Ph.D. in Emerging Digital Technologies
https://www.santannapisa.it/en/education/international-phd-course-emerging-digital-technologies

Coordinator	Prof. Luca Valcarenghi e-mail info-phdtecip@santannapisa.it	
Language	English	
Duration	3 years	
Curricula	**Embedded Systems**	It focuses on real-time embedded software for safe and secure cyber-physical systems, hardware acceleration of deep neural networks, operating systems, cloud computing, hypervisors, software architectures for a predictable support of machine learning algorithms in safety-critical systems, as autonomous driving and artificial intelligence for industrial systems.
	Photonic Technologies	It focuses on photonic integrated circuits and sensors, optical communication systems and networks, microwave photonics for 5G/6G, photonics for radar and lidar, optical wireless, artificial intelligence in telecommunication networks. Applications span terrestrial, aerial, and space domains.
	Perceptual Robotics	It focuses on human-robot interaction systems, telerobotics and virtual environments, intelligent automation systems and artificial intelligence, mechanical engineering and intelligent machine design, human-robot interaction and wearable robotics, virtual and augmented.
Number of available positions	**n. 5 positions with scholarship, funded by Scuola Superiore Sant'Anna** **n. 1 position with scholarship** funded under Ministerial Decree n. 351/2022 – Mission 4, Component 1, Investment 4. "**Ph.D. in Cultural Heritage**": *candidates should submit a research project on efficient management and development of the Country's enormous cultural heritage seizing the new opportunities offered by the digital transition* At least 2 positions will be assigned to each of the aforementioned curricula. **n. 4 further positions with scholarship funded under Ministerial Decree n. 352/2022 – mission 4, component2 , investment 3.3 of PNRR – "Innovative Ph.D." of which:** • **1 cofinanced by Hitachi Rail STS,** *dedicated to carrying out research activities in the field of Innovative Embedded Systems for Railway Applications;* • **1 cofinanced by Sma-RTy e CNR,** *dedicated to carrying out research activities in the field of Smart and secure communication through Quantum Key Distribution (SMARTQKD).* • **2 cofinanced by National, Inter-University Consortium for Telecommunications, (CNIT),** *dedicated to carrying out research activities in the field of (i) Telecommunications Networks and Systems (ii) Microwave Photonics* .	

ISTITUTO
DI TECNOLOGIE DELLA
COMUNICAZIONE,
DELL'INFORMAZIONE
E DELLA
PERCEZIONE

Scuola Superiore
Sant'Anna

Scholarship amount	**Euro 16,243.00** gross beneficiary paid in deferred monthly instalments. The amount is inclusive of social security charges. In addition, students can take advantage: 26 free monthly meals at the school canteen excluding academic holiday periods, - an increase of € 4.060 gross beneficiary for the period of study and research abroad, subject to the authorization of the Faculty Board, - a budget of € 4.873 to be allocated to cover expenses related to the research activity, - an additional contribution of € 2,200/year as reimbursement for accommodation costs reserved for off-site students to be paid based on Equivalent Economic Status Index (ISEE).
Requirements for participating to the competition (in addition to those under article 2 of the competition notice)	Candidates shall possess specific skills, certified by examinations taken in Bachelor's and Master's programmes, as defined for each curriculum in the *"Sheet of the skills required for admission to the Phd in Emerging Digital Technologies"* attached below. The Assessment Board may admit candidates without some of the required skills to the Ph.D. programme, appropriating debits which must be made up by the end of the first year of the programme.
Online application submission deadline	**June 24th, 2022 (23:59 CEST)**
Mandatory documentation under penalty of exclusion to be attached to the online application	Candidates should attach the following documents (all documents should be in pdf format with files named as specified below): - Passport_Surname_Name.pdf: copy of a valid identity document. Non-EU candidates are required to attach a copy of their passport; - Cv_Surname_Name.pdf: CV (in English or Italian), placing special emphasis on scientific training, professional experience, publications and any other information which can be used to assess the candidate; - Transcripts_Surname_Name.pdf: certificate (in English or Italian) of the exams passed in the Bachelor's and Master's programmes, specifying corresponding credits and the marks received for each of them; - Thesis_Surname_Name.pdf: copy of the MSc degree thesis (or an abstract of the thesis, with a photocopy of the cover page, in English or Italian), and of any other publication deemed useful for the assessment. Candidates who have not yet obtained the qualification should attach a copy of the degree thesis as a final draft or an abstract of it to the application; **only for candidates who obtained their qualification abroad**: copy of the Master's Degree Certificate or equivalent qualification translated into Italian or English unless written in French, German or Spanish; - Research Project_Surname_Name: a detailed research plan in Italian or English of no more than 3000 words. It should be a three-year research plan including details of: - the title of the research; - the scientific premises and relevant bibliography; - the aim and expected results of the research project; - experimental and data analysis methodologies, where necessary. The research plan submitted is not binding for the definition of the research plan to be carried out as part of the Programme;

Additional, not mandatory, documentation	1. References_Surname_Name: up to two letters of reference (in English or Italian), written by university teaching staff who monitored the candidate's education during his/her university studies. The letters of reference shall be uploaded <u>till three days after the deadline of the competition;</u> 2. Other_Surname_Name: any other documents deemed useful for the assessment (for example, GRE certificates, certificates for course and internship attendance, etc.).
Test examinations	**Qualifications and interview** Selection consists of the assessment of the submitted qualifications and an interview. The Board will award a score out of one hundred, from 1 to 100. *Assessment of qualifications – maximum possible score: 70* The Examining Board will assess the CV of studies and any scientific qualifications submitted. The candidate's research plan will be assessed in terms of both quality and feasibility and relevance with respect to the lines of research specified in the "brief description" and "curricula" sections of this information sheet. Those candidates obtaining a score of at least 49/70 in the assessment of qualifications phase will be accepted for interview. The School will publish the list of candidates selected for interview and the relative schedule at: https://www.santannapisa.it/en/education/international-phd-course-emerging-digital-technologies **Candidates are not required to be present during the assessment of qualifications.** *Interview – maximum possible score: 30* The interview will consist in a discussion about the qualifications submitted, in particular the CV, and about the proposed research topics, as well as verification of the level of knowledge of the English language. Candidates obtaining a score below 21/30 in the interview will be excluded from the merit ranking list. The interviews will take place on the premises of the School, in the city of Pisa. In special cases, due also to the current COVID-19 pandemic, subject to the opinion of the Board, the interview may be conducted as a video conference through the platforms available at the School. In this case, the candidate shall specify this choice in the application to take part in the competition, attaching a copy of his/her identity document which should include a clear photograph. The identity document used in the online form should be shown before the start of the test to enable identification of the candidate. Candidates should be prepared to conduct the interview throughout the whole day scheduled in the selection schedule, until their respective interviews take place. In the event of failure or problems with the connection, the Examining Board may decide to postpone the interview to another time, included within the test schedule. It is in any case the candidate's responsibility to make sure that required hardware (PC, webcam) and software are available and that there is a reliable internet connection. The minimum score for being added to the general merit ranking list is 70/100.

	The School will notify only successful candidates of their admission to the School, using the email address given in the application; the said candidates will be required to confirm their acceptance by responding within 7 days, on pain of forfeiture and awarding of the position to the first suitable candidate on the ranking list within the curriculum. If positions are left empty in one of the curricula making up the Programme, the relative scholarships may be assigned to other curricula, according to the ranking list.
Test schedule	The list of the candidates selected for interview, the interview dates, and the general merit ranking list will be published at: https://www.santannapisa.it/en/education/international-phd-course-emerging-digital-technologies
Information	e-mail info-phdtecip@santannapisa.it tel. +39.050.882095

SHEET OF THE SKILLS REQUIRED FOR ADMISSION TO THE PHD
IN EMERGING DIGITAL TECHNOLOGIES

Skills required for the Embedded Systems curriculum:

Basic Calculus
Fundamentals of Physics
Fundamentals of Computer Programming
Computer Architectures
Fundamentals of Digital Circuits
Fundamentals of System Theory
Operating Systems

Skills required for the Photonic Technologies curriculum:

Profilo A – Optical Communication systems and photonic devices	Profilo B – Optical Networks
Advanced Calculus	Advanced Calculus
Fundamentals of Physics	Fundamentals of Physics
Digital Communication Theory	Digital Communication Theory
Fundamentals of Optical Communications	Fundamentals of Optical Communications
Fundamentals of Optoelectronics	Computer Networks
Electromagnetic Fields	Fundamentals of Computer Science
Fundamentals of Computer Programming	Fundamentals of Computer Programming

Skills required for the Perceptual Robotics curriculum:

Profile A – Industrial	Profile B – Informatics
Common requirements:	**Common requirements:**
Elements of Algebra and Analysis	Elements of Algebra and Analysis
Elements of Physics	Elements of Physics
Fundamental of Robotics	Elements of Computer Programming
Check 3 out of 5 from:	**Check 3 out of 5 from:**
Automation and Control	Computer Architectures
Fundamentals of Applied Mechanics	Theory of Dynamic Systems
Fundamentals of Machine Design	Fundamentals of Operating Systems
Fundamental of Electronics or Mechatronics	Signal Theory
Measurement and Data Analysis	Fundamentals of Artificial Intelligence