Freie Universität Bozen
Libera Università di Bolzano
Università Liedia de Bulsan

Faculty of Engineering

Ph.D. Programme in ADVANCED-SYSTEMS ENGINEERING

Proposed General Research topics

Project Title	Supervisor
Smart definition of sources of inspiration for conceptual design based on neurophysiologic and biometric measures	Borgianni
Human-product interaction with sustainable products and sustainability-related cues or Areas of Interest	Borgianni
Electroabsorption spectroscopy of energy-levels line up in organic electronics: optimization of charge injection and extraction	Cacialli
Bio-compatible and bio-resorbable photonics and optoelectronics	Cacialli
Engineering Biomaterials for 3D Bioprinting and Biohybrid Interfaces	Ciocca
Characterization of Advanced Engineering Materials: Finite Element Analysis and Experiments	Concli
Tribology and Fatigue of Mechanical Components: testing, modelling and simulations	Concli
Extended Reality (XR) to support operator training in industry	Dallasega
Development of smart, modular and movable manufacturing assets for viable and sustainable Manufacturing-as-a-Service	Dallasega
Computational methods for trajectory generation	Frego
Optimization methods for robotics	Frego
Methodologies for adaptable human-machine interaction in manufacturing	Gualtieri
Assistance systems for the social inclusion of vulnerable workers in manufacturing	Gualtieri
Sculpturing in Mixed Reality using Head Mounted Displays like the Apple Vision Pro	Haller/Russo
Smart Fibers for next-generation wearables	Haller
Machine learning for three-dimensional wood cutting optimization in sawmills	Hosseini
Model predictive control for quality-driven wood cutting optimization	Hosseini
Numerical simulations of coherent systems in quantum mechanics and quantum optics [Further keywords: Dicke effect, super radiance, quantum synchronization, plasmonic Dicke effect, Python QuTiP package]	Modanese
Qubits and quantum circuits: numerical simulations in Python and possible applications to electronics [Further keywords: Josephson junctions, Python QuTiP and QuCAT packages, quantum Monte Carlo	Modanese
Thin-film electronics based on unconventional electronic materials	Münzenrieder
Flexible transistors and circuits for wearable sensor systems	Münzenrieder
AI engineering for distributed dependable software systems	Pahl
Intelligent resource management for IoT edge and cloud computing	Pahl
Exploiting context and generative AI technologies for enhancing human-robot collaboration	Peer
Brain and body computer interface-controlled systems and robots	Peer
Neuromorphic devices based on printed organic materials	Petti

Plant wearables based on flexible and sustainable sensors	Petti
AI technologies for enhancing the interaction with musical cultural heritage	Pretto
New interfaces for the Internet of Sound	Pretto
Software security of AI-generated software. Studying the security of software that has been automatically generated by AI. Developing secure AI-generated software	Russo
Responsible software. Investigating and Improving software systems in terms of fairness, performance and security	Russo
Dynamic task and motion planning strategies for safe and ergonomic human robot collaboration in manufacturing	Vidoni
Multibody-based digital twin solutions for condition monitoring/vibration control	Vidoni
Time-delay control for persistent robotic systems	von Ellenrieder
Agile control and design of aerial forest firefighting vehicles	von Ellenrieder

* this is only a partial list of potential projects, other topics dealing with the research activity of the members of the Ph.D. Committee can be explored.