SEDI GENERICHE SCUOLA INGEGNERIA

DESCRIZIONE TIROCINI

(per ulteriori informazioni contattare l'Ufficio Relazioni Internazionali della Scuola international@ingegneria.unifi.it)

1. **UNIVERSITY OF MALAGA - Spagna** (2 laureati della Magistrale - durata 6 mesi)
    a. 1.-Solar cooking. We investigate the behaviour of new models of solar cookers. The work is both theoretical and experimental. Write to: Antonio Carrillo or Xabier Apaolaza (ancarrillo@uma.es; apaolaza@uma.es)
    b. Thermal modelling and optimization of solar protections. We have an office with a solar protection electronically controlled and we want to optimize the position of the store during the day to minimize energy consumption but maintaining thermal comfort. Write to: Francisco Fernández (franciscofh@uma.es).
    c. Modelling of new refrigeration cycles to reduce ODP and GWP (reduction of refrigerant charge, use of new refrigerants, etc.) and to improve EER. Write to: Bernardo Peris (perisbernardo@uma.es)

2. **ECOLE D'INGENIEURS PAOLI TECH - Università di Corsica - Francia** (2 studenti della magistrale – durata 2 mesi)
    a. The platforms MYRTE and PAGLIA ORBA are the two most well-known facilities linked to Paoli Tech. The MYRTE platform unites photovoltaic solar energy with a hydrogen chain as an energy carrier to store renewable energies. It studies how hydrogen can store solar energy and guarantee its strength and power. The PAGLIA ORBA platform on the other hand is a smart power grid. It couples a range of storage units, smart grids and different renewable energy sources, supplying energy to different facilities in a micro-network.
    b. Paoli Tech also relies on the laboratory "Sciences pour l'Environnement", also accredited by the CNRS and which includes different projects such as renewable energies, forest fires management, natural resource preservation, fields and waves in applied mathematics, water management and development in the Mediterranean area, information technology and communication, and finally Smart Building design and Building rehabilitation on the Campus in CORTI.
    c. Paoli Tech also develops R&D topics in architectural acoustic in collaboration with the COMPA's team: it brings together mathematical and fundamental physics research around optimization of the urban acoustic comfort for rehabilitation and renovations.
    d. Propagation and diffusion in the presence of complex bottom / surface boundaries in underwater acoustics
    e. Improvement of urban acoustic comfort in the context of building renovation

3. **FACULTY OF BIOSCIENCE - UNIVERSITY OF GENT - Belgio** (2 studenti della Triennale o Magistrale – durata 6 mesi) Research at BIOMATH see the link https://biomath.ugent.be/education/thesistopics

4. **INSA ROUEN NORMADIE – Francia** (3 studenti magistrale – durata 6 mesi): Activities related to Energy (Fluid Mechanics, heat and mass transfert, combustion, renewable energy)

5. **SAARLAND UNIVERSITY, DEPARTMENT OF SYSTEMS ENGINEERING - Germania** (3 studenti della triennale o magistrale – durata 6 mesi):
    a. Development and characterization of of novel robotic and mechatronic systems based on smart material transducers
    b. Development of mathematical models and simulation tools for smart material robots and actuators
    c. Development and implementation of advanced motion control algorithms and systems for smart material-based robots and actuators

6. **VON KARMAN INSTITUTE FOR FLUID DYNAMICS – Belgio** (3 studenti della triennale o magistrale, 3 studenti laureati triennale o magistrale, 3 dottorandi, 3 PhD – durata 6 mesi): Research in Fluid Dynamic in aereospace, Aeronautic, Turbomachinery, Propulsion Environmental and Industrial Flow.

7. **IETR – Francia** (2 studenti della magistrale, 1 laureato della magistrale, 1 dottorando):

    1) Sub-THz radial line slot antenna on polymer substrate
    Abstract: Polymer substrates are known for their low dielectric constant and low losses at high frequencies (>200 GHz). Nevertheless, their low glass transition temperature (Tg) prevents the use of high-temperature process such as laser drilling and metallizing the substrate will damage the polymer.
    This stage will deal with the design of a low-profile LWA system on a low-loss polymer substrate: Cyclic Olefin Copolymer (COC). A high-gain polymer-based antenna will be designed, fabricated and tested. The proposed antenna system will consist of two building blocks, namely: a cylindrical wave launcher and a radial line slot array (RLSA). An important part of the project will consist in adapting our the RLSA design to the polymer characteristics.

    2) Mode matching for the synthesis Bessel-Gauss THz beams
    Abstract: We will study the capability of Bessel beams to establish robust wireless links in the near field with error-free, high data-rate transmission at J-band. The self-healing feature of Bessel beams will be exploited to create a resilient link to opaque metallic obstructions. Such capability will be first validated experimentally by placing a circular metallic obstacle within the non-diffractive region of the Bessel beam. To that end, the near field radiated by a broadband launcher consisting of a photonic transmitter and a spline-profile horn will be measured with and without obstacles, and the corresponding profiles compared.
    References: https://ieeexplore.ieee.org/document/9309030, https://ieeexplore.ieee.org/document/9425504

3) Ultra low profile transmitarrays

Abstract: Transmitarray antennas are very attractive for beam steering and beam scanning applications, e.g. at K/Ka bands for satellite communications and at millimeter-waves for beyond-5G point-to-point & point-to-multipoint services. They typically consist of a focal array (made of horn antennas or microstrip antennas, etc.) and a multi-layer radiating panel made of phase correcting unit-cells. The accurate control of the phase distribution across the radiating panel allows to steer the antenna beam. The focal distance F separating the focal array and the radiating panel is about 0.5xD to 0.8xD, where D is the size of the radiating panel. Therefore, transmitarrays with highly-directive beams have a large size (or in other words a large value for D), there a large total thickness F. One of the most important challenges is to explore new solutions to reduce the total thickness F of ultra-directive transmitarrays to generate low-profil reconfigurable smart skins. This constitues the main objective of the proposed project.

8. **DB SAS – France** (2 studenti magistrali – 6 mesi)
   The trainee will work on electronic designing and prototyping for ultrasonic imaging devices. He/she will be able to manage all steps of the R&D process: design, prototype, tests, application, etc.

9. **IMST – Germany** (1 studente magistrale 6 mesi – 1 laureato magistrale 6 mesi)
   Student will be hosed in the antenna group and will be involved in development of innovative RF systems. Antenna design and measurement could be possible tasks. Students could also improve soft skills as working with others, effective communication and self-management.

10. **FRAUNHOFER INSTITUTE OF STRUCTURAL DURABILITY AND SYSTEM RIABILITY – Germany** (1 studente magistrale 6 mesi – 1 studente laureato magistrale 6 mesi – 1 PHD 6 mesi)
    training on the job; participation in research projects in the context of:
    - ✓ digital twins and model update (advance digitalisation and simulation)
    - ✓ smart structures (e. g. noise and vibration control, SHM,...)
    - ✓ system reliability & structural durability (e.g. of batteries, hydrogen applications, additive manufacturing, electronics,..)
    - ✓ circular economy - sustainable plastics