NAVAL SECTOR

Index

- Applied Power Electronics Technology (APET)
- Chemical, Environmental and Thermal Engineering (ChETE)
- Corrosion Engineering and Materials-ENCOMAT (CI11)
- Engineering and Design Group-GED (EG2)
- CIMA (EG6)
- Energy Technology Group-GTE (EM1)
- Efficient and Digital Engineering (EN.EDI)
- Organisation Engineering (OE2)
- Antennas, Radar and Optical Communications-COM (SC7)
- Graphic and Multimedia Computing Group-Gig (SI6)
- Radio Systems Research Group (SR)
- Information Technologies Group (TC1)

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Vice-Rector for Communication and Institutional Relations

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Applied Power Electronics Technology (APET)

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Research lines

- Power supply and energy conversion electronic systems.
- Power electronics applied in transportation.
- Power electronics applied in energy.
- Topologies and control of power converters.

Offer

- Design and analysis of a ship's electrical plant. (Load flow, harmonics, short circuit, transients, protections).
- Marine electric propulsion. Electric drives.
- Electrical energy storage systems.
- Power electronics systems in the metallurgical industry.
- Power electronics systems in renewable energy.
- Professional training courses.

Keywords

Power electronics, renewable energy, energy quality, electrical units and lighting, electric vehicle, microgrids

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Chemical, Environmental and Thermal Engineering (ChETE)

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Research lines

- Industrial applications of XR technologies.
- Application of infrared thermography (TIR) in the industrial sector.
- Power process design and optimisation.
- Reduced order models.
- Computational Fluid Dynamics (CFD) simulation.

Offer

- CFD analysis in ship hydrodynamics.
- Application of augmented reality (AR) in industrial environments.
- Calculation of offshore wind turbine aerodynamics.
- Air conditioning and ventilation calculations.
- Fault detection in equipment and installations by means of TIR.
- Optimal design.
- Design and simulation of modular hybrid power generation systems.
- Wind tunnel testing.
- Training in CFD.
- Generation of predictive wind models for offshore wind farms.

Keywords

CFD, hydrodynamics, resistance, acoustics, numerical simulation, extended reality, infrared thermography, modular hybrid systems.

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Corrosion Engineering and Materials-ENCOMAT (CI11)

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Research lines

- Coatings for corrosion protection (organic coatings, conversion layers, functionalized nanofilms, self-healing coatings).
- Surface modification for improving anticorrosion properties through techniques such as ion implantation, laser remelting or friction.
- Electrochemical corrosion.
- Development of electrodes for lithium-ion batteries.
- Additive manufacturing of ceramic products (cement and concrete), metallic and polymeric materials.

Offer

- Aluminum alloys reinforced with nanoparticles for sustainable transportation: mechanical alloying, extrusion, and friction stir welding.
- Aluminum-based materials selectively reinforced using the friction stir welding technique: tribological properties and corrosion resistance.
- Structural and electrochemical characterization of shape memory steels (Fe-SMS).
- Development of new eco-friendly construction materials based on geopolymers obtained from microsilica as raw material (eGEO).
- Hot forging techniques for aluminum to manufacture large structural components for the automotive industry.
- E-Life. A project in collaboration with AIMEN and VMS Automotive for the characterization of lithium-ion batteries under different operating conditions.
- Sustainable transport infrastructure in the Atlantic Area (DURATINET).
- Development of new conversion coatings with self-healing properties for corrosion protection.
- Selective electrochemical recovery of minor elements from tin-based alloy waste.
- Analysis of the fermentation state of bread doughs for rheological control, automation of the cutting process, and direction of bar grinding.
- Additive manufacturing: Optimization of manufacturing parameters, post-processing techniques (thermal and electrochemical treatments), new filaments/recycling, corrosion.

Keywords

Corrosion, coatings, electrochemistry, lithium-ion batteries, surface modification, additive manufacturing.

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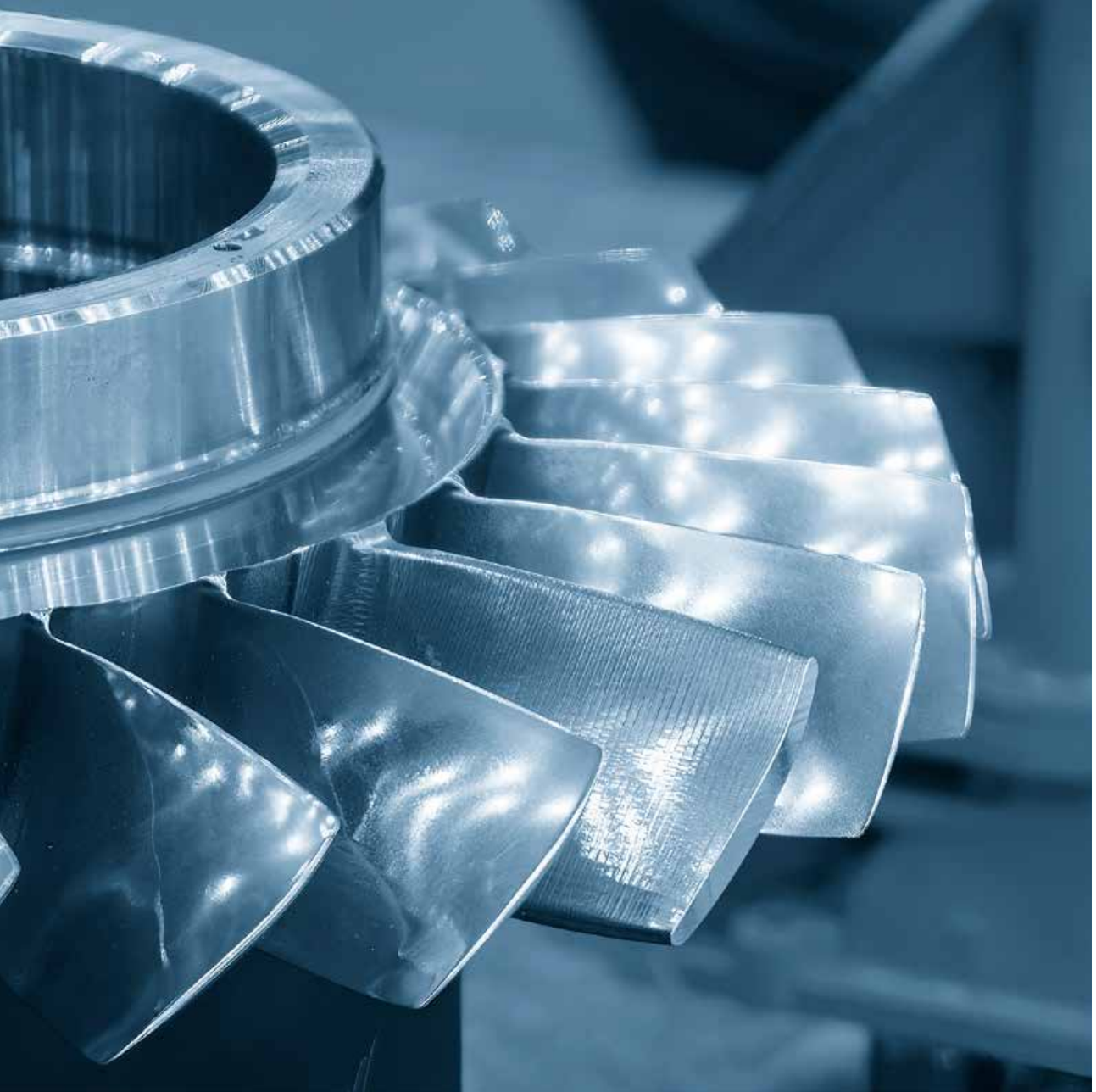

Engineering and Design Group-GED (EG2)

Researchers

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Research lines

- Engineering and Industrial Design.
- Parametric 3D modelling.
- Intelligent decision support systems in the naval sector.
- Smart ship support technologies.

Offer

- Computer-Aided Design (CAD).
- Advanced training and design.
- Industrial Design and Engineering.
- Parametric three-dimensional design.
- Virtual model creation.
- Digital twins and biomodels.
- Design and prototyping of parts and mechanisms.
- 3D printing.
- Advanced mechanical design.
- Design and development of intelligent products and systems.
- Design and development of artificial intelligence tools.
- Development of decision support systems in engineering environments.
- Design and development of assistive systems in the biomedical field.
- Intelligent systems based on reasoning and/or learning.
- Development of symbolic and/or statistical inference models.
- Design of expert systems with various inference engines.
- Simulation of complex systems: traffic, environmental, logistics, etc.

Keywords

Intelligent systems, inference models, complex systems.

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Research lines

- Aerospace, applied to small satellites.
- European scientific facilities for particle detector integration.
- Biomedical, designing and applying new thermoplastic materials developed for the aerospace industry, which we adapt for osteosynthesis plates.
- Mechanical engineering, with a primary focus on mechanical design in all its aspects.
- Application to mechanical engineering of 2D/3D CAD techniques, simulation, and FEM representation.
- Linear and Nonlinear FEM, static and dynamic analysis.
- Multi-body system (MBS) analysis, including impact studies.
- Stochastic analysis, fatigue calculation, and fracture simulation.
- Composite materials and advanced materials calculation.
- Thermal-structural analysis, CFD, BEM, FSI, and electromagnetism.
- Industrial automation.
- Hydraulic systems.
- Pneumatic systems.
- Electrical systems.
- Electronic systems.

Offer

- Biomechanics: characterization of hyperelastic, linear viscoelastic, and nonlinear viscoelastic materials.
- Dynamic systems: mechanical calculation of systems in explicit and implicit dynamics.
- CIMAclas / historic vehicle cataloging laboratory accredited by Xunta de Galicia.
- Energy production: design of mechanisms and equipment for energy production using renewable sources.
- Advanced mechatronics: mechanical design of custom equipment, satellites, and mechatronics applied to natural resources recovery.
- Mechanical design and calculation.
- Composite materials: calculation of the mechanical behavior of these materials and construction of equipment for scientific facilities.

Keywords

Aerospace, biomedical, mechanical engineering, industrial automation, composites.

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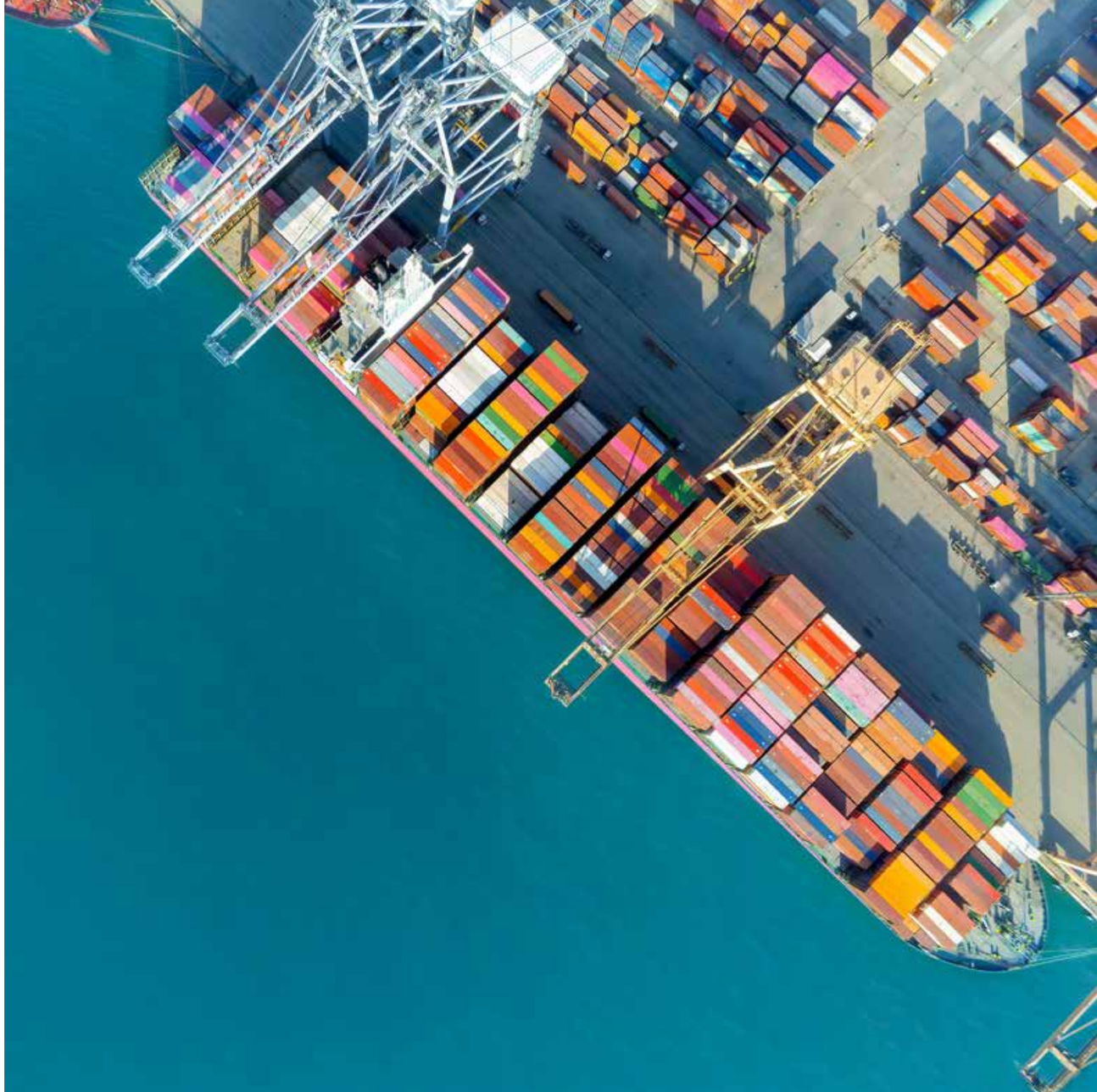

Energy Technology Group – GTE (EM1)

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Research lines

- Combustion.
- Heat transfer.
- Change of phase materials.
- Thermal equipment modelling, simulation and optimization.
- Dynamic simulation of buildings and installations thermal response.
- Anticontamination systems of automotive motors.
- Residual heat recovery systems.
- Artificial Intelligence for energy efficiency improvements.

Offer

- CFD applied to elements and systems of ships.
- Energy efficiency studies.
- Development of digital twins.
- Machine Learning based studies for improvement in equipment and systems.
- Carbon footprint analysis.

Keywords

Energy efficiency, combustion, digital twin, CFD.

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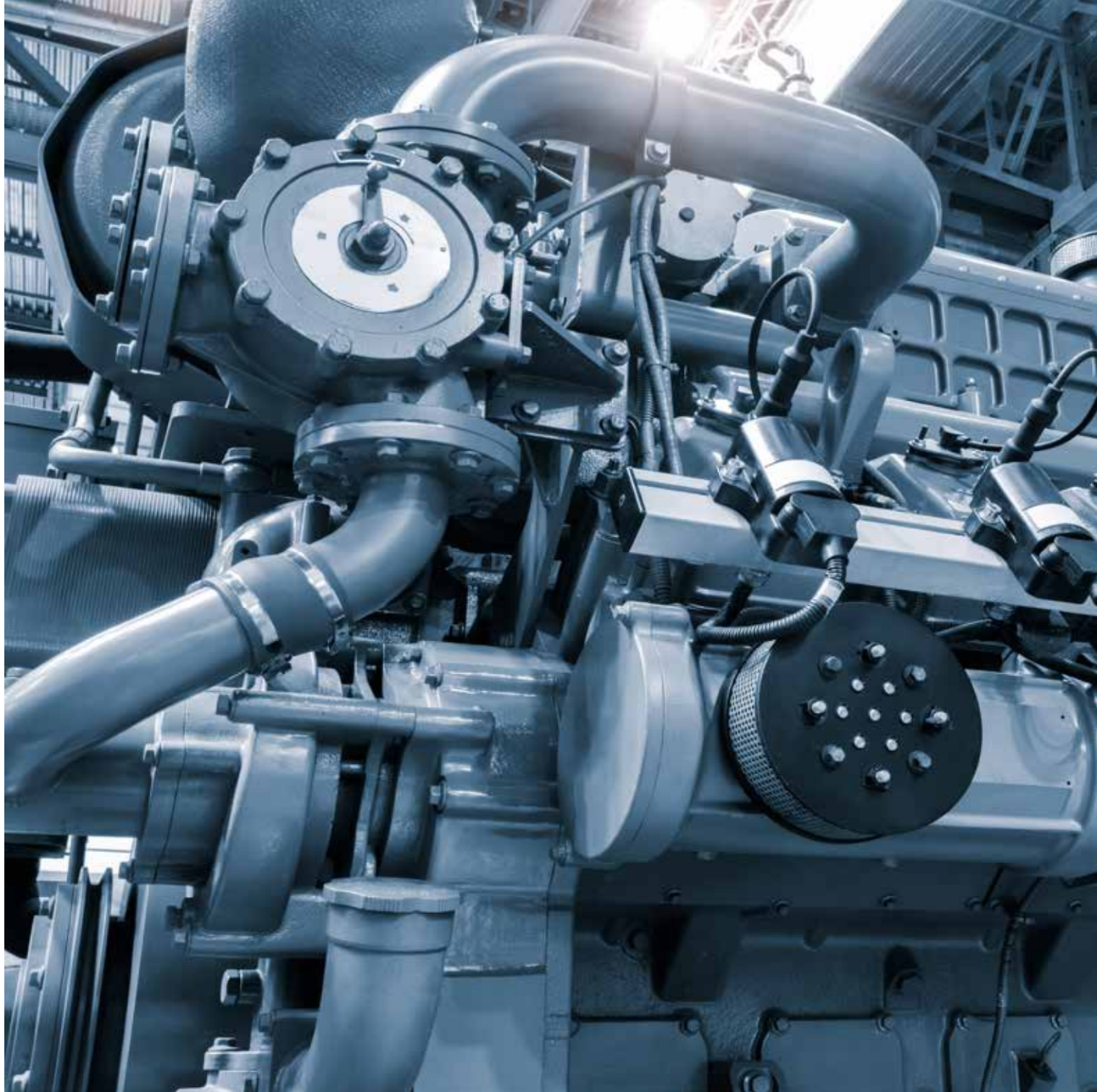

Efficient and Digital Engineering (EN.EDI)

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Research lines

- Analysis of marine energy resources.
- Simulation of power generation systems in marine environments.
- Simulation of onshore-offshore power evacuation systems.
- Industrial digitization. Complex systems for digital integration of industrial services (production control, traceability, maintenance etc.).
- Systems engineering and Industrial Informatics.
- Axes control and non-conventional robotics.
- Advanced industrial machinery automation.
- Automation of handling, logistics and industrial production systems.
- Development of standards for industrial automation.
- Industrial security.
- Renewable energies: simulation and integration in electrical grids.
- Electric power networks: planning, analysis, control and protection.
- Power supply quality.
- Evaluation of energy efficiency in facilities. Infrared thermography of electrical installations.
- Energy efficiency systems.

Offer

- Design of energy storage systems.
- Energy evaluation of load systems and their impact on power quality.
- Design and implementation of automated IT tools for business digitization: web environments, IIoT, data processing, data extraction.
- Simulation of industrial processes and systems: warehousing, intralogistics etc.
- Design of new configurations in advanced machinery: special robots, customized machine tools etc.
- Design and implementation of control systems: Industrial automation.
- Design and implementation of digital twins.
- Design and implementation of movement modification systems.
- Design and implementation of wired motion control equipment.

Keywords

Industrial digitization, industrial automation, robotics, mechatronics, energy, efficiency, renewable energy.

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Organisation Engineering (OE2)

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Research lines

- Development and integration of management systems (quality, environment, occupational risk prevention).
- Design of sustainable logistics for packaging and packing (P+P).
- Design of logistics systems and sustainable management in the supply chain, with special emphasis on sustainable transportation management.
- Continuous improvement, lean manufacturing, and staff participation systems.

Offer

- Supply Chain Management (Production and Logistics).
- Supply Chain Design.
- Design and implementation of lean manufacturing programs.
- Improvement of production and inventory management. Implementation of TPM programs.
- Redesign of production and logistics flows and processes.
- Design and improvement of transport networks.
- Design and improvement of warehouse management.
- E-commerce logistics.
- Efficient and sustainable packaging and packing design.
- Process simulation and improvement using advanced algorithms.
- Implementation of new technologies in production and logistics (Industry 4.0).
- Design and implementation of continuous improvement programs based on staff participation systems.
- Quality, environmental, and occupational risk management.
- Internal audits and certification advising.
- Information systems.

Keywords

Management systems, sustainable logistics, supply chain, continuous improvement, lean manufacturing.

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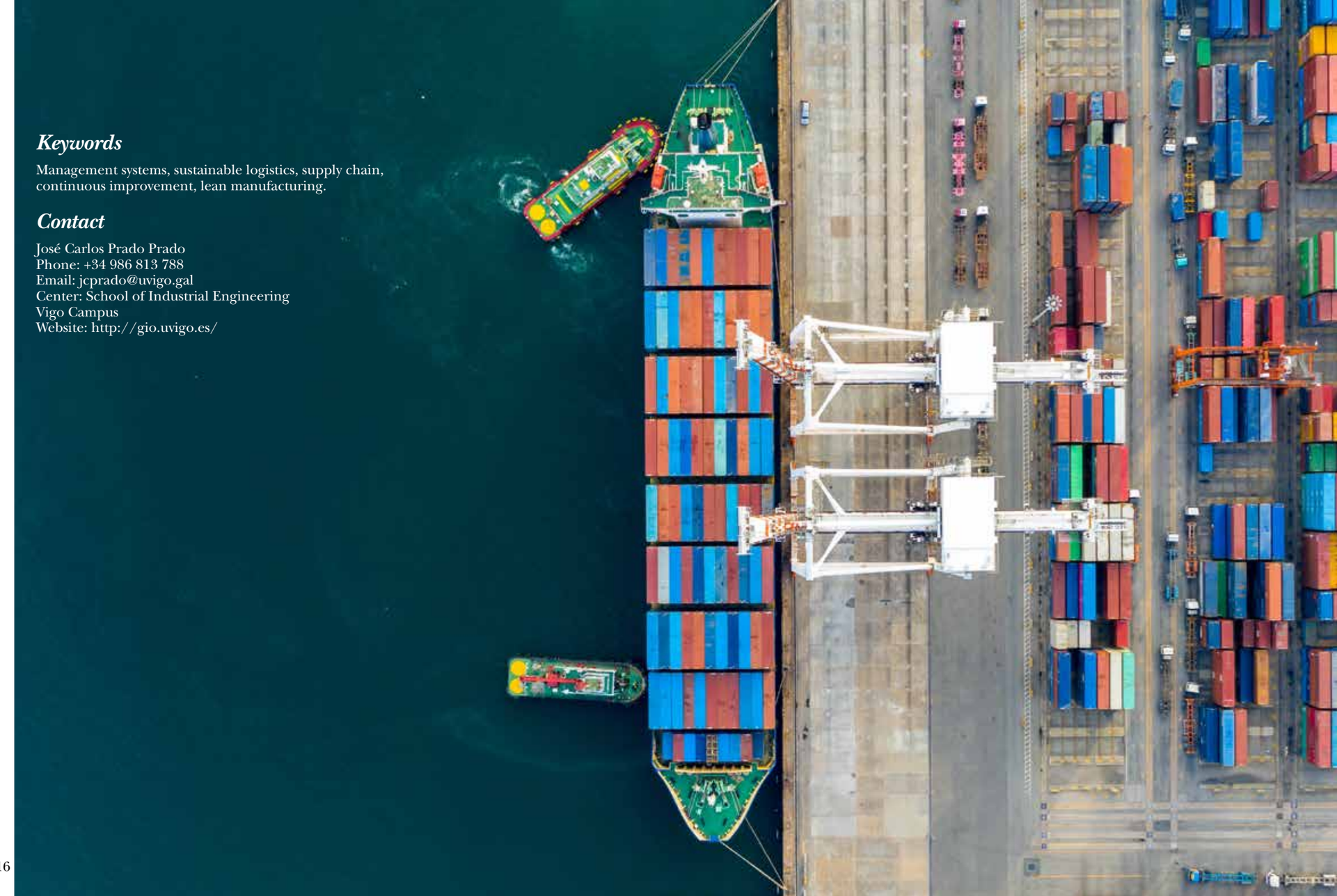

Antennas, Radar and Optical Communications-COM (SC7)

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Research lines

- Antennas.
- Biosensing and nanoplasmonics.
- Computational Electromagnetics (code M3).
- Communication and quantum cryptography theory.
- Electromagnetical environment effects (E3).
- Radar, infrared and electronic warfare signature.
- Satellites.
- Civil security.
- Systems 4.0 and cyberdefense.
- Integrated photonics, GaN RF.

Offer

- Application of electromagnetic fields to food freezing techniques. CAS freezing system.
- Cybersecurity of systems and network virtualization on board ships or in complex environments, digital twins, artificial intelligence, 5G networks, etc.
- Design and characterization of high-resolution 3D radar systems for obtaining moving images.
- Design and manufacturing of radar and infrared signature measurement systems, as well as diagnostic and training systems for electronic warfare teams.
- Design of radar systems for automotive applications.
- Electromagnetic consulting: analysis and synthesis of reflector antenna systems, electromagnetic compatibility.
- Electromagnetic measurements:
- Antenna characterization up to 24GHz.
- Measurements and tests of electromagnetic compatibility (radiated emissions/immunity and conducted emissions) according to UNE-EN 61000 and CISPR16 standards for low-power single-phase systems.
- Coverage measurements and signal analysis in wireless communications.
- Measurement of electromagnetic signatures on ships, land vehicles, and aircraft, including radar signature (RCS, ISAR, SAR, tomography, etc.) and infrared (IR) signature.
- Electromagnetic simulation of advanced metamaterials and frequency-selective surfaces (FSS), applied to low-observability radars.
- Miniaturization of HF antennas on military ships.
- Pre-certification of systems to verify compliance with electromagnetic compatibility (EMC/EMI) regulations.
- Security analysis of quantum cryptography systems.
- Consulting in quantum technologies.
- Simulation of complex plasmonic systems (nanoparticle colloids, nano-antennas, etc.). Surface-enhanced simulations, Raman spectroscopy (SERS), and other nanoplasmon applications in biomedicine and biosensors.
- Simulation of the electromagnetic behavior of platforms with multiple radiating systems (warships, aircraft, land vehicles, etc.). This process may include: antenna location design and optimization; simulation, reduction, and control of radar cross-section (SER/RCS); or complete modelling of E3 problems (Electromagnetic Environmental Effects). E3 covers fundamental disciplines such as electromagnetic compatibility (EMC), electromagnetic interference (EMI), or hazardous radiation (EMR/RADHAZ), including personnel safety (HERP), weapon safety (HERO), and fuel safety (HERF).
- THz spectroscopy: estimation of electrical parameters (refractive index, absorption coefficient), characterization of transmission channels or high-resolution antennas; THz imaging.
- Training through various courses, seminars, and conferences related to electromagnetic radiation (interaction with living beings, materials, or complex structures; electromagnetic compatibility).

Keywords

Electromagnetic fields, radiofrequency, electromagnetic compatibility, electromagnetic simulation, spectrometry, security, instrumental demonstrator, signal processing, communications, calibration, measurement and signal emulation, integrated service system, monostatic, multistatic, antennas, exploration antennas, reflector antennas, naval antennas, radiation pattern, antenna miniaturization, radar systems, radar imaging, millimeter-wave scanners, detection of improvised explosive devices, radar cross-section, radar signature, infrared signature, ground-penetrating radar, quantum communications, quantum cryptography, quantum key distribution, communication security, biodetection, biomedicine, electronic warfare, radar signature, infrared signature, remotely piloted aircraft, drone.

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Research lines

- Graphic technologies and vision.
- Advanced applications of computer graphics.
- Development of 3D environments, virtual reality, and augmented reality.
- Geometric modeling.
- Distributed visualization.
- Development of scientific visualization simulators.
- Generation of stereoscopic and autostereoscopic content.
- Advanced manufacturing: prototyping and evaluation of visual and industrial interfaces.
- Cybersecurity.
- Data flow analysis and early intrusion detection techniques.
- Geoinformatics.
- Model generation and navigation on Google Earth.
- Design and implementation of geographic information systems.

Offer

- Design and testing visualization equipment (smart factory).
- Design and testing scientific equipment.
- IT security consulting and auditing.
- Systems integration and corporate data cleansing.
- Business information system analysis and optimization.

Keywords

3D environments, virtual reality, augmented reality, cybersecurity, prototyping, visual interfaces, advanced manufacturing.

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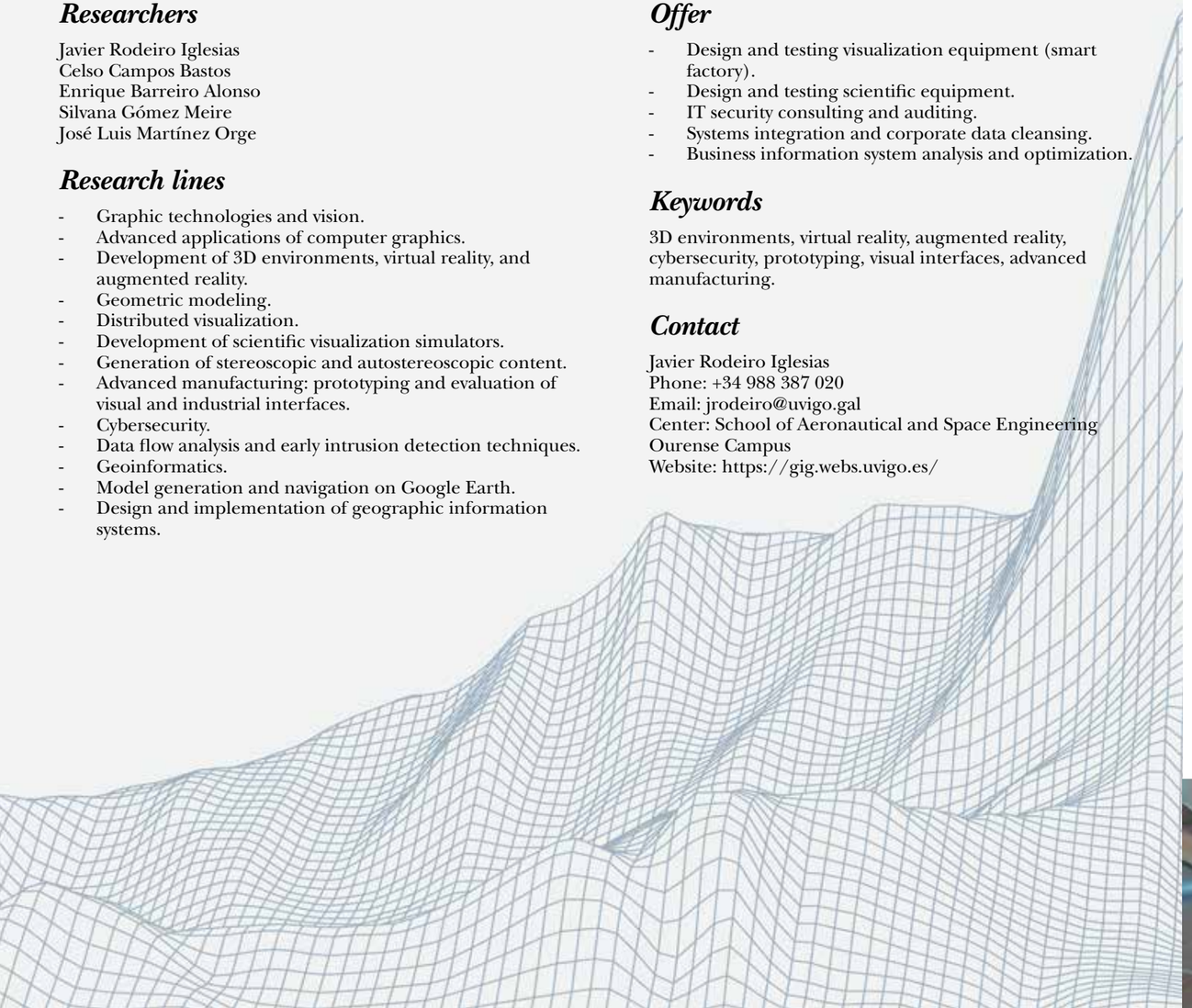

Radio Systems Research Group (SR)

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Research lines

- Radio systems.
- Mobile communications.
- Wireless networks.
- Point-to-multipoint networks.
- Digital television (terrestrial, satellite).
- Radio channel analysis.
- Characterization of propagation degradations.
- Noise and interference. Design of techniques to mitigate these problems.
- Design, construction, and measurement of antennas for different applications.
- Radar, with emphasis on polarimetric measurement techniques for meteorological radar and SAR.
- Passive radar.
- Software-Defined Radio (SDR).
- Multi-antenna communications (MIMO).

Offer

- Communication solutions using wireless networks.
- Antenna analysis and design.
- Antenna measurement and characterization.
- Antenna camouflage.
- Measurement of exposure levels to electromagnetic fields.
- Certification of radioelectric stations.
- Instrumentation control.
- Planning of radio communication systems.
- Pre-certification of electromagnetic compatibility.
- Measurement and characterization of noise and interference.
- Electromagnetic characterization and measurement of materials.
- Measurement and characterization of electromagnetic wave propagation.
- Measurement and calculation of coverage in the marine environment.
- Sensor networks.
- Radar.

Keywords

Radio systems, mobile communications, wireless networks, sensor networks, radio frequency, satellite navigation systems, antenna, radar.

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Research lines

- Aerospace, applied to small satellites.
- Industrial automation.
- Electronic systems.

Offer

- 5G and beyond communication networks: SDN, NFV, network resource virtualization and orchestration, service virtualization and orchestration, protocol design, network optimization, private networks, industrial networks, tactical networks including ship networks, economic models.
- Private cellular operators. Identification of the company's communication needs. Gathering of requirements. Analysis of the existing infrastructure. Design of optimized solutions with next-generation technologies according to the company's needs. Implementation and testing.
- Communication solutions for marine and aerial UAV networks. Hierarchical 3D networks.
- Embedded systems: sensors and intelligent systems for networked autonomous robots.
- Artificial intelligence technologies for solving large-scale problems. Agent technology.
- Data analysis: data analysis for Industry 4.0.
- AI platforms in the cloud, edge, or local installations for industrial applications. Transition to 5G. Computational offloading needs to edge and/or cloud. Computational delocalization. Flexible implementation of new processes. Flexible integration of new machinery.
- Multimedia distribution technologies: scalable protocols, intelligent network services.
- Wireless networks: intelligent access networks, cooperative networks, cognitive networks.
- Development of conversational agents for specific applications. Conversion of industrial and business data into coherent natural language. Multilingual support. Integration with processing and customer relationship systems. Mobile applications for field operators.

Keywords

5G, IoT, artificial intelligence, Industry 4.0, smart networks, autonomous vehicles, big data, natural language processing, data analysis, wireless networks, intelligent network services, cyber-physical systems.

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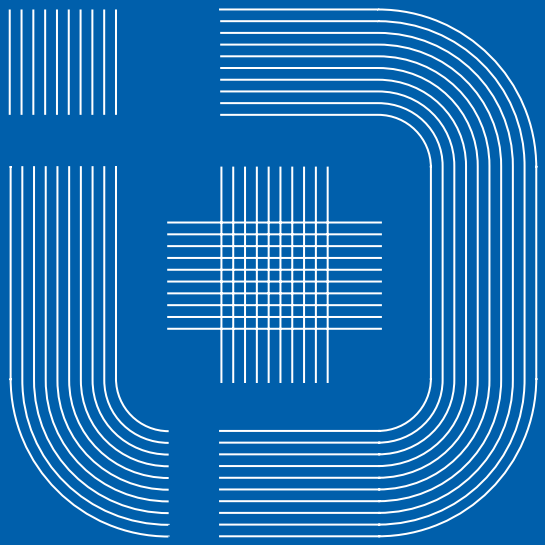

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