Intermediate
Internship Objectives	• Literature review on incentive mechanisms in online communities • Identify critical aspects that need to be supported in a data sharing online community • Propose mechanisms for incentivizing the participation in a data sharing online community
Expected Deliverables	A feasibility study that will provide a detailed analysis that considers all of the critical aspects of facilitating participation, communication and sustainability of an online data sharing community.

Internship Title	**Design of an "AI in everyday life" reporting mechanism**
Description of Internship	To realize the European Commission's vision for Trustworthy AI, there is a need to involve all stakeholders - including "average" citizens - in the process of analyzing the behaviors of AI applications. With the rapid democratization of AI components and recently, Foundation Models, the applications and contexts in which AI is being deployed are limited only by developers' creativity. In other words, to keep up with the ways in which citizens are encountering and experiencing AI in "everyday" contexts, it is necessary to involve them in systematic AI evaluation processes. We invite applications for internship projects that investigate the development of processes and interfaces to facilitate such reporting mechanisms. Projects may focus on investigating different aspects, including task design via user studies, business process modelling, and/or prototyping of an interface of the reporting mechanism.
Required Skills	• An interest in human-centered AI • Ability to read scientific literature and summarize the key findings • One of more of the following: i) methodologies for user-centered studies, ii) prototyping / web design, iii) data science / data analytics.
Level of required Skills	Basic to intermediate

Internship Objectives	Depending on the exact nature of the project, objectives will include 1+ of the following: • Generate a range of task designs for an "everyday AI" reporting mechanism • Evaluating task designs • Conducting user studies • Analyzing data collected from user studies • Implementation of the mechanism (e.g., web platform for reporting)
Expected Deliverables	Depending on the exact nature of the project, deliverables will include 1+ of the following: • Comprehensive literature review • Business Process Model for the mechanism(s) • Prototype and/or implemented reporting interface • Analysis resulting from user studies and/or data collection

MRG: PERVASIVE REAL-WORLD COMPUTING FOR SUSTAINABILITY (SUPERWORLD)

Internship Title	**How climate change affects agriculture in Cyprus**
Description of Internship	The goal is to use satellite imagery and computer vision to classify agricultural fields around Cyprus during the last 10 years, identifying how farmers adapt their practices (crops, seasonality, operations), being affected by climate change (e.g. higher temperatures, droughts). More info about the group's research: http://superworld.cyens.org.cy
Required Skills	Satellite imagery, deep learning (tensorflow/keras), computer vision, GIS (basic)
Level of required Skills	Good/advanced
Internship Objectives	Observe the trends in farming practices in Cyprus during the last 10 years
Expected Deliverables	Classification model, GIS visualizations, graphs and stats

Internship Title	**Identifying parcels suitable for afforestation**
Description of Internship	The goal is to use satellite imagery and computer vision to identify public parcels around Cyprus which are suitable for afforestation. These parcels need to be both public and unused, i.e. without any developments/infrastructures inside. The selected parcels will be shared to the Government of Cyprus to facilitate its efforts in reforestation. More info about the group's research: http://superworld.cyens.org.cy
Required Skills	Satellite imagery, deep learning (tensorflow/keras), computer vision, GIS (basic)
Level of required Skills	Good/advanced

Internship Objectives	Identify public parcels which are suitable for forestation
Expected Deliverables	Classification model, GIS visualizations

Internship Title	**Why are bees declining in Cyprus and globally?**
Description of Internship	As bees constitute the main pollinators for local flora, it is important to keep the bee population steady and healthy. For bees, the biggest problems they face include parasites (e.g. the Varroa Destructor parasite), pesticides (i.e. bees cannot function on plants that have been sprayed with artificial pesticide), radio waves from telephones (i.e. distort their orientation) and land use change, which is responsible for reducing its potential space for settling its base (colony). To counteract the extinction of bees, we propose in this pilot the development of smart camera traps, deployed around the island of Cyprus to capture the population of bees (among other insect species detected). The goal of this project is to monitor and maintain the camera traps, and use data collected for insect detection and classification by means of computer vision techniques. More info about the group's research: http://superworld.cyens.org.cy
Required Skills	Sensor technologies, Arduino programming
Level of required Skills	Good/advanced
Internship Objectives	Develop the smart bee hives and deploy them in different areas around Cyprus for small pilots
Expected Deliverables	Graphs, statistics and reports

MRG: MUSEUM LAB

Internship Title	**Archival research, documentation, and annotation**
Description of Internship	The aim of the internship is to help with the collection of audiovisual, archival material for the purposes of a research project on the urban centre of Nicosia.
Required Skills	• Possible degrees: History, Architecture, Photography, • Basic computer skills and the internet • Interest in photography • Familiarity with archival research or digital repositories • Knowledge of the urban centre of Nicosia
Level of required Skills	
Internship Objectives	- The intern will work on the DeepNic project which investigates the transformation of the urban centre of Nicosia from 1960 until 2020, using several types of data. The intern will help with research in photographic archives, collection of photographs and their documentation and annotation in a dataset. - The intern is expected to create a database of photographs on certain points of interest in the urban centre of Nicosia which will be incorporated into an interactive map

Internship Title	**Application of Emerging Technologies in Museum Environments**
Description of Internship	Emerging technologies are becoming an important part in the interpretation, education, and overall enhancement of the visitor experience in museums and heritage sites. We are looking for interns interested to work on researching various aspects of the application of these technologies in museum environments, with a special focus on the visitor experience.
Required Skills	• Knowledge of qualitative research methodologies such as interviews, surveys and overall familiarity with qualitative data analysis • Knowledge of quantitative data analysis and of SPSS software
Level of required Skills	Good knowledge
Internship Objectives	The Internship will include tasks relating to the review of relevant literature, analysis of qualitative and quantitative data and also data collection through survey questionnaires

MRG: COGNITIVE AND CLINICAL APPLICATIONS (CCAPPS)

Internship Title	**Cognitive skills in sports**
Description of Internship	The intern(s) will assist in the collection of data on a behavioral study aims to assess the role of cognitive skills in fast-paced sports.
Required Skills	A background in Psychology or Neuroscience and statistical skills.
Internship Objectives	To collect and analyze data from experiments with human participnants

Internship Title	**Pain rehabiliation for musicians using virtual reality and eletromyography**
Description of Internship	The intern(s) will work on a project that aims to build a virtual reality neurofeedback tool that helps musicians improve their postures during instrument playing.
Required Skills	Skills in mathematics and statistics, experience with physiological measures will be a plus.
Internship Objectives	To assist in the design of the prototype tool

MRG: VISUAL COMPUTING GROUP (VCG)

Internship Title	**Semantic 3D Segmentation for Scene Understanding**
Description of Internship	Semantic 3D segmentation is a task essential to applications that require an understanding of real-world 3D scenes, such as robotics, artificial intelligence (AI), augmented or virtual reality (AR/VR), and autonomous navigation/driving. The successful candidate is expected to conduct research at the intersection of computer vision, computer graphics and machine learning, by integrating concepts and methods from these areas to advance the state of the art in 3D scene understanding.
Required Skills	Basic knowledge of computer vision and deep learning. Programming skills: Python, TensorFlow (optional), PyTorch (optional)
Level of required Skills	Intermediate
Internship Objectives	The scientific objectives of the project span a range of topics from these research areas, including data collection, neural networks training, evaluation, and application development, with the final goal to develop a novel deep learning architecture for semantic 3D segmentation, composed of deep neural networks for segmenting and labelling real-world objects and scenes.
Expected Deliverables	Final Report, Source Code, Trained models

Internship Title	**BuildingNet: Learning to Label 3D Buildings**
Description of Internship	BuildingNet is a large-scale dataset of annotated 3D building models whose exteriors and surroundings are consistently labeled. The dataset provides 513K annotated mesh primitives, grouped into 292K semantic part components, across 2K building models. The dataset covers several building categories, such as houses, churches, skyscrapers, town halls, libraries, and castles. Two tracks are included in our benchmark. In the first track, called "BuildingNet-Mesh", algorithms can access the mesh data, including subgroups, thus leveraging pre-existing mesh structure common in 3D building models. The algorithms are evaluated in two conditions: when the RGB texture is available, and when it is not. In the second condition, algorithms must label the building using only geometric information. The second track, called "BuildingNet-Points", is designed for large-scale point-based processing algorithms that must deal with unstructured point cloud data without access to mesh structure or subgroups. This dataset is a joint work between UMass, CYENS (Visual Computing Group), and Adobe Research.

Required Skills	Basic knowledge of computer vision and deep learning. Programming skills: Python, TensorFlow (optional), PyTorch (optional)
Level of required Skills	Intermediate
Internship Objectives	The internship involves evaluating existing 3D semantic segmentation deep learning-based methods on the BuildingNet benchmarks and contributing towards a novel Graph Neural Network architecture, that can exploit the spatial and structural relations between the geometric primitives that compose a 3D building. The successful candidate will also have a chance to contribute to the actual dataset, mainly by refining the semantic parts on some of the building models.
Expected Deliverables	Final Report, Source Code, Trained models, Dataset

Internship Title	**Neural 3D Reconstruction**
Description of Internship	3D reconstruction is a classic scene understanding task with applications ranging from robotics to architectural and surveying scenarios. In the classic reconstruction pipeline, a set of RGB images of a 3D scene or 3D shape are provided to the algorithm, which then proceeds to retrieve the camera locations and poses, as well as a sparse point cloud representing the 3D geometry, in a process called Structure from Motion (SfM)]. The following step then refines predictions and extracts dense point clouds via the multi-view stereo (VMS) triangulation process. Finally, the underlying surface is discretized via a meshing process such as screened Poisson reconstruction.

Recent advances in machine learning have led to increased interest in solving the 3D reconstruction problem using coordinate-based neural networks. These methods, called neural fields, parameterize the physical properties of scenes or shapes across space. Neural fields store quantities like radiance (appearance) or distance/density (geometry) defined for all spatial coordinates and are parameterized by a neural network.

A large amount of work is focused on reconstructing scene/shape representations, either of geometry in the form of signed distance functions (SDFs) given 3D supervision, or appearance by adopting neural volume rendering. In the first case, neural SDF-based methods can faithfully reconstruct a 3D surface by encoding an implicit geometric field. In the latter scenario, novel views of the 3D scene can be produced by leveraging neural radiance fields (NeRFs), that show promising results in reproducing |

	the appearance of an object or a scene. One main drawback of many of these methods is that they are scene-specific, i.e., the neural network needs to be optimized for each scene independently, thus they cannot generalize to unseen objects or scenes.
Required Skills	Basic knowledge of computer vision and deep learning. Programming skills: Python, TensorFlow (optional), PyTorch (optional)
Level of required Skills	Intermediate
Internship Objectives	The internship involves combining both approaches (SDF + NeRF) to reconstruct a surface's appearance and geometry. Additionally, deep MVS techniques that encode prior geometric cues will be investigated, which can help model a neural radiance and SDF field of new scenes much faster than previous approaches.
Expected Deliverables	Final Report, Source Code, Trained models

Internship Title	**Conditional facade synthesis**
Description of Internship	Current state-of-the-art generative networks can generate high-quality photorealistic images by approximating real data distributions. Conditional generative models can control the style and structure of the output sample to ensure that desired features exist on fake-generated images while maintaining high-quality photorealistic results. The successful candidate is expected to use state-of-the-art generative models and conduct a complete experiment with quantitative and qualitative comparisons. This internship aims to create a model that synthesizes a facade given semantic segmentation maps as inputs. The training will be based in a supervised manner with the creation of a paired dataset that correlates real and semantically annotated images.

	The first step of the project is to use conditional neural layers to assemble a model that takes the semantic segmentation mask as input and conditions the generative procedure toward a specific facade structure.
	The second step of the project aims to incorporate style conditional information. This will enable controllability on the generated images by manipulating the style of the facade's features such as the 1) color/ architectural style 2) windows 3) doors and 4) balconies style.
	The successful candidate is expected to experiment with both probabilistic denoising diffusion and Generative Adversarial networks.
Required Skills	Good understanding of computer vision and deep learning. Familiar with PyTorch (developed at least 1-2 simple projects with this framework)
Level of required Skills	Intermediate
Internship Objectives	This project aims to work with state-of-the-art conditional generative models on creating photorealistic facades with controllable features and structure.
Expected Deliverables	Final Report, Source Code, Trained models

MRG: IMMERSIVE TECHNOLOGIES FOR INTELLIGENT AND CREATIVE APPLICATIONS

Internship Title	**XR technologies for accessibility in cultural heritage sites**
Description of Internship	The intern(s) will assist in the development of accessibility tools using XR techologies for cultural heritage sites.
Required Skills	A background in Computer Science and experience in XR technologies
Internship Objectives	To help in the development and testing of the XR tools

MRG: EDMEDIA

Internship Title	**Learning Experience Design and EdTech**
Description of Internship	The intern(s) will assist in research or/and development of learning experiences around the use of emerging technologies
Required Skills	Good communication skills and ability to learn
Internship Objectives	Research or/and development of learning experiences around the use of emerging technologies