

Digital Skills for Healthcare Transformation



Student recruitment handbook
(short version) 2023-2026



www.digitalskills4health.eu



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Dear Prospective DS4Health Student,

It is with great pleasure and a profound sense of purpose that I introduce our international Master’s program in Digital Skills for Healthcare Transformation (DS4Health). As the Head of the Department of Intensive Care Medicine, I have witnessed firsthand the rapid evolution of healthcare and the critical role that digital skills play in reshaping our industry. In today’s dynamic healthcare landscape, the need for professionals who possess the knowledge and expertise to harness the power of digital technology is more pressing than ever. We are in a new era of healthcare, characterized by groundbreaking advancements in medical science and an unprecedented level of interconnectedness. Digital technology has emerged as the linchpin in this transformative journey, enabling us to deliver higher quality care, improve patient outcomes, and streamline operations. The DS4Health Master’s program is designed to prepare the next generation of healthcare leaders to navigate and excel in this ever-changing landscape.

This program represents a unique collaboration between leading academic institutions and industry experts across many countries, fostering a rich learning environment that seamlessly integrates theory and practice. By offering a comprehensive curriculum that delves into data analytics, telemedicine, artificial intelligence, and digital health systems, this program equips students with the essential knowledge and skills required to drive innovation and optimize healthcare delivery. The Recruitment Handbook you are holding in your hands is your gateway to understanding the vast opportunities and experiences that await you as a prospective student. It provides a detailed overview of our international DS4Health Alliance as well as the program’s structure, admission requirements, and the caliber of faculty members who will guide you on this transformative journey. I extend my heartfelt gratitude to the dedicated faculty and staff across the DS4Health Alliance who have worked tirelessly to create this exceptional program, and I welcome all those who choose to embark on this transformative journey with us. Together, we can advance healthcare and improve the lives of countless individuals around the world.

Sincerely,

Univ.-Prof. Dr. Gernot Marx, FRCA
Head of the Department of Intensive Care Medicine
University Hospital RWTH Aachen
Coordinator for the DS4Health Project



What is the Digital Health MSc Program About?

What is the Digital Health MSc Program About?



Decision algorithms, electronic health records, personal health applications, telemedicine, and telehealth are just a few examples of the extensive range of healthcare services and products that fall under the umbrella of digital health. Simple scheduling tools to digital treatments that could take the role of drugs, diagnostics, and a number of healthcare interventions are all included in the spectrum of digital health technology. Digital health technology brings fresh, cutting-edge approaches to healthcare while also improving patient outcomes. Digital health tools and services allow patients to become more involved in their own care and to have more autonomy in controlling their own medical condition. Digital tools have the power to alter patient paths, support medical expert decisions, intervention choices, and inter-actor dynamics in therapeutic settings and improve finally quality of life and health economics.



What is the Digital Health MSc Program About?

This **two-year MSc** in Digital Health aims to impart the multidisciplinary knowledge and abilities required to spur innovation in the rapidly expanding field of digital health. The MSc program can be followed in any of the **six countries that form the DS4Health alliance** (www.digitalskills4health.eu), under which the program is created. Students enrolled in this MSc program will have to choose during their application process the University at which they wish to attend the program. The participating Universities are the University Hospital and Medical Faculty at the RWTH Aachen (UKA), the Tel Aviv University (TAU), the Institut Polytechnique de Paris (IP Paris), Universidade NOVA de Lisboa (FCT), the Medical University of Vienna (MUVI) and the University of Ioannina (UOI).

The course leverages each institution's extensive portfolio of globally recognized digital health research by fusing theoretical and methodological know-how with practical clinical practice. Furthermore, acknowledging the multidisciplinary character of digital health, the MSc program leverages the proficiency of academics from several departments within each University, including medicine, social sciences, engineering, computer, and data science.

The Digital Health MSc program **is designed for professionals in their early or later career stages**, as well as students who just graduated, and applicants may come from a variety of fields, such as medicine, medical sociology, psychology, statistics, computer science, and engineering, among others. Embark on a transformative journey with the DS4Health master program, **seamlessly blending theory with hands-on experience in real-world health settings**. Join forces with leading experts from academia and industry in the dynamic field of digital health, fostering collaboration and synergy.

Gain valuable insights into emerging technologies, understanding their impact and unlocking incentives in daily healthcare practices. This program is meticulously designed to empower you with unique skills and competencies, cultivating technical prowess and analytical finesse essential for senior roles in healthcare technology. Completing the DS4Health master program is your key to elevating your career in the healthcare domain, providing the tools and knowledge to thrive in the fast-paced world of digital health.

Shape your future with us!

What is the Digital Health MSc Program About?

DEGREE / DURATION

MSc in Digital Health / 2 years

START DATE

September 2024



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Why choose the “Digital Health” MSc Program?

An alliance of six highly rated European universities

The MSc program is under the umbrella of the **EU’s Digital Europe program within the framework of the Digital Skills for Healthcare Transformation (DS4Health) project**. Each member of the **DS4Health alliance** has its own long-standing history and is ready to provide its expertise to all students that apply for the MSc program.

A global perspective

A **vast ecosystem** of health, industry, academia, and research institutions across Europe provides program participants with internships, hands-on experiences, and site visits. This collaborative endeavour fosters **deeper understanding, sharing knowledge and cultivates connections with individuals and organizations worldwide through networking opportunities**.

Innovative and Agile curricula in Digital Health

The curricula provide **state of the art theoretical knowledge with practical experience** to contribute to the **design, deployment and use of the current and future generation digital technologies in health**. The curriculum is based on a series of compulsory courses in the 1st semester, followed by courses belonging to three elective tracks in the 2nd and 3rd semesters, project/internship in the 3rd semester and the master dissertation in the 4th semester.

Internship possibilities

All six MSc programs within the alliance offer an internship, collaborating with renowned industry partners.

Student exchange ability

The students are able to have access to **different courses** and **Universities** within the DS4Health alliance even when enrolled in another University of the alliance.

Why choose the “Digital Health” MSc Program?

Advance your career as a Healthcare Professional

By choosing this “Digital Health” MSc program, healthcare professionals will bring their training to a higher level, broaden their knowledge on the application of artificial intelligence, wider informatics applications, and their application in healthcare and gain the skills to critically evaluate the evidence of the effectiveness of new technologies in healthcare.

Aim for a career in Digital Health

The program offers an **MSc degree in digital health** aiming to improve higher education and increase the capacity of the training offer for advanced technologies for future healthcare professionals with respect to digital skills and allow the students to comprehend the regulations, governance, and public acceptability of new technologies in healthcare.

Strong industry Partnerships in the EU

Important industry partners are members of DS4Health and will offer their extended expertise, as well as their equipment and facilities, in training the students.

How can I apply?

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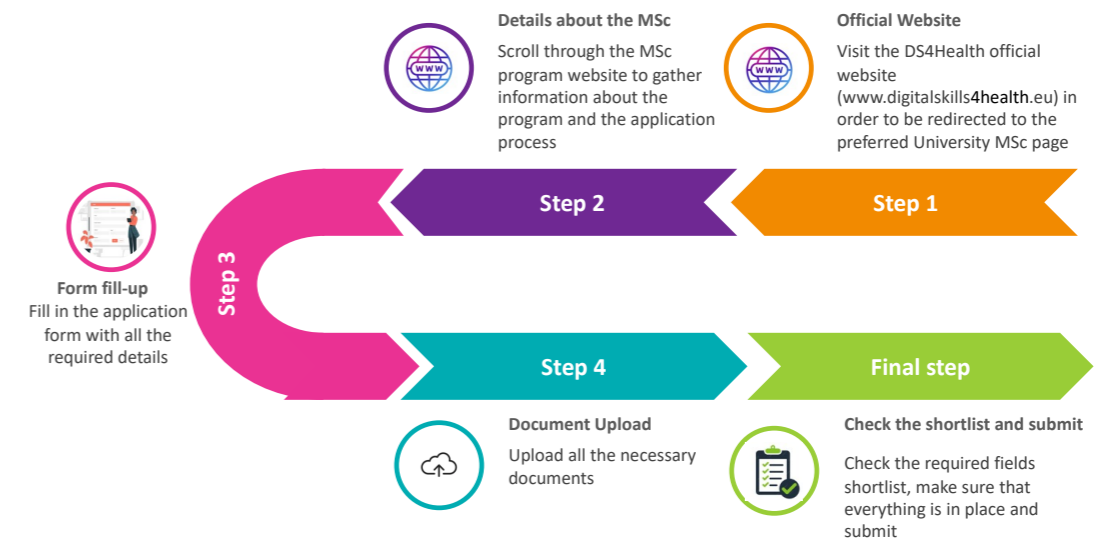
Entry requirements

Degree-level qualifications: Different degree-level qualifications are required by each of the collaborating Universities. Briefly, a BSc degree in Life Sciences, Natural Sciences, Exact Sciences, Medical Sciences, Pharmacology, Communication Disorders, Nursing, Physical Therapy, Occupational Therapy, Polytechnic Schools or School of Economics, depending on the University of interest, is required to apply.

English language level: In order for a student to be eligible to be recruited, a minimum of a B2 level in English is required. However, each University might have other more specific recommendations.

Other qualifications: Other qualifications such as publications or relative working experience might also be considered in cases of equivalent main qualifications and shortage of MSc positions.

Application process



Application Assessment

Your application will only be evaluated in light of your demonstrated academic ability and aptitude, as well as any additional prerequisites for admission listed under that area. The degree-level qualifications and the English language level are the first to be checked upon, followed by the outcome of the interview, depending on the University, which takes place only if the applicant meets or is likely to meet preliminary criteria which mainly refer to eligibility for the MSc Program and completeness of the submitted documents.



How does the program work?

Being a student

As a student in this dynamic and innovative field, you are embarking on a journey that combines cutting-edge technology with healthcare to address the evolving challenges of the digital age.

Each MSc program in Digital Health is divided into three phases. The 1st phase consists of the 1st semester, where the student has to attend the respective compulsory courses which account for a maximum of **30 ECTS**. Then, the student has to **choose** between the three offered tracks (**Track 1**: Data experts in health, **Track 2**: Digital Health Transformation and **Track 3**: Technologies for digital health) which are offered within the alliance.

Each track covers **2 semesters** and attributes a maximum of **60 ECTS**. Each University offers a minimum of two tracks. The final phase of the program includes the **4th semester**, where the MSc **dissertation** is carried out and accounts for **30 ECTS**, resulting to a **total of 90 to 120 ECTS** for the entire MSc program. The course outline throughout the 2-year duration of the MSc programs is depicted in Figure 1.

1 st Semester	2 nd Semester	3 rd Semester	4 th Semester
Compulsory courses	Track 1 Data experts in Health	Track 1 Data experts in Health + Internship/Project	MSc Dissertation
	Track 2 Digital Health Transformation	Track 2 Digital Health Transformation + Internship/Project	
	Track 3 Technologies for digital health (interoperability)	Track 3 Technologies for digital health (interoperability) + Internship/Project	

Figure 1: MSc programs outline

How does the program work?







Tracks	UKA 	TAU 	IP Paris 	FCT 	MUVI 	UOI 
Track 1	✓	✓	✓	✓	✓	✓
Track 2	✓	✓			✓	✓
Track 3	✓		✓	✓		

Figure 2: Tracks offered by each University partner in their MSc program.

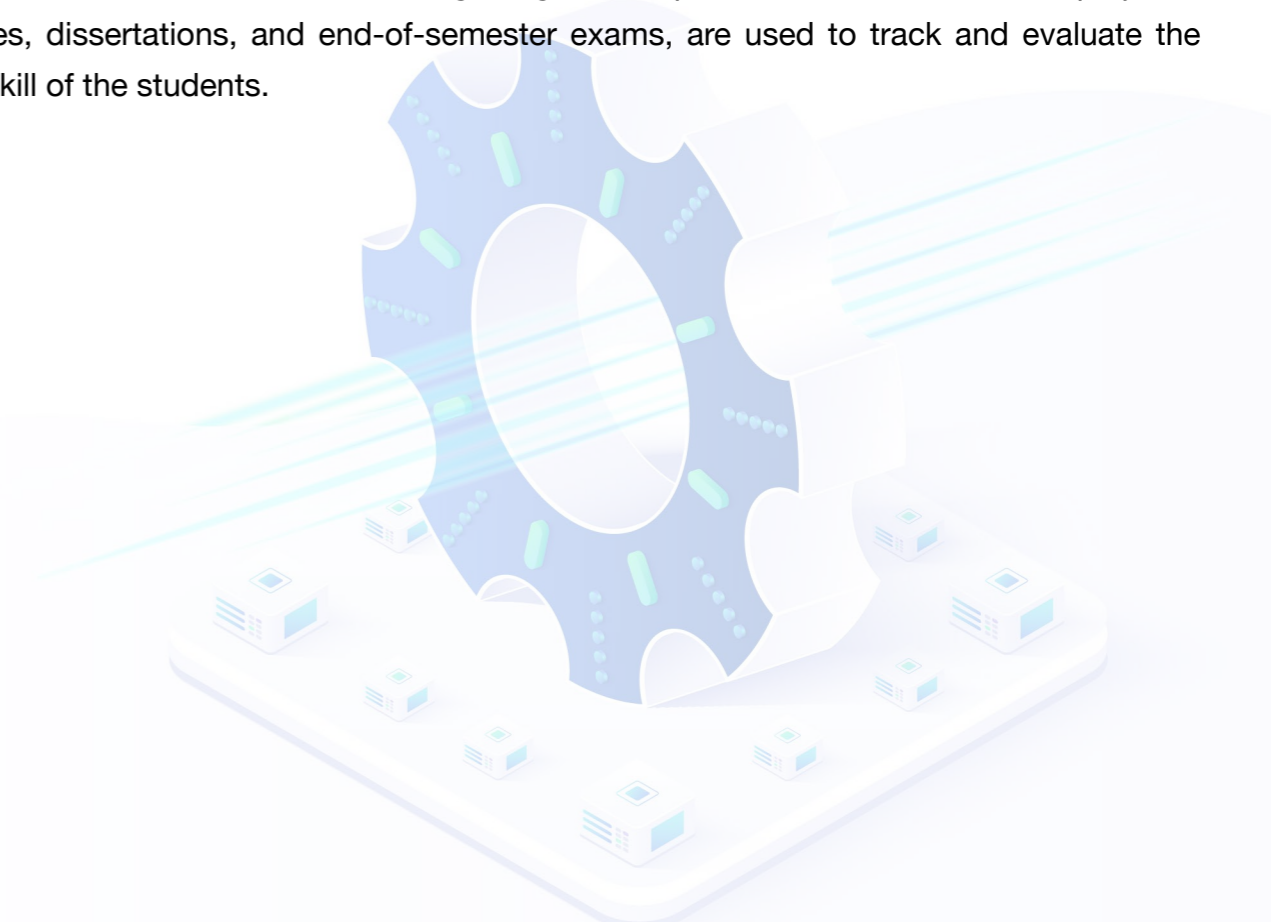
The elective tracks that are offered in each of the six Universities of the alliance are shown in the table below.

*A detailed description of the curriculum of each University is available in the full version of the recruitment handbook and on the website of each MSc Program

**The curriculum can be updated and is subject to change

Student Assessment and Evaluation

A variety of assessment instruments, including assignments, presentations, case studies, projects, online quizzes, dissertations, and end-of-semester exams, are used to track and evaluate the quality and skill of the students.





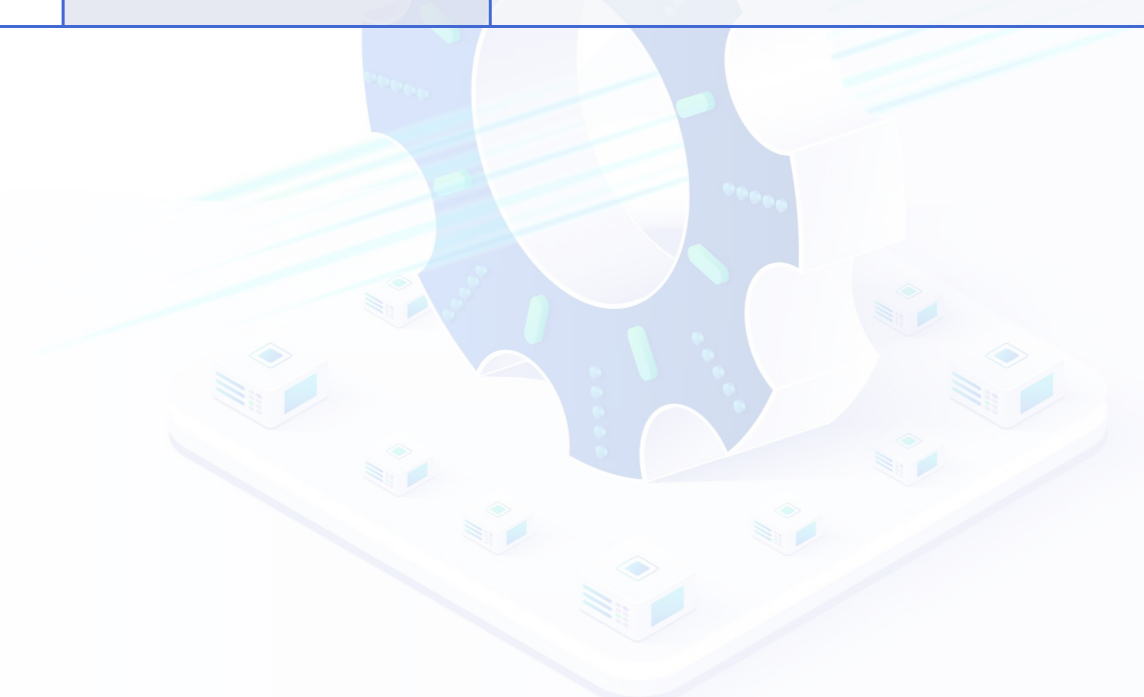
Career Pathway

A student pursuing an MSc in digital health has a variety of job options, including careers in information technology, data science, and healthcare institutions that focus on digital health data. Opportunities for employment are easily found in the public and private sectors. An overview of the areas and scope of work of a digital health specialist is given in the table below.

Key Area	Occupation	Work Scope
Foundation of digital health and informatics	<ul style="list-style-type: none"> › Health Systems & Service Designers › Health System Developer › Clinical Analyst Support Officer › Digital Health Transformation Manager › Data Analytics 	<ul style="list-style-type: none"> › Implement processes and systems to support medical record documentation. › Predict drug interactions, potential side effects, and effectiveness. › Extract meaningful information from patient records. › Use AI-powered bots to answer medical queries and provide virtual health consultations. › Utilize AI to understand health trends in larger populations. › Customize patient care based on individual genetic, behavioral, and environmental factors.
Information and Communication Technologies	<ul style="list-style-type: none"> › Business Intelligence Analyst › Data Model Engineer › Data Engineer › Systems Engineer › IT Support 	<ul style="list-style-type: none"> › Translate business rules into usable conceptual, logical, and physical models and database designs. › Develop AI-driven virtual assistants for customer support, task automation, and information retrieval. › Utilize AI to detect anomalies, intrusions, and potential security breaches in real-time. › Implement AI to optimize the performance, cooling, and energy consumption of data centers. › Drive the evolution of next-generation communication technologies.
Data Science	<ul style="list-style-type: none"> › Health Data Analyst › Health Business Analyst › Healthcare Data Scientist › Data Scientist Executive › Data Analytics › R&D Data Engineer 	<ul style="list-style-type: none"> › Find trends in datasets and develop algorithms to translate the raw data to useful information. › Quantify the statistical reports, fix problems and reconcile data across healthcare systems, making them highly valuable to the healthcare sector. › Conduct preliminary investigations on data to discover patterns, anomalies, or other insights. › Prepare raw data for analysis by removing, imputing, or correcting anomalies and inconsistencies. › Extract relevant information from data and select the most informative attributes. › Develop and train AI models to predict, classify, or cluster data. › Use advanced neural architectures for complex data tasks, such as image or speech recognition. › Ensure that AI model decisions can be understood and trusted by humans. › Use AI and data science techniques to optimize decisions and outcomes.



Key Area	Occupation	Work Scope
Data-driven decision making in healthcare	<ul style="list-style-type: none"> › Researcher › Pharmaceutical companies › Data analyst › Health policy maker › Primary care provider › Regulatory bodies 	<ul style="list-style-type: none"> › Drive new discoveries in digital health. › Innovate software of medical devices. › Use AI to predict clinical trial outcomes and optimize participant selection. › Apply AI techniques to analyze genetic sequences and predict patient-specific responses to treatments. › Use AI to predict disease spread, analyze risk factors, and identify potential intervention strategies. › Deploy Natural Language Processing (NLP) techniques to extract and summarize knowledge from vast medical literatures. › Analyze patient data to optimize treatment pathways and improve outcomes. › Utilize AI to analyze and optimize healthcare systems and policies. › Integrate AI to analyze biological data, from protein structures to cellular pathways.
Healthcare Research, Ethics, and Digital Transformation	<ul style="list-style-type: none"> › Ethical and legal bodies › Security expert › Data analyst › Data engineer 	<ul style="list-style-type: none"> › Understand the ethics, challenges, and methodologies of research in the digital healthcare landscape, ensuring innovation aligns with patient safety and well-being. › Implement ethical considerations in digital healthcare, develop research methodologies for digital health, take care of patient data privacy and compliance (e.g., HIPAA, GDPR), digital health intervention studies, and user experience research in healthcare apps.



MSc program Directors



MSc program Directors



UNIKLINIK
RWTHAACHEN

Prof. Dr. Rainer Röhrig

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Prof. Rainer Röhrig has been head of the Institute of Medical Informatics at RWTH Aachen University Hospital since May 1, 2019. Previously, he was responsible for the Department of Medical Informatics at Carl von Ossietzky University Oldenburg for five years.

Rainer Röhrig first studied computer science and then switched to human medicine. After completing his studies, he worked as a physician and medical informatics specialist.




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Prof. Tal Soffer

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Director of two academic units: Technology and Society Foresight (TSF) and the Center for Web-Supported Academic Instruction - Virtual TAU. She has a Ph.D. in Education and an M.A. in Labor relation from the Tel-Aviv University.

She has an extensive research experience of more than 20 years, in the field of Technology Foresight and its relations with societal implications: education and cyber technologies specialization in e- learning, community learning and Life Long Learning; privacy and cyber technologies; future of work and leisure and it's relation to occupations and skills.

She has been involved in vast of Israeli and EU research projects as principal investigator such as: Future Opportunities of Middle Triole Pupils, OPET, e-Living, NBIC, SSH-FUTUERS and FESTOS projects; and as coordinator of the ELOST project – e-Government for Low Socio-economic Status Groups and the PRACTIS project: Privacy - Appraising Challenges to Technologies and Ethics.

In addition she has consulting experience to policymakers in the Israeli Ministries such as: Ministry of Education, Ministry of Science and technology, Ministry for the development of the Negev and the Galilee and other clients, such as the EU. She is a member in several comities such as: the academic advisory council of World ORT Kadima Mada, FEMIS - Euro-Mediterranean network. She has an extensive amount of publications in Journals and EU reports as well as presentations of papers in conferences papers on various subjects.



Prof. Adriana Tapus
 Director of the Doctoral School of IP Paris
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Adriana TAPUS is Full Professor in the Autonomous Systems and Robotics Lab in the Computer Science and System Engineering Department (U2IS), at ENSTA Paris, Institut Polytechnique de Paris, France.

Since 2019, she is the Director of the Doctoral School of the Institut Polytechnique de Paris (IP Paris). Prof. Tapus serves as one of the member of the Women in Science and Engineering Committee at IP Paris. In 2011, she obtained the French Habilitation (HDR) for her thesis entitled “Towards Personalized Human-Robot Interaction”. She received her PhD in Computer Science from Swiss Federal Institute of Technology Lausanne (EPFL), Switzerland in 2005.

She worked as an Associate Researcher at the University of Southern California (USC), where she was among the pioneers on the development of socially assistive robotics, also participating to activity in machine learning, human sensing, and human-robot interaction.

Her main interests are on long-term learning (i.e. in particular in interaction with humans), human modeling, and on-line robot behavior adaptation to external environmental factors. She worked on various applications going from socially assistive applications for helping people with physical and cognitive impairments (e.g., children with autism, the elderly, people suffering of sleep disorders, people in rehabilitation after a stroke) to autonomous vehicles.

Prof. Tapus is a Senior Editor of International Journal on Robotics Research (IJRR), an Associate Editor for International Journal of Social Robotics (IJSR), an Associate Editor for ACM Transactions on Human-Robot Interaction (THRI), and Associate Editor for Frontiers in Robotics and AI.

She is member of the program and steering committee of several major robotics conferences (e.g., General Chair 2019 of HRI, Program Chair 2018 of HRI, General Chair 2017 of ECMR). Prof. Tapus was the Keynote Speaker at several workshops and conferences. She has more than 200 research publications.



Ricardo Jardim-Gonçalves
 Full professor at NOVA
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Ricardo Jardim-Goncalves is full professor at Universidade NOVA de Lisboa (FCT NOVA). Head for Internacional Relation at FCT NOVA. He is also research Coordinator at UNINOVA – Instituto de Desenvolvimento de Novas Tecnologia.

His research activities have been focused on Interoperability of Complex Systems. He has been researching in European Commission funded projects during the last 30 years, with more than 300 papers published in conferences, journals and books. Member of the board of UNINOVA, 1st in the ranking of H2020 Research and Development project funds management. Also, he directes GRIS (GRupo para a investigação em Interoperabilidade de Sistemas) at UNINOVA (Instituto para o Desenvolvimento de Novas Tecnologias), CTS (Centro para as Tecnologias e Sistemas). He is Expert for the European Commission and project leader in ISO TC184/SC4. Ricardo is graduated in Computer Science, with MSc in Operational Research and Systems Engineering, and has a PhD degree and Habilitation in Industrial Information Systems by the NOVA University of Lisbon.



Prof. PD Dr. Oliver Kimberger
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MSc, MBA is currently working as the interim head of the Department of General Anesthesiology and Intensive Care Medicine at the Medical University of Vienna (since 2023) and as Professor for Perioperative Information Management (since 2021).

He completed a postgraduate study of statistics and biometry at the University of Heidelberg in 2012 (thesis: Meta-Analysis of Method Comparison Studies) and a Health Care Management MBA at the Medical University of Vienna in 2020. He has spent two years as a full-time researcher at the University of Bern, Inselspital. His scientific focus includes microcirculation & fluid management, patient temperature management and patient temperature management technology, big data, artificial intelligence, data science and the digital transformation of medicine.



Prof. Dimitrios I. Fotiadis

FIEEE, FEAMBES, FIAMBE, Prof. of Biomedical Engineering, University of Ioannina / FORTH, Head of the Unit of Medical Technology and Intelligent Information Systems, Editor in Chief IEEE Journal of Biomedical and Health Informatics.

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Prof. Dimitrios I. Fotiadis received the Diploma degree in chemical engineering from the National Technical University of Athens, Athens, Greece, and the Ph.D. degree in chemical engineering and materials science from the University of Minnesota, Minneapolis. He is currently a Professor of Biomedical Engineering in the Department of Materials Science and Engineering, University of Ioannina, Ioannina, Greece, where he is also the Director of the Unit of Medical Technology and Intelligent Information Systems and is also an Affiliated Member of Foundation for Research and Technology Hellas, Institute of Molecular Biology and Biotechnology, Dept. of Biomedical Research. He was a Visiting Researcher at the RWTH, Aachen, Germany, and the Massachusetts Institute of Technology, Boston.

He has coordinated and participated in more than 250 R&D funded projects (in FP6, FP7, H2020, and national Projects), being the coordinator (e.g. INSILC, TAXINOMISIS, HOLOBALANCE, CARDIOCARE, DECODE, etc.) and Technical coordinator (e.g. SMARTOOL, KARDIATOOL, TO_AITION, etc.). He is the author or co-author of several papers in scientific journals and peer-reviewed conference proceedings, and books in the field of Medical Informatics.

His work has been internationally recognized. He is IEEE EMBS Fellow, EAMBES Fellow, Fellow of IAMBE, member of the IEEE Technical Committee of information Technology in Healthcare, Editor in Chief of IEEE Journal of Biomedical and Health Informatics, Member of the Editorial Board in IEEE Reviews in Biomedical Engineering, Associate Editor for IEEE Open Journal in Engineering in Biology and Medicine and Computers in Biology and Medicine. His research interests include multiscale modelling of human tissues and organs, intelligent wearable/implantable devices for automated diagnosis, processing of big medical data, machine learning, sensor informatics, image informatics, and bioinformatics. He is the recipient of many scientific awards including the one by the Academy of Athens. He is the co-founder of PD Neurotechnology Ltd, UK.



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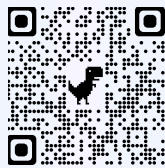
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