

Faculty of Engineering

Ph.D. Programme in ADVANCED-SYSTEMS ENGINEERING

Proposed General Research topics

Project Title	Supervisor
Analytical and numerical treatment of differential equations modelling complex systems	Bertotti
Deterministic and stochastic dynamics on complex networks	Bertotti
Development of a system for design ideation providing sources of inspiration based on real-time biofeedback	Borgianni
Study of the impact of different interactive representation media on user-product interaction	Borgianni
Organic electronics devices (light emitting and photovoltaic diodes) on soft hydrogels for biomedical applications	Cacialli
Biocompatible, biodegradable and bioresorbable light emitting and photovoltaic diodes for in-vivo theragnostic	Cacialli
Graph methods for joint optimal control/estimation on dynamic robots	Camurri
Deep learning methods for accurate surface reconstruction with noisy data and deformable surfaces	Camurri
Wearable sensors for sport and e-health applications	Costa Angeli
Processing, fusion, and analysis of printed sensor data	Costa Angeli
Human-Factors and Ergonomics in Advanced Industrial Human-Machine Interaction	Dallasega
Extended Reality to support operator training in industry	Dallasega
Path and motion planning for intelligent vehicles and robots	Frego
Control and optimization in presence of uncertainties in gamification and game theory	Frego
Next-Generation Interfaces for the automotive industry	Haller
Smart Textile Interfaces for wearables	Haller
Real-Time Optimization of Quality-Based Wood Cutting for Improved Yield Recovery in Wood Manufacturing	Hosseini
Machine learning for Three-dimensional Wood Cutting Pattern Generation in Sawmills	Hosseini
Analytical and numerical treatment of differential equations modelling complex systems	Modanese
Deterministic and stochastic dynamics on complex networks	Modanese
Integrated circuits on flexible substrates	Münzenrieder
Thin-film electronics on 3D substrates	Münzenrieder
AI engineering for distributed systems	Pahl
Intelligent resource management for IoT and edge computing	Pahl
Context-aware intention recognition, shared control and decision making in human-robot collaboration	Peer
Brain and body computer interface-controlled systems and robots	Peer
Bioelectronics and bioprinting for engineered hybrid living systems	Petti

Synaptic soft devices for neuromorphic computing	Petti
Auditory displays and multimodal interaction in the automotive field	Pretto
New interfaces for the Internet of Sound	Pretto
Security in software systems: Detecting and predicting security breaches and automatically recommended fixes	Russo
Security in cyber-physical systems: intelligent systems for tracing attacks and implementing defense	Russo
Dynamic simulation and design optimization of flexible multibody systems	Vidoni
Optimal motion planning for redundant industrial collaborative robots	Vidoni
Use of control barrier functions for safety critical control of uncrewed ground vehicles	von Ellenrieder
Nonlinear control of low power robotic systems with time delay	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.

PhD scholarship bound to specific research topics/areas:

1. Biodegradable, near-infrared (NIR), or tattooable organic light-emitting diodes (OLEDs) (supervisor Prof. Franco Cacialli)
2. Active Thin-Film Electronics for Circular Electronics (supervisor Prof. Giuseppe Cantarella/co-supervisor Prof. Niko Münzenrieder)
3. Transient electronic devices based on inorganic materials (supervisor Prof. Niko Münzenrieder/co-supervisor Prof. Giuseppe Cantarella)