DOCTORAL PROGRAMME IN INFORMATION ENGINEERING

Director prof. Fabio Schoen

Industrial Doctoral Programme

XXXVI cycle – academic year 2020/2021

TECHNOLOGICAL AREA	
ADMINISTRATIVE OFFICE	Department of Information Engineering
CURRICULA	1. Control, Optimization and Complex Systems 2. Electronics, Electromagnetics and Electrical Systems 3. Computer Engineering 4. Telecommunications and Telematics
POSITIONS AVAILABLE: 8 + 1 industrial doctoral position Positions with Scholarship: 6 Positions without Scholarship: 2	
SCHOLARSHIPS: 6	University of Florence
RESERVED POSITION INDUSTRIAL DOCTORAL PROGRAMME: 1	Reserved position for Yanmar R&D Europe employees
STUDY/RESEARCH PERIODS ABROAD	Not required
DOCUMENTS REQUIRED FOR THE ADMISSION (under penalty of exclusion)	● Copy of the Identification Document ● <u>Replacement Declaration Form</u> self-declaration for: - Italian Degree required for the access - transcript of records with marks *(for those candidates whose degrees will be awarded within the 31st October 2020)* - acknowledgment of compliance for any other qualification documents enclosed with the application ● Foreign Degree required for the access *(those candidates whose degrees will be awarded not later than 31th October 2020 shall enclose the list of the examinations completed with marks)*
DOCUMENTS REQUIRED FOR THE EVALUATION	**MANDATORY** ● Curriculum vitae including a list of publications and of the other qualification documents (if any) ● Title and grades of Bachelor and Master Thesis (or equivalent) (the grade of the Master thesis is required if it has been discussed prior to the application to the PhD) ● Abstract of the Master Thesis ● List of all the exams of the Bachelor and Master Degrees with grades (documents should be either in Italian or in English) ● Research proposal

	OPTIONAL • Copy of the Master Thesis (or equivalent) • Publications (if any)
RESEARCH PROJECT	The proposal must be in .pdf format, written either in Italian or in English. The proposal should describe a three-years project having a high potential for novel scientific contributions in the broad field of Information Engineering, but also in other fields provided that methodologies and/or technologies of Information Engineering are exploited. The proposal must include the specific reference to the curriculum and the chosen area of study listed in the below section **"Thematics"**.
EVALUATION PROCEDURE	● **Evaluation of curriculum vitae, research project, publications and other qualification documents** ● **Interview** As detailed in the section below **"Evaluation Marks"**.
OTHER LANGUAGE FOR THE INTERVIEW	English
INTERVIEW **by remote mode**	**Google Meet** or **Skype**
FURTHER INFORMATION	The interview will primarily concern a discussion on the research proposal presented by the candidate.

EVALUATION MARKS		

parameter	minimum score	maximum score
Curriculum vitae, publications, qualification documents	27/120	40/120
Research proposal	27/120	40/120
Applicants who obtain a mark of at least 54/120 according to the minimum score for each parameter will be admitted to the interview		
Interview: (including a discussion of the research proposal)	26/120	40/120
Eligibility is achieved with a minimum score of 80/120		

THEMATICS	**Control, Optimization and Complex Systems** AREA 1 – CONTROL SYSTEMS: concerns analysis, modelling and synthesis of high-performance (possibly networked and hence subject to cyber attacks) automatic control, supervision and monitoring systems for processes that are only partially known, possibly distributed in space and subject to constraints, such as those encountered in industrial applications, robotics, bio-engineering, aerospace, electrical systems, etc. AREA 2 – OPTIMIZATION: Concerns the study of Operations Research models and applications, the development and the analysis of efficient optimization algorithms for the solution of complex problems and the interaction between data science and optimization. The applications of optimization can be found in the field of automation, in industrial production, from logistics to transportation, to the supply-chain, in the

management of electrical energy networks and in training machine learning systems.

AREA 3 – COMPLEX SYSTEMS: this research area is suitable for applicants with a strong background in Physics, Chemistry, Mathematics or Engineering who are willing to carry out research work of cross-disciplinary type. Training aims to deepen the more formal aspects of the analysis of complex systems. The research topic can concern methodological aspects, from dynamical systems to stochastic processes, including complex networks and their applications, from computer engineering to life science.

Electronics, Electromagnetics and Electrical Systems

AREA 1 – HIGH-FREQUENCY ELECTRONICS: concerns the analysis and design of electronic devices and systems at high frequency (from radio frequency to millimeter waves).

AREA 2 – DIGITAL ELECTRONIC SYSTEMS: concerns the analysis and design of electronic systems based on advanced digital components, with applications from biomedical to radar fields.

AREA 3 – ELECTROMAGNETICS: concerns the use and development of numerical techniques for the analysis and design of radiant systems and passive devices at high frequency, from some GHz up to optical frequencies.

AREA 4 – ELECTRICAL SYSTEMS: concerns the critical and comparative analysis of control techniques for electrical drives with the development of innovative algorithms, the automation of power systems, with particular reference to the "power quality" in distribution networks, to the "smart-metering" and fault diagnosis in electrical systems.

Computer Engineering

AREA 1 – METHODS AND TECHNOLOGIES OF SOFTWARE: concerns methods of design, examination and evaluation of complex software systems, with further details on formal methods and advanced software architectures.

AREA 2 – MULTIMEDIA AND COMPUTER VISION: concerns the design and implementation of multimedia data processing systems, automatic image and video interpretation, 3D data elaboration, automatic image and video annotation, media search from databases and internet, smart computing and intelligent environments for advanced human-machine interaction, surveillance, robotics.

AREA 3 – ARTIFICIAL INTELLIGENCE AND BIOINFORMATICS: is mainly focused on algorithms and architectures for machine learning, with special emphasis on relational and structured data, kernel methods, neural networks, bioinformatics applications, neuroinformatics, chemioinformatics, image recognition and methods for electronic publishing.

AREA 4 – DISTRIBUTED SYSTEMS AND DATA ENGINEERING: it concerns the study of distributed, parallel and complex processing systems wherein distributed architecture, performance and data complexity issues are integral part of the problem, such as for instance in applications for big data, smart cities, smart clouds, internet-of-things, smart manufacturing, etc.

	Telecommunications and Telematics AREA 1 – ALGORITHMS AND TECHNOLOGIES FOR SIGNAL PROCESSING: concerns processing methods and techniques of mono/multidimensional signals for the extraction of information and the efficiency of their representation in transmission and storage. AREA 2 – TRANSMISSION SYSTEMS: concerns methods and techniques for efficient generation, transmission and disclosure of information through future terrestrial and satellite transmission channels. AREA 3 – TELECOMMUNICATION NETWORKS: concerns methods and techniques for efficient transfer of information from source to destination through complex and advanced communication networks and related communication network applications. AREA 4 – TELEMATICS AND INFORMATION SOCIETY: this cross-disciplinary area involves the applications of ICT technologies considered as key-enabling in different scientific and application domains. It requires a multi-disciplinary background in order to cope with the large variety of services and applications of telematics. The domains of interest include: telecommunications, communication, political and socio-economic sciences including all areas of the "Societal Challenges" of the European programme H2020.
Further information is available at the following web page: http://informationengineering.dinfo.unifi.it/	

EXAMINATIONS SCHEDULE		
	DATE	**TIME**
INTERVIEW	September 11th 2020	10:00 a.m.
The list of the candidates admitted to the interview and the final ranking will be published at the following web page: https://www.unifi.it/p11741.html		