UNIMORE
UNIVERSITÀ DEGLI STUDI DI MODENA E REGGIO EMILIA

Dipartimento di
Scienze e Metodi dell'Ingegneria

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Traineeship program at The Department of Sciences and Methods for Engineering - Reggio Emilia

Main topic/field of the Traineeship	Areas of study and education level of the ideal candidate	Skills/Language requirements	Goals and activities
Project Nr. 1 Prof. Marco Mamei	Pervasive Computing e Servizi Cloud (ING-INF/05)	Master degree in Computer Science or similar	Analyze software platforms, develop code, data mining, AI and IoT applications
Project Nr. 2 Luke Mizzi	Mechanical Engineering - Metamaterials	Metamaterial Design, Finite Element Simulations, 3D Printing, Auxetics - both Masters and Undergraduate students are welcome.	The traineeship will involve contributing to the current research aims of group. This includes the development of novel metamaterials, the design of smart materials incorporating metamaterial designs and investigating their implementation in biomedical and electronic devices.

		B2 Level English recommended. Basic knowledge of any programming language and experience with finite element simulations is a plus.	
Project Nr. 3 Fabrizio Pancaldi	Signal processing	Computer science, electrical engineering, biomedical engineering. English B2. Basic knowledge of scientific programming, for instance Matlab and/or Python.	The diagnosis of interstitial lung diseases in patients affected by autoimmune pathologies is fundamental to improving their survival rate. The gold standard for confirming the diagnosis of these diseases is computed tomography. However, raising the diagnosis suspicion is very difficult because the symptoms are extremely common in elderly people. Thoracic auscultation has shown a huge potential in the early detection of interstitial lung diseases, but still represents an underexplored field in the clinical practice. The goals of this project are: (a) developing novel algorithms for the analysis of lung sounds and the early detection of interstitial lung diseases; (b) designing a new electronic stethoscope suitable to quantitatively support physicians in the prescription of computed tomography.
Project Nr. 4 Cristian Secchi	Robotics, Control of Robotic Systems	Electrical Engineering, Mechanical Engineering, Applied Mathematics - Master Level English (at least B2, preferred C1)	Design control strategies for complex robotic systems and applications (collaborative robotics, Teleoperation systems, autonomous mobile robots, robotic manipulation)
Project Nr. 5 Davide Castagnetti	Machine Design	Efficient structures for energy harvesting from ambient vibrations. Piezopolymers materials design and applications. Innovative three-dimensional metamaterials for energy harvesting and for biomechanical	The traineeship will be in the domain of machine design. The can be the goals of the study, according to the issue: i)analysis design and validation of an energy harvester; ii) design and characterization of novel piezopolymers; iii) design and investigation of metamaterial structures for biomechanical applications; iv) testin of epoxy or anaerobic adhesives (effect of temperature and fatigue. All the activities will involve both analyisi, design, and experimental steps.

		applications. Structural adhesive joint characterization: fatigue and temperature effect. Both master and bachelor students are welcome (goals and activities will be set accordingly) English level B2 strongly recommended. Basic knowledge of finite element analysis and Design of Experiments are preferred.	
Project Nr. 6 Marco Picone	Computer science, Computer Engineering. Both master and bachelor students are welcome (goals and activities will be set accordingly)	English level B2 strongly recommended. Basic knowledge of Python, Java or C/C++.	The traineeship will be in the domain of Internet of Things (IoT), Pervasive Systems and Digital Twins. The goal will be the study of design and development of distributed and pervasive system with the aim to allow a simplified interaction among users, devices and services and to introduce intelligent capabilities to cyber-physical systems. Specific objectives will be defined. They might include measurement and analysis of IoT protocols and architectural components, design and development of Digital Twins through different application domains and the creation of intelligent application for the interaction between physical assets and users in pervasive environments.

OLD PROJECTS

Name and Contact	Main topic/field of	Areas of study and education level of the	Skills/Language requirements	Goals and activities

	the Traineeship	ideal candidate		
1. Enrico Radi eradi@unimore.it	Mechanics of solids and structures	Civil engineering Mechanical engineering Master Degree	English – Fluent	Analysis of stress concentration in fracture, contact and dislocation problems. Effective properties of composite materials. Modelling of the termomechanical behavior of Shape memory alloys beams.
2. Federica Ferraguti federica.ferraguti@unimore.it	Robotics	Computer science Mechatronic engineering Robotics Biomedical engineering Both master and bachelor students are welcome (goals and activities will be set accordingly)	English level B2 strongly recommended. Basic knowledge of programming (C++ or Python).	The traineeship will be in the domain of surgical robotics. The goal will be the development of advanced technologies for supporting the surgeon during the execution of the intervention. Main topics that can be addressed are: application of Artificial Intelligence to surgical robotics, augmented and virtual reality for assisting the surgeon, autonomous and semi-autonomous surgical robots, shared control for surgical robots.
3. Federica Ferraguti	Robotics	Computer science	English level B2 strongly recommended.	The traineeship will be in the field of collaborative robotics and physical human-robot interaction.

federica.ferraguti@unimore.it		Mechatronic engineering Robotics Both master and bachelor students are welcome (goals and activities will be set accordingly)		The goal will be the development of advanced control algorithms for improving the performance of the collaborative robotics systems while satisfying the safety regulations for guaranteeing the safety of the human operator.
4. Stefano Mariani stefano.mariani@unimore.it	Software engineering, Artificial Intelligence, Distributed systems	Both master and bachelor students with programming skills (e.g. Computer Science, Engineering, Applied Mathematics, Data Science, ...)	English level B2 highly recommended Any programming skills (best if Java / Kotlin / Python)	The work will mostly regard application of artificial intelligence techniques (machine learning, logic programming, planning) for the engineering of distributed systems. Specific activities will likely include design and development of new software libraries and applications and use of third party software libraries and simulation tools. Topics covered may include: application of bayesian and causal learning techniques to the Internet of Things, application of reinforcement learning and causal inference in multiagent systems, conception and design of coordination models for multiagent systems, conception and design of argumentation

				protocols and application to the Internet of Things.
5. Fabrizio Pancaldi fpancaldi@unimore.it	Telecommunications - Signal processing	Graduate or undergraduate students in Computer Science or Electrical Engineering	B2 english or B1 italian	Measurement of the damping factor of car dampers using force sensors and accelerometers
6. Davide Castagnetti davide.castagnetti@unimore.it	Machine Design	Mechatronic Engineering Mechanical Engineering Master Degree	English language	Efficient structures for energy harvesting, 3D printed strructures for biomechanic applications, structural bonded joints analysis and experimental characterization, structural optimization.
7. Pierpaolo Veroni pierpaolo.veroni@unimore.it	Finanza di Progetto/ Project financing	Magistrale/Master Degree	English C1 Italian	Supporto alla valutazione e gestione tecnico operativa di progetti nell'ambito della finanza di progetto rinnovabili trasporti logistica energia telecomunicazioni infrastrutture sanitarie/Supporting the evaluation and the technical-operational management in the field of renewable project financing regarding transports, logistics, energy, telecommunication, health facilities

8. Luisa Malaguti luisa.malaguti@unimore.it	Dynamical Systems	Mathematics Physics Computer science Both master and bachelor students are welcome (goals and activities will be set accordingly)	English level B2 is strongly recommended Basic knowledge of both the theory of differential equations and Matlab are preferred	The traineeship will be in the study of some quantitative model coming from Physics, Thechnology, Biology or collective movements theory. The well-posedness of such model will be preliminarly discussed, by means of the main tools of the dynamical systems theory. The model will then be validated with concrete data.
9. Andrea Spaggiari andrea.spaggiari@unimore.it	Mechanical Design, smart materials, metamaterials and structural adhesives	MS in mechanical or mechatronic engineering	B2 at least	Design of novel actuators and systems based on Shape memory alloys or metamaterials
10. Paolo E. Santangelo paoloemilio.santangelo@unimore.it	Thermal fluids	Mechanical engineering (preferred) or related programs; Bachelor's and Master's students equally welcome	English B2 (CEFR) strongly recommended Basic knowledge of MS Excel and Matlab for data processing strongly recommended; previous experience in experimental research welcome	The overall scope consists of assessing thermophysical properties of biomaterials (or innovative materials) to be employed in the construction industry. Notably, experimental techniques (e.g., guarded hot plate) and approaches will be used to the purpose. Candidates are expected to acquire the ability to perform quantitative experiments and ultimately build a sound dataset of the analyzed properties. The involved activities may

				be performed in collaboration with and at another UNIMORE Department (i.e., DIEF, located in Modena, Italy).