

Curricular Internship Topics 2024-2025

In this 2nd phase, INESC TEC is offering you 22 internship topics! The topics are organized into the following scientific domains:

- **AI - Artificial Intelligence**
- **BIO - Engineering**
- **COM - Communications**
- **CSE - Computer Science and Engineering**
- **PES - Power and Energy Systems**
- **ROB - Robotics**

Choose **up to 3 topics that most interest you** and fill in [\[here\]](#) the application form indicating your order of preference. On the form, you should also **indicate the keywords that best characterize your research preferences**. If none of the topics you have chosen are available, you may be offered a topic within the same scientific area and aligned with your interests.

Each topic is identified by a reference, for example, **[AI01]**. Use these references to fill in the application form.

If you want to develop a different theme or if you don't particularly identify with any of the proposed topics, **in the motivation text available on the form you should describe the research themes you are most interested in pursuing**. In this case, you should put the generic reference of the scientific field you wish to apply for in the “options” section, for example, **[ROB00]**.

Described in the section below, in addition to the title of the topic and a brief description of what is required, you will find the names of the supervisors, the research center where you will be working, the location of the internship and the estimated number of hours.

Artificial Intelligence

Ref. [AI09] Image pre-processing for Visually Impaired Consumers' applications

Ref. [AI00] Generic Topic – Artificial Intelligence

Bioengineering

Ref. [BIO01] AI interpretation of chest CT for interstitial lung disease management

Ref. [BIO02] AI interpretation of cardiac CT for cardiovascular risk stratification

Ref. [BIO03] Segmentation and Landmark Detection in X-ray Images for Automatic Measurement of Anatomical Parameters

Ref. [BIO00] Generic Topic – Bioengineering

Communications

Ref. [COM02] Control Board Design for Reconfigurable Intelligent Surfaces

Ref. [COM03] Patch Antenna Designs for Reconfigurable Intelligent Surfaces

Ref. [COM04] Optimization and Characterization of Transmitter Positioning for Enhanced RIS Illumination Using a 3D-Printed Adjustable Support

Ref. [COM05] API Integration in an Underwater Acoustic Network

Ref. [COM00] Generic Topic – Communications

Computer Science and Engineering

Ref. [CSE05] Observability and Automation for Robotic DevOps Tools

Ref. [CSE06] Customization and Simulation of a RISC-V Based System-on-Chip

Ref. [CSE07] Development of a Synchronous Wi-Fi CSI and RGB-D Data Capture System

Ref. [CSE08] Dynamic Dashboard Generation Platform - backend

Ref. [CSE09] Dynamic Dashboard Generation Platform - frontend

Ref. [CSE10] Inven!RA Platform - frontend

Ref. [CSE11] Blue energy XR Immersive dashboard visualization tool

Ref. [CSE12] Visualisation tool of clinical timelines based on health data

Ref. [CSE13] Models visualization interactive web launcher

Ref. [CSE14] Augmented Insights: Developing a Mobile AR Solution for Offshore Wind Farm Monitoring

Ref. [CSE15] Augmented Reality Application for Monitoring Offshore Wind Farms with Apple Vision Pro

Ref. [CSE00] Generic Topic – Computer Science and Engineering

Power and Energy Systems

Ref. [PES09] Development and Evaluation of Solid-State Protections for DC Microgrids

Ref. [PES10] Strategies for Sustainable Investments in Energy Storage

Ref. [PES00] Generic Topic – Power and Energy Systems

Robotics

Ref. [ROB02] Quality Assurance for Robotic DevOps Tools

Ref. [ROB00] Generic Topic – Robotics

Artificial Intelligence

Ref. [AI09]

Image pre-processing for Visually Impaired Consumers' applications

Handling food products is a daily activity, yet understanding product information remains challenging, especially for individuals with visual impairments. This internship focuses on the research and experimentation of algorithms for image enhancement under varying lighting conditions, particularly in low-light scenarios. By exploring image processing techniques to improve image quality while preserving essential features, the goal is to enable the development methods that facilitate the subsequent accurate identification of products and labels, improving accessibility for all users.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Christina Mastralexi, Pedro Carvalho

Ref. [AI00]

Generic Topic – Artificial Intelligence

With a significant impact on many industries, including healthcare, transportation and manufacturing, Artificial Intelligence is also playing an increasingly important role in our everyday lives, from virtual assistants to online recommendation systems.

About Artificial Intelligence at INESC TEC: more information [here](#)

Bioengineering

Ref. [BIO01]

AI interpretation of chest CT for interstitial lung disease management

Interstitial lung disease (ILD) refers to a diverse group of pulmonary disorders characterized by inflammation and fibrosis of the lung interstition, which can lead to progressive respiratory failure. Accurate diagnosis and classification of ILD are essential for determining the appropriate treatment and prognosis. High-resolution computed tomography (HRCT) plays a crucial role in evaluating ILD, offering detailed imaging that can identify patterns of lung involvement, such as ground-glass opacities, reticulation, and honeycombing. This internship will focus on the development of computer vision tools for the segmentation of the lung and ILD patterns that can characterise a patient to help reach a final diagnosis.

Research Center: CBER - Biomedical Engineering Research

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: João Pedrosa

Ref. [BIO02]

AI interpretation of cardiac CT for cardiovascular risk stratification

Cardiovascular diseases (CVDs) are the leading global cause of mortality, responsible for over 17.8 million deaths annually. Early and accurate diagnosis is essential for effective management and prevention of adverse outcomes, and cardiac CT has become a key

diagnostic tool in this context. Cardiac CT provides high-resolution, non-invasive imaging of coronary arteries, cardiac chambers, and vasculature, helping to assess coronary artery disease, evaluate myocardial perfusion, and plan interventions such as revascularization or valve repair. In this internship, AI computer vision tools for the interpretation of cardiac CT images will be developed, namely pericardial/anatomical segmentation and patient reidentification.

Research Center: CBER - Biomedical Engineering Research

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: João Pedrosa

Ref. [BIO03]

Segmentation and Landmark Detection in X-ray Images for Automatic Measurement of Anatomical Parameters

Accurate analysis of bone structures in X-ray images is essential for evaluating clinical conditions such as joint misalignments and bone deformities. In this internship, we propose the development of a hybrid approach that combines segmentation and key point detection techniques for the automatic analysis of X-ray images.

The work plan will include:

- The segmentation of bony structures (e.g. femur, acetabulum) using networks based on U-Net and modern variants such as SegNet, among others.
- Detection of relevant landmarks (e.g. femoral head, acetabulum edges) with models like YOLOv7 and ResNet50.
- The integration of segmentation and detection results to perform precise measurements of distances, anatomical angles and other metrics of interest.

Public datasets (e.g. MURA, OAI-ZIB or similar) will be used to train and validate the models, and different architectures will be evaluated in terms of accuracy, robustness and computational efficiency. This work will have potential applications in AI-assisted medical diagnostics.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: Vila Real - UTAD

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Vitor Filipe, Lio Gonçalves

Ref. [BIO00]

Generic Topic – Bioengineering

Bioengineering is a rapidly growing and evolving domain at the intersection of engineering and life sciences. It combines fundamental engineering principles, practices, and technologies in medicine, biology, environment, and health sciences to provide effective solutions to problems in these fields. The domain addresses the development of mathematical theories and models, physical, biological, and chemical principles, computational models and algorithms, devices and systems for the early detection and diagnosis of different types of diseases, ageing-related impairments, rehabilitation, occupational health and wellness, and environmental-biology interactions, among others.

About Bioengineering at INESC TEC: more information [here](#)

Communications

Ref. [COM02]

Control Board Design for Reconfigurable Intelligent Surfaces

Reconfigurable Intelligent Surfaces (RISs) are devices composed of a 2D matrix of patch antennas. They will be a key technology in emergent communications networks, and allow for directional communications, and control of the RF medium to allow localization or sensing. To control a RIS, the state of each patch antenna must be set, which is typically done with a microcontroller. This work will design a new version of an existing control setup for a RIS (currently assembled on breadboard), including adding pin headers to mount an ESP32 or similar, and adding a daughter board containing status LEDs for debugging. The design should consider scalability for larger RISs.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Nuno Paulino

Ref. [COM03]

Patch Antenna Designs for Reconfigurable Intelligent Surfaces

The 6G era presents challenges regarding high-frequency signal propagation. At the same time, 6G will also include sensing capabilities in addition to communication, to support applications like augmented reality, localization, or human activity recognition. To do this, devices known as Reconfigurable Intelligent Surfaces (RISs) will be essential. A RIS is a device composed of a 2D matrix of patch antennas. This work will design and simulate one or more patch antennas for 6.5GHz and 28GHz (based on existing designs) and simulate a complete RIS using one of the designed antennas.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Mohammed Ghatas

Ref. [COM04]

Optimization and Characterization of Transmitter Positioning for Enhanced RIS Illumination Using a 3D-Printed Adjustable Support

This project focuses on developing a 3D-printed adjustable support for a transmitter (TX) antenna to investigate its optimal positioning relative to a Reconfigurable Intelligent Surface (RIS), a transformative technology for enhancing wireless communication and sensing. The support will enable precise adjustments to the TX antenna's tilt angle and distance from the RIS, facilitating controlled experimentation and analysis.

The project will experimentally characterize how the TX position impacts the received power at a receiver (RX) for various configurations. The results will be compared with theoretical predictions obtained using MATLAB simulations, providing valuable insights into illumination optimization. Students will gain hands-on experience in CAD design, 3D printing, RF measurement techniques, and simulation-based analysis, contributing to advancements in RIS research and practical implementation.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Francisco Manuel Ribeiro

Ref. [COM05]

API Integration in an Underwater Acoustic Network

The sea presents adverse conditions for the development of emerging activities, such as environmental monitoring or deep-sea mining, requiring expensive resources and complex logistics. Autonomous Underwater Vehicles (AUVs) offer a cost-effective platform for such missions by collecting large datasets. In maritime operations, where it is difficult to surface the vehicle, it becomes almost impractical to deliver data. Acoustic communications therefore become essential but presents challenges such as multipath interference and high error rates, in addition to their low bitrates. This proposal focuses on the development of solutions, based on the API of Subnero acoustic modems, improving the performance of acoustic communications through controlled experiments in a freshwater tank.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: João Pedro Loureiro. Guilherme Moreira

Ref. [COM00]

Generic Topic – Communications

Digital network communications underpin the Internet and the myriad of services we increasingly depend on, indispensable for the widespread digital transformation.

About Communications at INESC TEC: more information [here](#)

Computer Science and Engineering

Ref. [CSE05]

Observability and Automation for Robotic DevOps Tools

Be part of building the future of Robotair.io by enhancing observability and user feedback systems. You'll design a usage analytics dashboard, optimize SEO tracking, and set up infrastructure for gathering user insights, integrating them into GitHub and Slack workflows. Additionally, you'll implement AI tools like Cody for automated unit test generation in VSCode. This internship combines cutting-edge technology, user-focused design, and DevOps excellence to make a tangible impact on the emerging robotic software development landscape.

Research Center: CRIIS - Centre for Robotics in Industry and Intelligent Systems

Internship location: iiLAB, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Rafael Arrais

Ref. [CSE06]

Customization and Simulation of a RISC-V Based System-on-Chip

RISC-V is a royalty free instruction set specification which has gained great traction in the open hardware community. The customizability-oriented paradigm of RISC-V makes it suitable for designers to add custom instructions for specific tasks, like AI acceleration. This work will consider an existing RISC-V SoC simulation platform (x-heep) and study its native XAIF (eXtensible Accelerator InterFace) to determine how to implement one or more custom instructions. The custom instructions to implement will be determined. They may tentatively first be a small set dedicated to AI operations. The outcome will demonstrate the potential for improved efficiency and adaptability in RISC-V-based systems.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Nuno Paulino

Ref. [CSE07]

Development of a Synchronous Wi-Fi CSI and RGB-D Data Capture System

Recent advances highlight the potential of combining RF data, such as Wi-Fi Channel State Information (CSI), with visual and depth data from RGB-D cameras to explore new machine learning (ML) approaches. The main challenge is ensuring the synchronous capture of these data streams to enable effective correlation between Wi-Fi and imaging information.

This internship focuses on implementing a system capable of capturing Wi-Fi CSI data synchronously with RGB-D information, using an NVIDIA Jetson Orin Nano for processing and a Stereolabs ZED 2 camera for depth-aware imaging. The resulting platform will support research into ML techniques that integrate RF and visual data, with applications in areas such as environmental sensing, human activity recognition, and smart environments.

Research Center: CTM - Telecommunications and Multimedia

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor's degree, 162 hours

Supervisors: Francisco Manuel Ribeiro

Ref. [CSE08]

Dynamic Dashboard Generation Platform - backend

This project aims to develop an innovative web platform for creating dynamic and configurable dashboards, adaptable to any type of data or domain, enabling non-technical users to create intuitive visualizations. The system will feature a robust backend for data management and scalable APIs. Key challenges include designing a flexible and scalable core, managing diverse data sources (JSON, SQL, NoSQL, external APIs), implementing authentication and authorization (OAuth2/JWT), creating models to store dashboard configurations, and ensuring performance for multiple users. Clear API documentation will be essential to facilitate usage and integration.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE09]

Dynamic Dashboard Generation Platform - frontend

This project aims to develop an innovative web platform for creating dynamic and configurable dashboards, allowing non-technical users to intuitively customize data visualizations. The challenge is to build an interactive and responsive interface with drag-and-drop tools for real-time configuration. Key features include: designing user-friendly interfaces with customizable graphs, tables, and maps; ensuring seamless communication with the backend via API; optimizing performance and compliance with accessibility standards (WCAG); and providing clear documentation for end-users and the development team.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE10]

Inven!RA Platform - frontend

The Inven!RA architecture enables tracking and orchestration of distributed learning activities provided by third parties, integrating with platforms like Moodle. Developed in collaboration between INESC TEC (Portugal) and the UNISINOS CAPES/PRINT project (Brazil), it maps learning analytics to objectives through Inventive Activity Plans (IAPs)—parameterizable graphs of activities linked to learning goals. With recent changes to the backend, including database structure and APIs, the frontend requires updates for compatibility. The scholarship project involves analyzing the current platform, gathering requirements, refactoring the frontend, conducting tests, and delivering a final report to ensure alignment with the updated backend architecture.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE11]

Blue energy XR Immersive dashboard visualization tool

The Blue Energy Offshore Installation Accelerator (BLUE-X) project aims to advance the EU's Green Deal goals by optimizing decision-making for blue renewable energy projects. Leveraging cutting-edge XR (Extended Reality) technology, we will develop an immersive dashboard visualization platform using virtual choreographies to enhance decision-making and monitor workflows. Virtual choreographies integrate behaviors, interactions, and events within defined spaces, enabling dynamic analysis across domains. The project will identify optimal 3D visualization approaches, select XR development tools, and build a platform utilizing Oculus Quest 3. This innovative tool will streamline planning, operations, and decommissioning processes for offshore renewable energy installations.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE12]

Visualisation tool of clinical timelines based on health data

This proposal focuses on creating a digital platform that consolidates and visualizes clinical data for healthcare professionals, aligning with the PRR Health from Portugal (HfPT) project. Current challenges include fragmented clinical information, hindering decision-making and policy development, especially in pediatric care. The platform will integrate behavioral, cognitive, and health data into evolving timelines, enabling efficient data visualization and analysis.

Work Plan:

1. Identify tools for timeline visualization.
2. Gather and document system requirements.
3. Develop the timeline platform prototype.
4. Deliver a comprehensive final report.

This project will enhance decision-making, improve public policies, and advance health data accessibility, positioning Portugal as a leader in health innovation.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE13]

Models visualization interactive web launcher

Under the scope of the EU-funded ILIAD Project, which aims to develop a Digital Twin of the Ocean, this internship supports the creation of an interactive web launcher to visualize ocean scenarios. This tool will enable users to explore and configure interoperable visualization models, such as oil spill simulations, through an immersive environment. The work plan includes studying geographic visualization tools and virtual choreographies, gathering requirements, and implementing a platform that integrates these choreographies into an intuitive interface. This project addresses key challenges in ocean data interoperability and visualization, advancing digital ocean technologies.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE14]

Augmented Insights: Developing a Mobile AR Solution for Offshore Wind Farm Monitoring

This internship focuses on developing a mobile augmented reality (AR) application for monitoring data in offshore wind farms. The application will enable interactive visualization of spatial, oceanographic, and energy-related data by pointing a smartphone at a 3D model of a wind turbine. Objectives include integrating real-time data APIs, developing an intuitive interface, and validating with physical models. Activities involve requirements gathering, design, programming with AR frameworks (Unity, Vuforia, ARCore), API integration, testing, and documentation. The project fosters skills in AR, data visualization, and innovative mobile application development.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE15]**Augmented Reality Application for Monitoring Offshore Wind Farms with Apple Vision Pro**

This internship focuses on developing an augmented reality application for Apple Vision Pro to monitor data in offshore wind farms. The application will provide an immersive experience, combining oceanographic, energy, and temporal data with interactive 3D models of wind turbines. Objectives include developing real-time visualization features, integrating APIs, and designing intuitive interfaces using the visionOS framework. Activities involve requirement gathering, prototyping, programming, testing, and application validation, emphasizing immersive interaction and data exploration. This project fosters skills in cutting-edge technologies, such as visionOS and augmented reality.

Research Center: HumanISE - Human-Centered Computing and Information Science

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Fernando Cassola Marques

Ref. [CSE00]**Generic Topic – Computer Science and Engineering**

Computer science and engineering are the linchpins to the unstoppable evolution of computing and enable its application to an ever-growing plethora of computer-based solutions.

About Computer Science and Engineering at INESC TEC: more information [here](#)

Power and Energy Systems

Ref. [PES09]**Development and Evaluation of Solid-State Protections for DC Microgrids**

With the growing use of direct current (DC) microgrids in renewable energy systems, electric mobility, and the electrification of remote areas, the protection of these networks has become a highly relevant technical challenge. Conventional protections, based on electromechanical or hybrid technologies, present significant limitations in terms of response speed, precision, and durability. This project proposes the investigation, development, and evaluation of solid-state protections, exploring their superiority over conventional solutions, particularly in the context of DC microgrids.

Research Center: CPES - Power and Energy Systems

Internship location: X-Energy laboratory, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: José Pedro Martins da Silva

Ref. [PES10]**Strategies for Sustainable Investments in Energy Storage**

The global energy transition is driving the growth of renewable energy communities (CERs), highlighting the strategic role of energy storage systems, such as batteries, in maximizing the use of renewable sources. This project proposes an in-depth analysis of the feasibility of sustainable investments, exploring how these technologies can transform energy management by reducing costs, ensuring stability, and optimizing energy efficiency.

Using mathematical tools, such as optimization models and predictive simulations, the study aims to identify the conditions under which these investments become financially viable and sustainable. Additionally, it will assess the impacts of market fluctuations, the variability of renewable energy production, and regulatory incentives, offering strategic insights for informed decision-making in real-world scenarios.

Beyond economic benefits, the project will explore how these technologies can contribute to decarbonization and more resilient energy management. This study aims to contribute to the development of strategies that accelerate the energy transition and promote scalable and sustainable storage solutions.

Research Center: CPES - Power and Energy Systems

Internship location: INESC TEC headquarters, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Laura Cavalcante

Ref. [PES00]

Generic Topic – Power and Energy Systems

Digital network communications underpin the Internet and the myriad of services we increasingly depend on, indispensable for the widespread digital transformation.

About Power and Energy Systems at INESC TEC: more information [here](#)

Robotics

Ref. [ROB02]

Quality Assurance for Robotic DevOps Tools

Join our team to analyse the competitive landscape of DevOps tools for robotics. Your work will involve evaluating competitors solutions, conducting usability and time-to-onboarding analyses, and benchmarking these findings against Robotair.io using real industrial robots in the state-of-the-art iiLab laboratory. You'll also help establish a Quality Assurance (QA) procedure by identifying less relevant features of our app using analytics tools. This is a hands-on opportunity to shape the future of robotic software development and improve our platform's user experience.

Research Center: CRIIS

Internship location: iiLAB, Porto

Type: Curricular internship for completion of bachelor degree, 162 hours

Supervisors: Rafael Arrais

Ref. [ROB00]

Generic Topic – Robotics

Robotics provides new tools and paradigms to enable robots to operate in complex and dynamic environments, shared with humans.

About Robotics at INESC TEC: more information [here](#)