University of Applied Sciences and Arts of Southern Switzerland
Department of Innovative Technologies
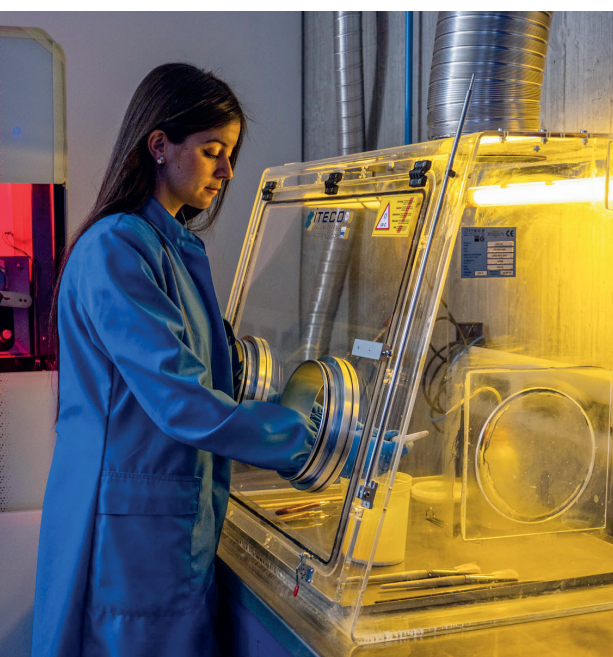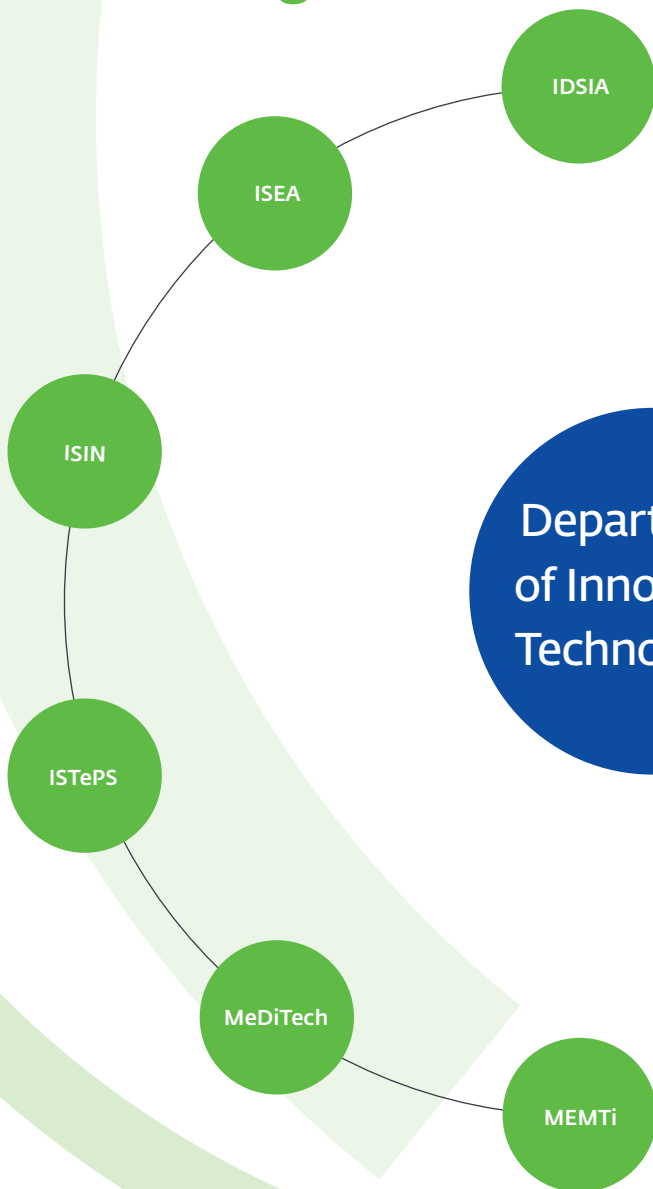
SUPSI

Department of Innovative Technologies
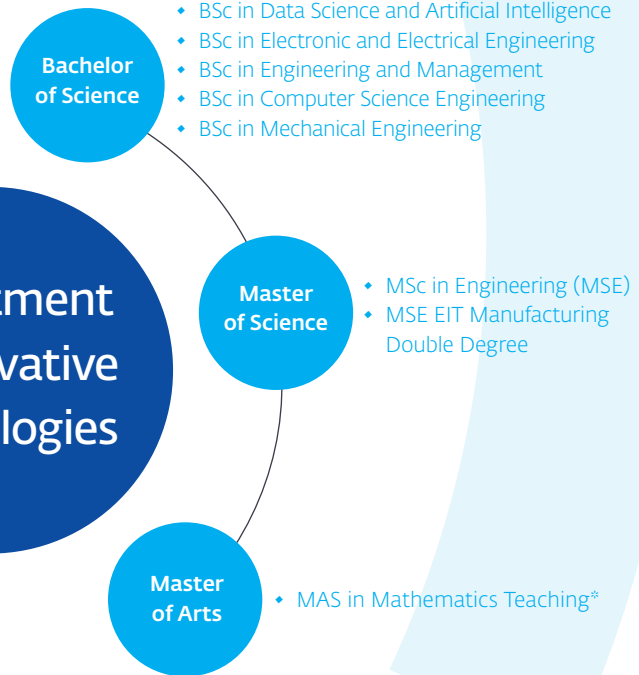*Facts and Figures 2022*

Research, development and knowledge transfer

Undergraduate and Graduate Studies

IDSIA

ISEA

ISIN

ISTePS

MeDiTech

MEMTi

Department of Innovative Technologies

Bachelor of Science
- BSc in Data Science and Artificial Intelligence
- BSc in Electronic and Electrical Engineering
- BSc in Engineering and Management
- BSc in Computer Science Engineering
- BSc in Mechanical Engineering

Master of Science
- MSc in Engineering (MSE)
- MSE EIT Manufacturing Double Degree

Master of Arts
- MAS in Mathematics Teaching*

Continuing Education

- Business Agile
- Data Privacy and Cybersecurity
- Fashion Innovation
- Information Technology and Digitization
- Industrial Engineering
- Project Management

CAS

MAS

DAS

IDSIA USI-SUPSI	Dalle Molle Institute for Artificial Intelligence USI-SUPSI
ISEA	Institute of Systems and Applied Electronics
ISIN	Institute of Information Systems and Networking
ISTePS	Institute of Systems and Technologies for Sustainable Production
MeDiTech	Institute of Digital Technologies for Personalized Healthcare
MEMTi	Institute of Mechanical Engineering and Materials Technology
MAS	Master of Advanced Studies
DAS	Diploma of Advanced Studies
CAS	Certificate of Advanced Studies

*The Master of Arts in Mathematics Teaching is offered in cooperation with the Department of Education and Learning/University of Teacher Education (DFA/ASP)
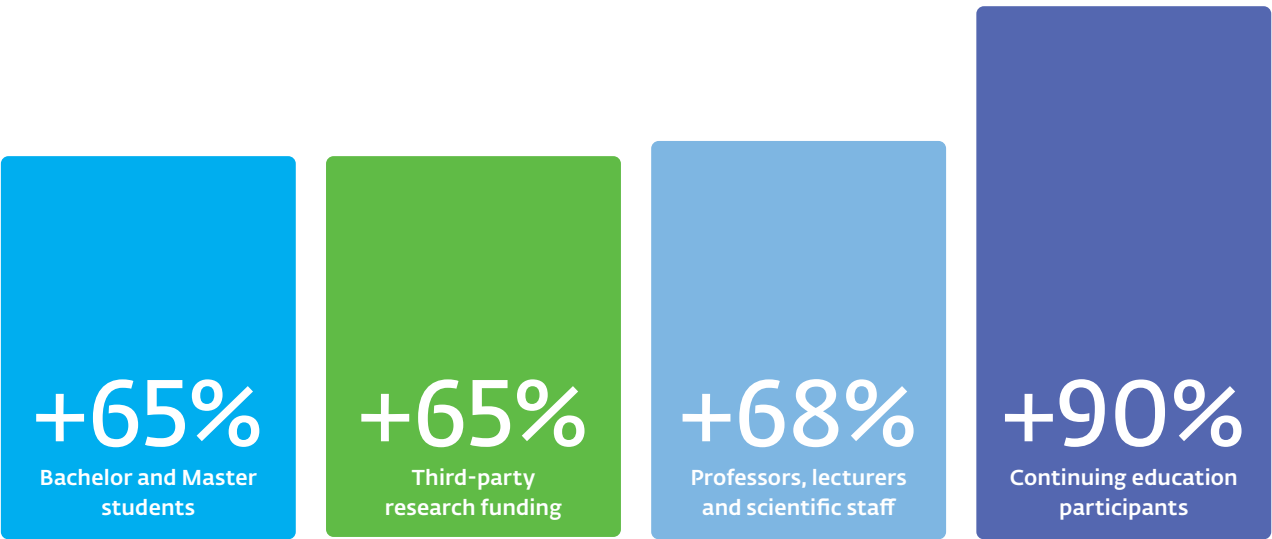
Our organisation

"

At SUPSI's Department of Innovative Technologies, we thrive on vibrant dynamism and continual innovation. Our institutional mission is a beacon of growth, spanning from academic programs to pioneering research and development. Our faculty tirelessly develop relevant, engaging curricula, while our researchers collaborate on groundbreaking projects with partners locally and globally, embodying our daily commitment to shaping the future.

Prof. Milena Properzi, PhD
*Director of the Department of Innovative Technologies*

+65%
Bachelor and Master students

+65%
Third-party research funding

+68%
Professors, lecturers and scientific staff

+90%
Continuing education participants

Data from 2016/17 to 2022/23.

The Department in figures

928 Bachelor and Master students

392 Participants in Continuing Education certificate courses

371 Staff members
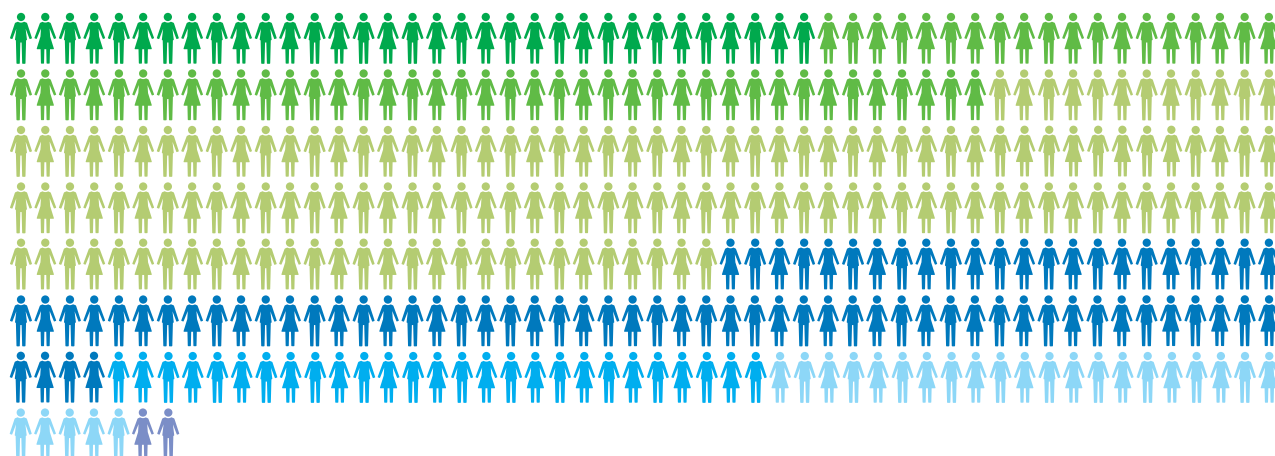
- ● 33 Professors
- ● 59 Lecturers
- ● 145 Researchers
- ● 79 Assistants
- ● 27 Administrative and technical staff
- ● 26 PhD students
- ● 2 Apprentices

6 Research institutes

20+ Specialised technology laboratories
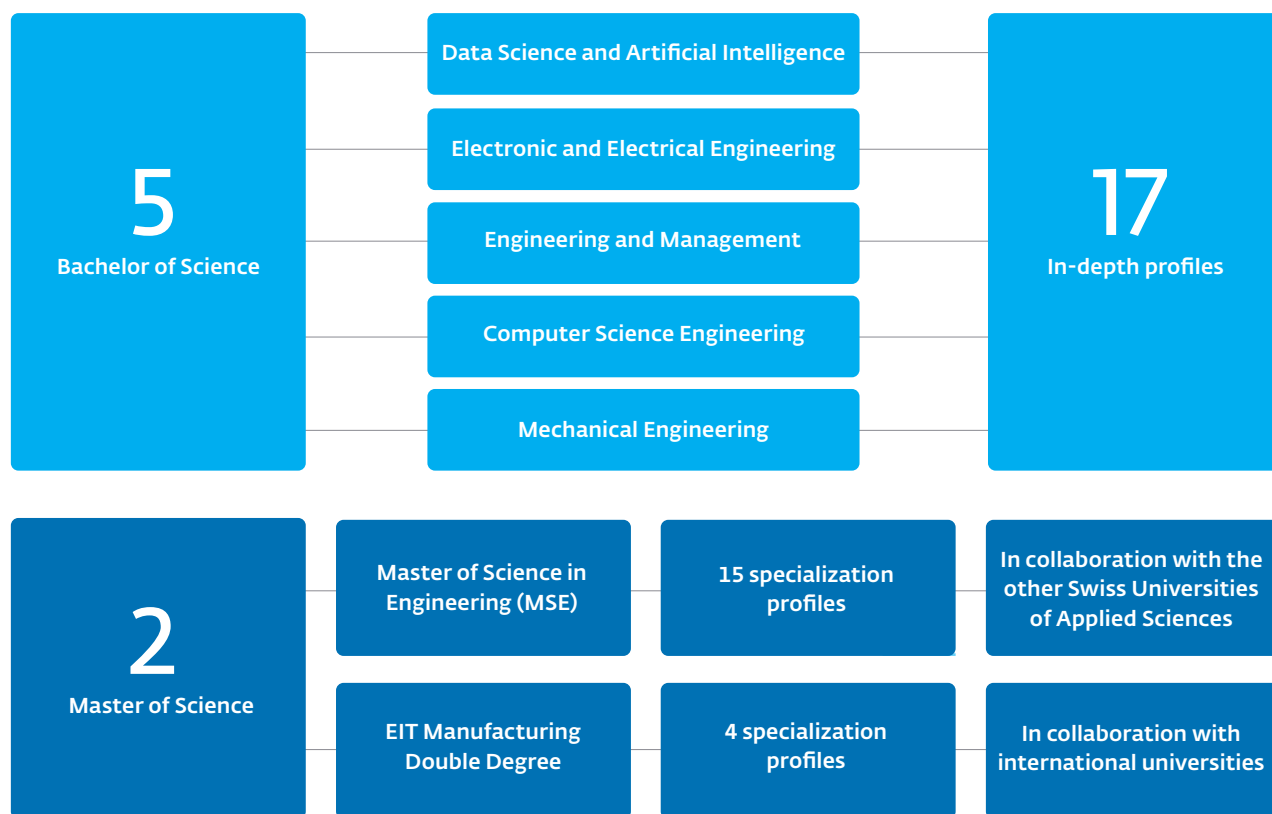
23+ million CHF financial turnover for research

240+ Research projects

Costruisci il tuo futuro
scopri il dipartimento
tecnologie innovative

Undergraduate and Graduate Studies

Head: Prof. Andrea Graf

5
Bachelor of Science

- Data Science and Artificial Intelligence
- Electronic and Electrical Engineering
- Engineering and Management
- Computer Science Engineering
- Mechanical Engineering

17
In-depth profiles

2
Master of Science

| Master of Science in Engineering (MSE) | 15 specialization profiles | In collaboration with the other Swiss Universities of Applied Sciences |
| EIT Manufacturing Double Degree | 4 specialization profiles | In collaboration with international universities |

	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total enrolled / Bachelor	453	508	542	563	583	666	705
Total enrolled / Full-time	388	445	468	484	507	574	603
Total enrolled / Parallel to professional activity	65	63	74	79	76	92	102

Evolution of DTI student numbers. Figures from 2016/17 to 2022/23.

	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total enrolled / Master	109	126	137	166	180	215	223

Evolution of DTI student numbers. Figures from 2016/17 to 2022/23.

16/17   17/18   18/19   19/20   20/21   21/22   22/23
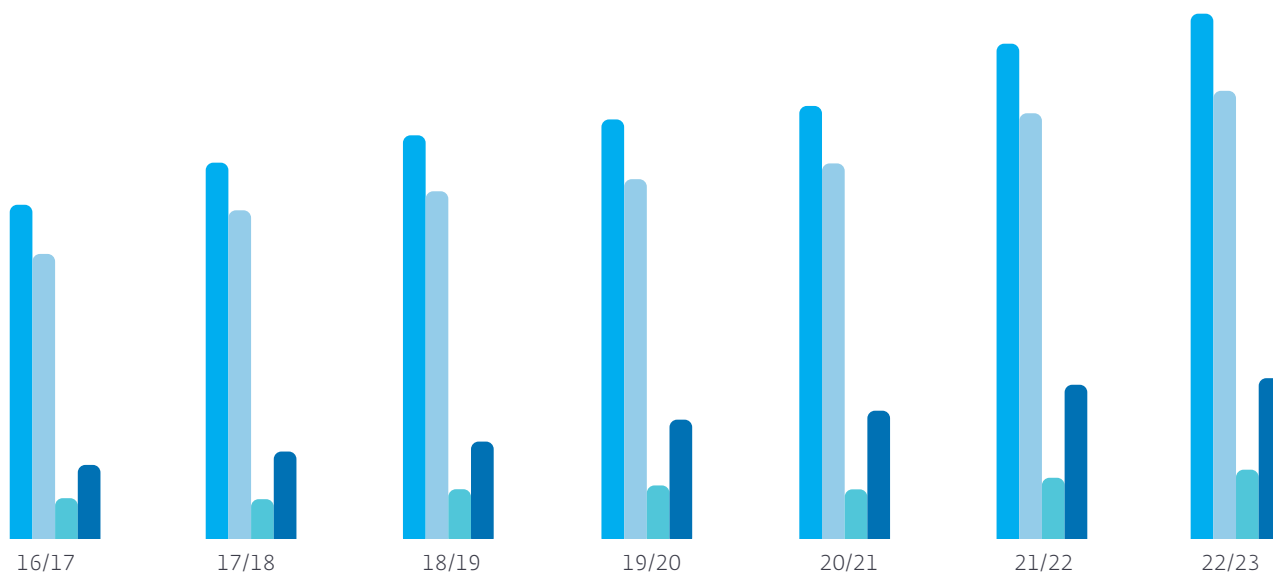
Theses in collaboration with industry

Every year, more than 80 Bachelor's and Master's theses are conducted in cooperation with local companies and institutions.

Some of our partners:

And many more.

Continuing Education

Head: Eng. Antonio Bassi

18	2	5
Certificate of Advanced Studies	Diploma of Advanced Studies	Master of Advanced Studies

9	130	52
Tailor-made courses for companies	Advanced Short Courses	Webinar

	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total participants in certifying courses	206	286	190	278	402	404	392
Total participants Advanced Studies (10 to 60 ECTS)	167	159	173	265	224	238	287
Total participants Advanced Short Courses (1 to 9 ECTS)	39	127	17	13	178	166	105

Evolution of the number of participants. Figures from 2016/17 to 2022/23.

	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total webinar and conference participants	568	646	593	2937	1680	1451	1265

Evolution of the number of participants. Figures from 2016/17 to 2022/23.

Graduation ceremony Continuing Education 2022.
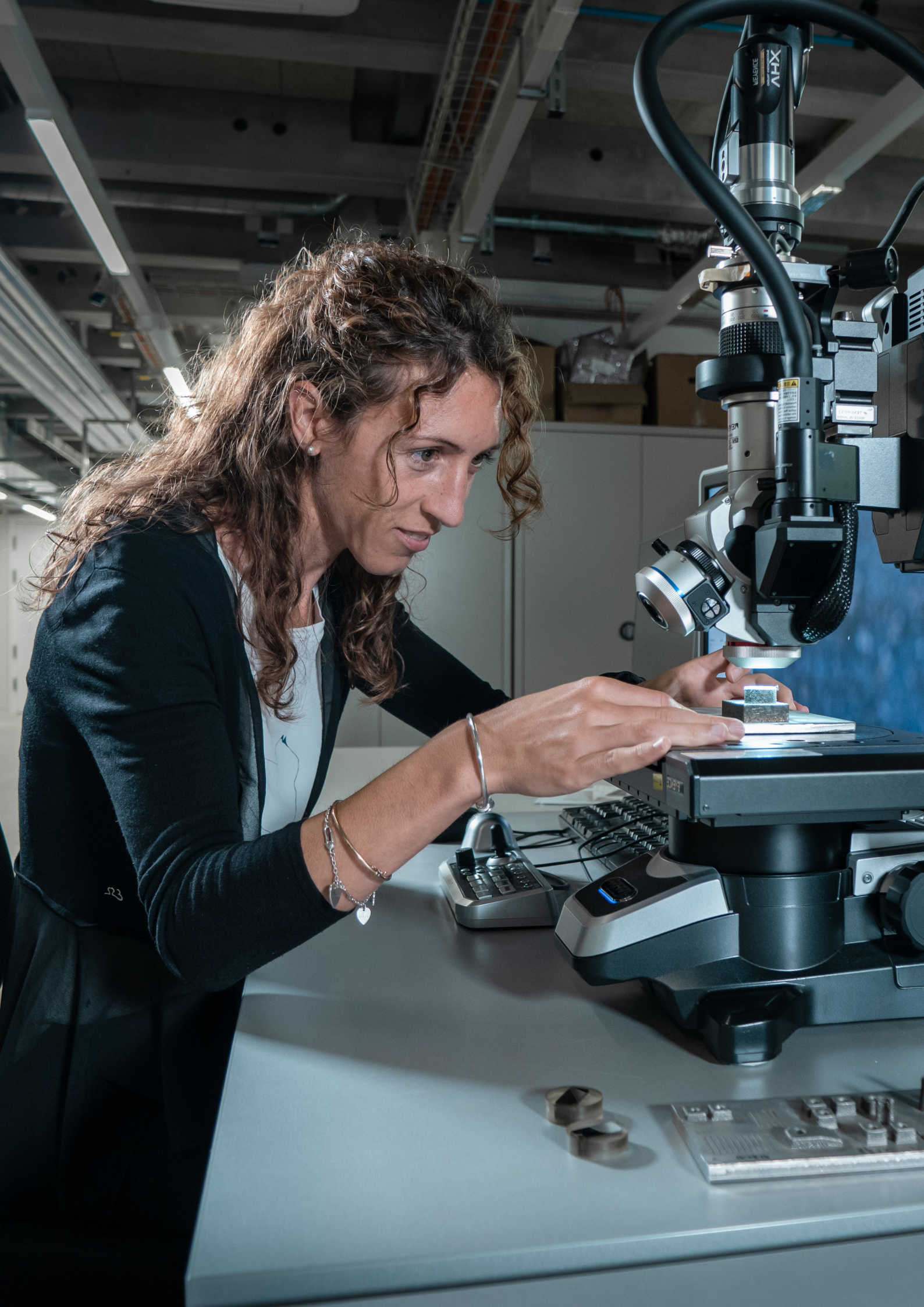
Applied Research

Head: Prof. Federico Bosi, PhD

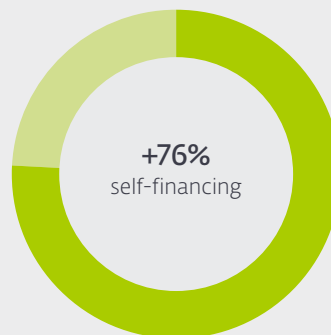| 340+ Researchers and professors | 6 Research institutes | 20+ Laboratories | East Campus Lugano-Viganello and Balestra Building |

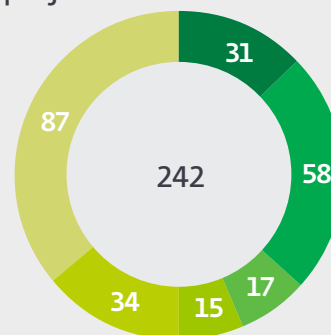**Technological research to support the local business and innovation system**

Budget 2022

+76% self-financing

CHF 23.5 million Research budget

534 Partnerships with private and public companies

150+ Publications

5-10 Patents

+70% New projects compared to 2018

110

Current projects

242

- 31
- 58
- 17
- 15
- 34
- 87

● Other EU agencies and foundations
● EU
● SNSF
● Internal SUPSI
● Research Mandate
● Innosuisse

724 research partnerships

| Universities and research centres | 85 | 103 | 2 | 190 |
| Private and public companies | 169 | 365 | | 534 |

National partnerships with public and private companies
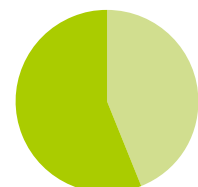
■ Ticino: 95
■ Other cantons: 74

242 projects

Ticino	Switzerland	Europe	Non-EU countries
170 70%	37 15%	34 14%	1 0.4%

Geographical distribution of research projects.

Main areas of research

- Artificial intelligence
- Computer science
- Production and manufacturing engineering
- Electronic systems
- Medtech
- Other
- Education
- Robotics
- Energy
- Materials science

19%
19%
15%
10%
10%
9%
5%
5%
5%
3%
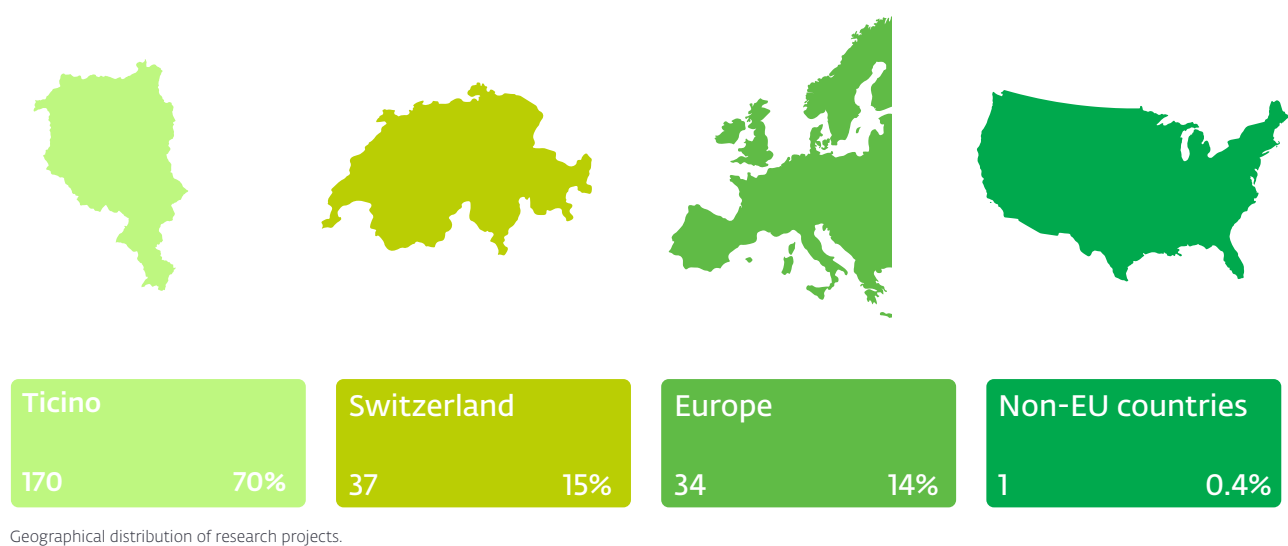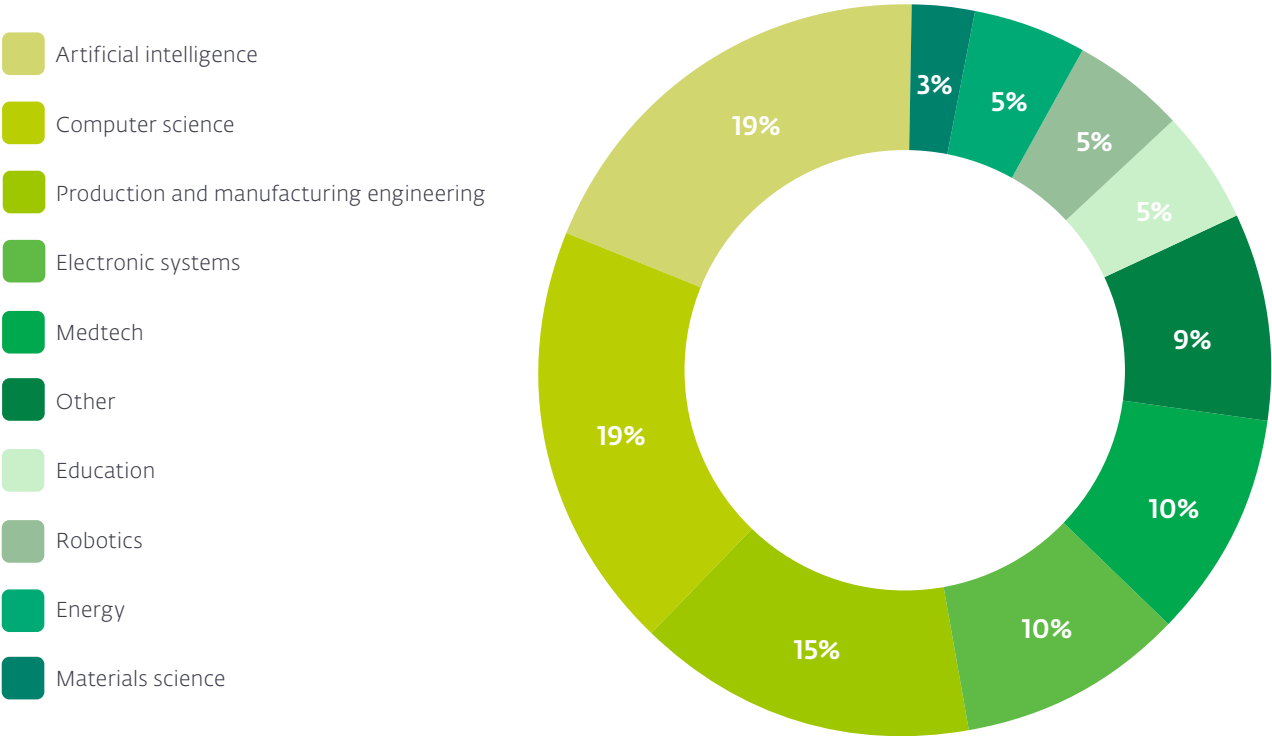
Institutes and research areas

Dalle Molle Institute for Artificial Intelligence USI-SUPSI
Director: Prof. Emilio Rizzoli, PhD

IDSIA

- Machine learning
- Intelligent control for systems and networks
- Natural language processing and information retrieval
- Computational geometry and computer vision
- Autonomous robotics
- Theory and algorithms

Institute of Systems and Applied Electronics
Director: Prof. Eng. Andrea Salvadè

ISEA

- Digital electronics, microelectronics and bioelectronics
- Analogue and radio frequency electronics, telecoms and imaging systems
- Power and applied energy electronics
- Mechatronic systems
- Precision microtechnical systems
- Applied photonics and optoelectronics

Institute of Information Systems and Networking
Director: Prof. Tiziano Leidi, PhD

ISIN

- Advanced human-machine interaction
- Audiovisual processing and immersive multimedia
- Cloud and distributed systems
- Data engineering, analysis and processing
- Educational technology and open data
- Reliable and secure computer networks

Institute of Systems and Technologies for Sustainable Production
Director: Prof. Marco Colla

ISTePS

- Digital transformation of production systems
- Industrial sustainability
- Industrial robotics
- Systems and technologies for laser machining processes and additive manufacturing

Institute of Digital Technologies for Personalized Healthcare
Director a.i. (rotating):
Francesca Faraci, PhD
Eng. Alessandro Puiatti
Igor Stefanini, PhD

MeDiTech

- Biomedical Signal Processing
- Digital Health
- Medical Devices

Institute of Mechanical Engineering and Materials Technology
Director a.i.: Prof. Maurizio Barbato, PhD

MEMTi

- Polymer Engineering
- Mechanical Engineering
- Hybrid Materials
- Computational Materials Science
- Thermo-fluid Dynamics

Research explained

Dalle Molle Institute for Artificial Intelligence (IDSIA USI-SUPSI)

Artificial intelligence to predict the taste of food

The Dalle Molle Institute for Artificial Intelligence USI-SUPSI is an academic partner in the VIRTUOUS project (Virtual tongue to predict the organoleptic profile of Mediterranean ingredients) for the prediction of the organoleptic properties of foods in the Mediterranean diet from their molecular composition.

Often taken for granted, of the five senses, taste is one of the most fascinating: while it is possible to agree on the taste of sweet, bitter or salty foods, different perceptions are triggered by various foods, influenced by genetic, social and cultural variables. Thanks to the complex mechanism of taste perception, nutrition becomes not only a necessity, but also a pleasure.

VIRTUOUS is an international research project within the European Marie Curie programme for the realisation of an 'artificial language' capable of predicting the organoleptic properties of food, such as taste, from its molecular composition.

Launched in 2019 under the coordination of the Politecnico di Torino, the four-year project involves eight industrial and academic partners from Italy, Greece, Spain and Switzerland. Multidisciplinary in nature, it combines different research areas such as chemistry, molecular modelling, neuroscience, artificial intelligence, biophysics and bioinformatics.

In this context, the contribution of the Dalle Molle Institute is twofold. "At the molecular level, we deal with the physical and chemical study of molecules, the reception mechanisms by cellular targets located on the tongue and palate, and the processes for determining the different taste sensations,' explains **Gianvito Grasso**, Biomedical Engineer and Researcher at IDSIA. "We are also interested in understanding the pathway and interactions of these molecules within the body."

On the other hand, from the point of view of artificial intelligence, models are created that make it possible to predict the organoleptic properties of foodstuffs from the molecules that make them up.

"Our AI models are not black boxes; they are explainable and interpretable," emphasises **Dario Piga**, Senior Researcher at IDSIA. "This means that they allow us not only to predict the characteristics of the molecules that determine taste, but also to explain and interpret how they work."

Compared to the Swiss partners, VIRTUOUS also sees the involvement of the Ticino company Missing Tech for the development of the software architecture that will house the molecular models and artificial intelligence algorithms developed during the project.

"We are happy to be able to provide the project with our experience in building cloud-based software platforms, as well as being able to host researchers from the international working group. With the team at the Dalle Molle Institute, an excellent connection was immediately established, and the technical integration between the purely scientific part and the software infrastructure we are developing is very promising," says Emanuele Mottola, founder and CEO of Missing Tech.

The project involved the realisation of AI models for the preselection of taste molecules with reference to sweet and sour, while the molecular analysis also covers the receptors for the perception of saltiness.

At this stage, the researchers are focusing on the study of oil and wine, foods typical of the Mediterranean diet and susceptible to significant taste alterations when subjected to small molecular modifications. In order to verify the accuracy of the algorithmic visions and train the artificial intelligence, a group of expert tasters has also been appointed to assess the actual sensations perceived.

Looking forward, the project aims to extend the pre- vision capacity of AI algorithms to be able to understand, given a molecule of any food, whether it is sweet, bitter or salty. This could have important spin-offs in various fields, such as health and wellness for the preparation of balanced and tasty diets, but also in neuroscience for the study of the mechanisms of brain processing of taste and related sensations.

An interesting field of application then concerns the possibility of developing new foods by combining the functionality of certain molecules with the taste of others, e.g. combining the properties of milk and its high calcium content with the tasty flavour of junk food.

Not least, through VIRTUOUS, it will be possible to establish a closer relationship with the local area: once the molecule responsible for a certain taste has been identified, it will be possible to choose it from indigenous products, generating a positive impact on the local economy.

Institute of Systems and Applied Electronics (ISEA)

Applied research in the service of REGA

The Institute of Applied Systems and Electronics (ISEA) and DOS Group developed a people search device acquired by Swiss Air Rescue (REGA).

ArvaDOS and ArvaDOS2 are two research projects funded by Innosuisse, led by the ISEA Institute and the Ticino-based IT company DOS Group, which aim to develop portable equipment for rescuing missing persons.

"Through ArvaDOS, we were able to design and create, with state-of-the-art telecommunication technology, a device that will further facilitate life-saving operations and more," explains **Samuel Poretti**, Head of Scientific Area Analogue Electronics and Radio Frequency, Telecommunication and Imaging Systems ISEA and head of the project. "The product developed is an example of how new technologies can improve activities that, like rescue operations, have always existed."

And precisely because of its innovation, the device developed within the framework of these projects was recently acquired by Swiss Air Rescue (REGA) with the aim of creating new solutions for the rescue and emergency world.

"This is a virtuous example of successful university-business collaboration: through the two Innosuisse projects Arva-DOS and ArvaDOS2, ISEA engineers developed a unique electronic system that today gives rise to an innovative and revolutionary product for the search, rescue and helicopter rescue sector," continues Prof. **Andrea Salvadè**, Director of the ISEA Institute. "With the newly completed venture, DOS Group is handing over a project developed in cooperation with SUPSI to REGA. It is with great satisfaction that thanks to Innosuisse funds and SUPSI we were able to work on a new device to bring to market," concludes **Stefano Doninelli**, President of DOS Group. "REGA considered the ArvaDOS solution innovative and with great potential for use in various fields."

Institute of Information Systems and Networking (ISIN)

Blockchain in the international cotton market

ISIN is participating in the Traceability for Sustainable Garment and Footwear project launched by the United Nations (UN) as part of the United Nations Economic Commission for Europe (UNECE) platform for the use of blockchain in the management of traceability and transparency in the global cotton market.

Many sectors are confronted with the need to improve the transparency and traceability of their supply chain. This makes it possible to manage value chains more effectively, to identify human rights and environmental violations, but also to combat counterfeiting and support more sustainable production and consumption patterns.

"Through blockchain technologies, the *Traceability for Sustainable Garment and Footwear* project aims to create trust and transparency on commercial transactions between the different partners in the field," explains **Giacomo Poretti**, Senior Lecturer-Researcher at ISIN. "In the same way, it also aims to support relations with certifying bodies that ensure that individual companies maintain the quality required by the industry for the development of certain materials or products."

At present, the developed system is used by a hundred or so companies in around 30 countries, but the intention is that an industrial model will soon be created that can cover the international market in various economic sectors in such a decentralised manner.

Since January 2022, the project has entered a new phase: instead of the manual data input that characterised the first phase, the aim is now to automate the procedure by means of programmed interfaces within the management sites of the individual companies.

The experience gained and the positive results obtained during the first phase of the project have also aroused interest at a local level. The Ticino State Council, through the Department of Finance and Economy (DFE), has commissioned the Institute of Information Systems and Networking to coordinate a pilot project for the use of blockchain in the Ticino PDO alpine cheese supply chain, with the aim of giving certified producers the opportunity to validate their certification through a new digital procedure.

"Blockchain is a fast-growing sector: more and more companies and institutions are interested in developing pilot projects that can exploit the potential offered by these new technologies," explains Poretti. "At the moment, ISIN is involved in several projects on the topic of blockchain, financed by Innosuisse, to which direct mandates and thesis projects are also added. This shows that our students, the software engineers of tomorrow, are also paying more and more attention to this topic."
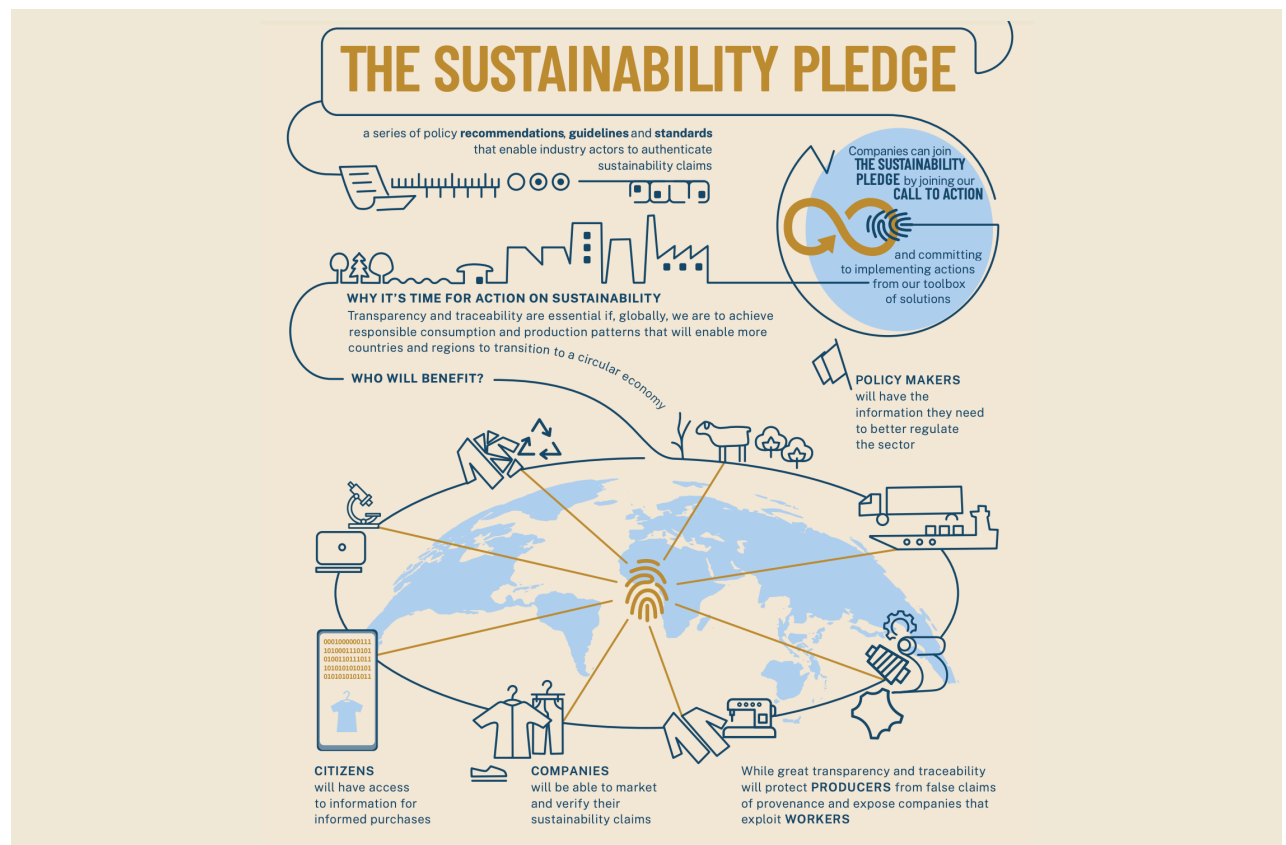
Institute of Systems and Technologies for Sustainable Production (ISTePS)

Innovation in SMEs between risk and growth opportunities

Andrea Barni, Senior Researcher at ISTePS, presented the results of the Interreg RISICO Project on Innovation in Small and Medium-sized Enterprises.

Many sectors are confronted with the need to improve the transparency and traceability of their supply chain. This makes it possible to manage value chains more effectively, to identify human rights and environmental violations, but also to combat counterfeiting and support more sustainable production and consumption patterns.

The Department of Innovative Technologies is the Swiss lead partner in the RISICO (Rete Integrata di Servizi per l'Innovazione e la Competitività - Integrated Network of Services for Innovation and Competitiveness) project, developed within the framework of Interreg, the Italy-Switzerland cross-border cooperation programme.

"The 30-month project (2019-2021) involved 40 SMEs active in the area of the canton of Ticino and the Italian provinces of Milan, Varese and Como in an analysis of the strengths and weaknesses of their innovative processes,

and then implement accompanying plans and training paths to improve their performance," explained **Andrea Barni**, Senior Researcher at ISTePS.

The results confirmed some of the critical issues typical of innovation processes in small and medium-sized enterprises, such as difficulties in raising finance and the lack of internal structures dedicated to innovation management.

Among the strengths that emerged from the analysis, the importance of the company's openness to the outside world stands out. "Companies that 'contaminate' themselves and look outside their own walls for inspiration and support for innovation are more likely to integrate product and process innovation into their business and generate concrete spin-offs," the researcher concludes.

Robotic systems for hostile environments: the AVANGARD project and the revolutionary UMA platform

The Automation, Robotics and Machine Laboratory (ARM) at ISTePS is collaborating on the European project Advanced manufacturing solutions tightly aligned with business needs (AVANGARD) for the design of robotic systems capable of operating in hostile environments.

The European project AVANGARD, funded by the Horizon2020 Research and Innovation Fund, was set up in response to the demands of the 'inspection and repair' industry for the design of robotic systems capable of operating in environments and conditions hostile to humans.

Developed by the ISTePS Institute in collaboration with 22 international industrial and academic partners, AVANGARD aims to achieve two main objectives: to speed up maintenance operations, ensuring 24/7 operation, and to reduce the risk of injury to operators. As part of the project, the Automation, Robotics and Machine Laboratory (ARM) has developed UMA (Universal Maintenance Automata), a totally innovative robotic platform able to move and operate on vertical surfaces by being equipped with different tools and processing technologies.

"The UMA platform represents the first mobile robotics solution designed and built entirely within the ARM Lab. In particular, we have developed the mechanical architecture of UMA, enhancing it with sensors capable of recognising the environment and operating in particularly hostile contexts in order to undertake complex decision-making processes," says Prof. Dr. **Anna Valente**, Head of the Automation, Robotics and Machine Laboratory.

"Thanks to the scale replication of various application contexts, such as vertical surfaces with variable geometry in metal or concrete, both smooth and shaped, we are able to test the performance of UMA and assess its reliability," explains **Ivan Brugnetti**, ARM Researcher. "Looking ahead, the goal is to estimate the scalability potential of this application in new industrial contexts and in an increasing number of use cases."

"Compared to state-of-the-art platforms whose use is limited to inspection operations, UMA can also perform measurement and maintenance work (e.g. rust removal, sandblasting, brushing, spraying of protective coatings and painting)," concludes **Diego Gitardi**, ARM Researcher.

In the course of 2021, the UMA platform won numerous industrial and scientific awards, including the Swiss DINNO Award, a prize awarded annually to the best Swiss projects for the digital modernisation of products, services or processes.
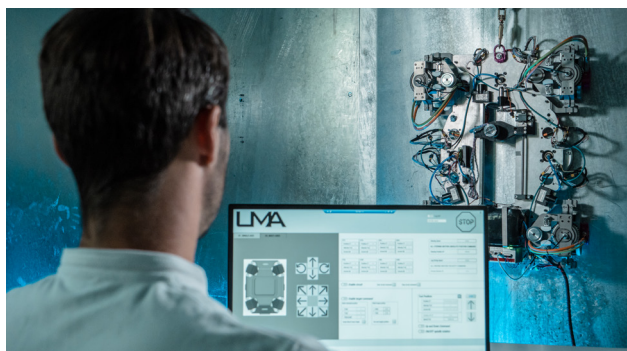
Institute of Digital Technologies for Personalized Healthcare (MeDiTech)

Artificial intelligence for the characterisation of sleep phases

Sleep disorders are an important and growing public health problem affecting a considerable part of the world's population in need of medical care. The Eurostars project 'Sleep Physician Assistant System (SPAS)' aims to create a platform that supports and optimises the work of health professionals active in the analysis of sleep disorders. The project was initiated in cooperation with the NeuroTec Centre of the Swiss Institute for Translational and Entrepreneurial Medicine (Sitem-insel), the Sleep-Wake-Epilepsy-Centre of the Inselspital, University Hospital of Berna, and two companies active in the fields of MedTech (Relitech, The Netherlands) and Data Science (Biomax Informatics, Germany).

The study of such disorders is made possible by polysomnography (PSG): an ad hoc examination that allows a series of physiological parameters to be recorded during the night, such as brain activity, eye movements, muscle movements, oxygen levels, heartbeat and respiration.

For decades, numerous AI algorithms have been developed to automate the scoring of PSG, i.e. the extraction of clinically relevant information from physiological signals according to official standards.

Recently, thanks to increased computing power, deep learning has also been employed with promising results, highlighting the other capabilities of learning from a highly heterogeneous data set.

The Biomedical Signal Processing (BPS) research group led by Francesca Faraci of the Institute of Digital Technologies for Personalized Healthcare (MeDiTech), the Sleep Centre of the Inselspital Bern, the University of Bern and the NeuroTec Centre of sitem-insel (Swiss Institute for Translational and Entrepreneurial Medicine) have been working together for several years. In this context, various publications and the EU project SPAS, Sleep Physician Assistant System, were created to create a platform to support and optimise the work of healthcare professionals involved in the analysis of sleep disorders.

As part of this research, **Luigi Fiorillo** and **Giuliana Monachino**, a researcher and doctoral student at MeDiTech, carried out numerous tests using access to InselSpitalBern's large database and the clinical support of the renowned sleep centre, achieving excellent performances.

The study, co-funded by the State Secretariat for Education, Research and Innovation (SERI) and the European Union, it demonstrates the resilience of a deep learning algorithm in identifying different sleep phases. Specifically, it shows how a deep learning algorithm can solve a clinical procedure using information (derivations of physiological signals) that differs from that normally used by a sleep physician. This study is the result of analyses performed on the highest number of PSGs ever used to date in the published literature.

Institute of Mechanical Engineering and Materials Technology (MEMTi)

A new sustainable material for making toys

The MEMTi Institute and the company Geomagworld in Novazzano, with funding from Innosuisse, are collaborating to produce 'csi', a recycled plastic material to be used in the production chain of Geomag toys.

Sustainability is now a key concept on the political, social and economic agendas both nationally and internationally.

In this regard, Prof. **Andrea Castrovinci**, Head of the Polymeric Materials Engineering Laboratory, and Filippo Gallizia, CEO of Geomagworld, are working on the creation of XI (from the Greek ΞI, 'csi'), a recycled plastic material to be introduced into Geomag's production chain.

"XI is a recycled plastic, made from the cellular fibres of wood, i.e. wood waste from lumber mills or forest maintenance activities," Castrovinci explains.

The project also saw the involvement of **Alessandro Fontana**, Senior Lecturer-Researcher at the ISTePS Institute, in the realisation of an analysis of the environmental impact (Life Cycle Assessment) of XI production. "The analysis considered several environmental aspects, including water consumption, ozone depletion potential (ODP) and global warming potential (GWP). The results show that the life cycle of XI leads to a reduction in the environmental impact of these indicators compared to currently used materials," the researcher said.

Last but not least, this new material also meets the criteria of the EN71 standard, which regulates the safety requirements for the manufacture of materials for the toy industry, such as resistance to breakage or the absence of chemical additives. Once certified, XI will progressively be used within Geomag's production chain.

"Geomag products are appreciated for the educational value of their play activities; this commits the company to do its utmost to respect the ecosystem in which we live. Together with SUPSI, we have taken a major step forward on the path towards reducing the environmental impact of our industrial activity, and at the same time we are certain that we have gained some standing in that competitive model called 'circular economy'," says **Filippo Gallizia**, General Manager of Geomagworld.

Ceramic structures for thermochemical heat storage, the HEXCER project

MEMTi's Hybrid Materials Laboratory is taking part in the HEXCER project to develop a stationary heat storage technology with thermochemical systems.

The three-year project HEXCER, financed by Innosuisse and realised in cooperation with the Institute for Solar Technology (SPF) of the Eastern Switzerland University of Applied Sciences (OST), aims to develop a heat storage system based on thermochemical processes by exploiting the special heat and mass exchange properties of ceramic architectures produced by means of additive manufacturing techniques.

"At MEMTi, we are working on developing the ceramic components inside the heat and mass exchanger to increase power and efficiency. In particular, we are currently starting to optimise the production process and engineer the structured porosity of these highly innovative components," explains **Giovanni Bianchi**, Senior Researcher at the Institute.

The thermochemical system being developed exploits a solution of water and sodium hydroxide that is concentrated by exploiting the heat produced from renewable sources and diluted to recover thermal energy. Specifically, the evaporation and condensation of the water takes place in a single heat exchanger, avoiding excessive space and heat flow losses. "This technology has the advantage of being able to store heat during the summer by means of solar collectors or photo-voltaic panels and to allow long-term storage until the time of use, e.g. in the winter period," the researcher provides.

In addition to the development of the technical side, the project also includes the verification of safety conditions for use and installation, as well as a study on the acceptance of and interest in this type of technology by stakeholders (e.g. architects, manufacturers, purchasers and installers).

"Once on the market, this system can also be installed in single-family homes. In this way, a viable alternative to large centralised systems will be available, thanks to low volumes and investments," Bianchi concludes.
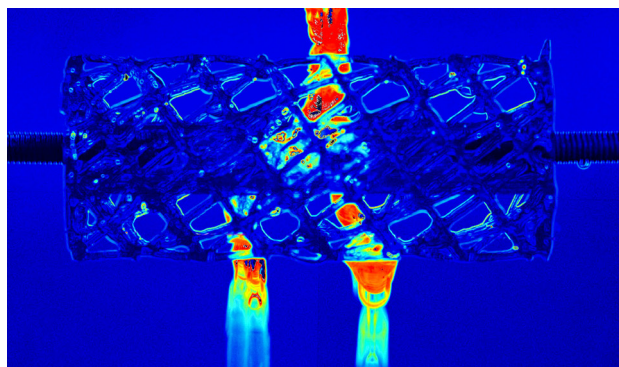
Major events and conferences

Innogly Cost Action - Annual meeting

4 - 6 May

INNOGLY (Innovation with Glycans: news frontiers from synthesis to new biological targets) is a European research project that aims to create multidisciplinary networks to address a pioneering goal: obtaining new knowledge about the biological functionality of glycans in different biological contexts.

The event was organised by the Dalle Molle Institute for Artificial Intelligence (IDSIA USI-SUPSI).

Swiss Text Analytics Conference

8 - 10 June

Seventh edition of the Swiss Text Analytics Conference, an annual event bringing together text analysis experts from academia and industry.

Keynote speakers:
- **Marco Passarotti**, Professor of Computational Linguistics at the Università Cattolica del Sacro Cuore in Milan
- **Enrique Alfonseca**, Research Scientist at Google Inc. in Zurich
- **Raul Rodriguez-Esteban**, Senior Principal Scientist at Roche Pharmaceuticals in Basel

The conference was organised by the Institute of Information Systems and Networking (ISIN) in cooperation with the Swiss Association for Natural Language Processing (SwissNLP), ZHAW and the Data Innovation Alliance with the support of the Swiss Innovation Agency (Innosuisse).

CIRP CMS International Conference

28 June - 1 July

55th CIRP CMS International Conference on 'Leading Manufacturing Systems Transformation'. Over 350 international experts gathered at the Palazzo dei Congressi in Lugano to discuss the impact of new technologies on industrial production systems.

Keynote speakers:
- **Simon Harst**, PhD, The Fraunhofer-Gesellschaft, Germany
  Re-Thinking Manufacturing - Future concepts for production
- **Thierry Protas**, Antares Vision Group
  Digital factory, lesson learned
- **Lars Sommerhäuser**, PhD, Swiss Federal Laboratories for Materials Science and Technology
  Advanced Manufacturing Research Initiatives in Switzerland

Technology and health: challenges and opportunities between academia, research and industry

20 October

Event dedicated to medical technologies with experts from the academic, medical and industrial worlds.

Speakers and presentations:
- Prof. **Luca Crivelli**, Director of the Department of Business Economics, Health and Social Care (DEASS)
  Digitisation: expectations and hopes for health policy
- Prof. **Paolo Bonato**, Harvard University Medical School, on the topic of change in the health sector and future (remote)
  The Digital Health Technology Revolution: How Digital Technology is Changing Healthcare and Future Innovation Opportunities
- **Marcello Ienca**, PhD, Group Leader, Intelligent Systems Ethics Group, EPFL
  Ethics and Data: Emerging Issues and Possible Solutions
- Eng. **Francesco Siccardi**, CEO Medacta International
  Industry's response to new medtec and digitisation requirements

Round table:
- Prof. **Paolo Bonato**, Harward University Medical School (remote)
- Prof. **Emanuele Carpanzano**, PhD, Director, Head of Research, Development and Knowledge Transfer SUPSI
- Prof. **Alessandro Ceschi**, PhD, Director Clinical Trial Unit EOC and Deputy Head of Academic Training, Research, and Innovation, General Management EOC
- **Marcello Ienca**, PhD, Group Leader, Intelligent Systems Ethics Group, EPFL
- Eng. **Francesco Siccardi**, CEO Medacta International
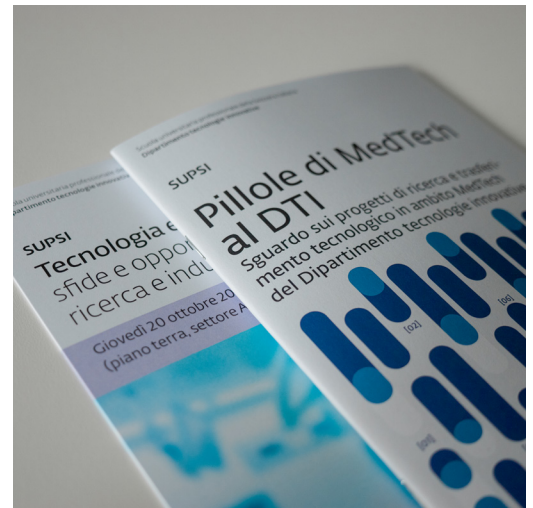
Awards and prizes

Best Bachelor's theses

Erik Nonis, Electronic and Electrical Engineering
High Frequency Converter

Luca Rinaldi, Engineering and Management
Implementation of a CRM strategy: Hupac Intermodal SA

David Braile, Computer Science Engineering
REDuced GRAvity VIrtual Laboratory Realisation of a graphical interface for numerical simulation code

Nico Höhn, Mechanical Engineering
Optimisation and engineering of a mobile robot used during in-situ maintenance processes

RUAG Innovation Award

Marco De Piaz, Mechanical Engineering
Completion and validation of a code to finite volumes for calculating the temperature distribution inside batteries

Best Master's theses

Nizzola Foundation Award

1st prize: **Christian Brianza**
Mechatronic model for a high dynamic 3-axis machine tool

2nd prize: **Filippo Pura**
Hybrid physical-based and data-driven modelling for automated calibration of laser cutting parameters

3rd prize: **Camilla Perego**
Pre-coat filtration as quaternaty municipal wastewater treatment

Argor-Heraeus Award

Laura Bauce
Recycling of cotton garments with elastomer: an LCA study

Riccardo Biella
A comprehensive tool for optimised waste collection

Our outstanding research

IDSIA Team 1st place at the Nanocopter AI Challenge
The PULP team, consisting of researchers from IDSIA, the University of Bologna and the Technology Innovation Institute in Abu Dhabi, won the first edition of the Nanocopter AI Challenge organised as part of the International Conference on Micro Air Vehicles in Delft.

The competition is dedicated to the development of the intelligence of a palm-sized quadcopter capable of autonomously navigating in an unknown environment studded with fixed and moving obstacles.

On the IDSIA side, the Nanocopter AI challenge saw the direct participation of **Daniele Palossi** and **Elia Cereda**, Researcher and PhD student, who competed with the remote support of Prof. PhD **Alessandro Giusti** and Researcher **Gabriele Abbate**.

NCCR Robotics Most Impactful Paper Award
The article *A Machine Learning Approach to the Visual Perception of Forest Trails for Mobile Robots*, which was realised in 2015 in collaboration between IDSIA and the University of Zurich, was awarded as the most relevant for the entire duration of the NCCR initiative.

IDSIA team who contributed to the drafting: Prof. PhD **Alessandro Giusti**, PhD **Jerome Guzzi**, PhD **Dan Ciresan** (currently CEO of Conndera Research), Prof. **Gianni Di Caro** (currently at CMU in Qatar), Prof. **Juergen Schmidhuber** and Prof. **Luca Gambardella** - as well as two co-authors who were assistants at IDSIA at the time during their studies at SUPSI: **Fang-Lin He** (now at Meta) and **Juan Pablo Rodriguez** (now at the University of Seville).

IDSIA awarded at Wiki-Science Competition
A reportage from the Dalle Molle Institute for Artificial Intelligence USI-SUPSI, shot by photographer Marian Duven and published by the Ticino Science portal (IBSA Foundation for Scientific Research) won the 'Image Set' section of the Swiss edition of the Wiki Science 2021 competition.

Best Paper Award at the workshop Temporal Graph Learning, NeurIPS 2022 for the article Scalable Spatiotemporal Graph Neural Networks, by PhD **Andrea Cini**, Mr. **Ivan Marisca**, Prof. **Filippo Maria Bianchi** and Prof. **Cesare Alippi**.

Swiss Government Excellence Scholarship (ESKAS)
Fatima Ezzeddine is a PhD student at USI's Faculty of Informatics and SUPSI's Department of Innovative Technologies, under the supervision of Prof. PhD **Marc Langhenirich** (USI) and Prof. PhD **Silvia Giordano** (SUPSI).

ESKAS fellowships promote international and scientific cooperation between Switzerland and other countries. They also provide many advantages for both researchers and host institutions, enabling them to enhance their academic careers through mobility and promote knowledge transfer between Swiss hosts and scholarship holders.

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Swiss Government Excellence Scholarships

STUDY IN SWITZERLAND

Prof. Valente named among BILANZ's 100 Digital Shapers 2022
Every year, the business magazine BILANZ selects Switzerland's 100 most distinguished minds in various digitisation-related fields.

Anna Valente, Head of the Automation, Robotics and Machines (ARM) Lab, was nominated by BILANZ magazine as one of the most innovative personalities in Switzerland in the 'Digital Manufacturers' category.

In particular, the work of Prof. PhD Valente's team focuses on the design of robotic systems capable of operating in environments and conditions hostile to humans.
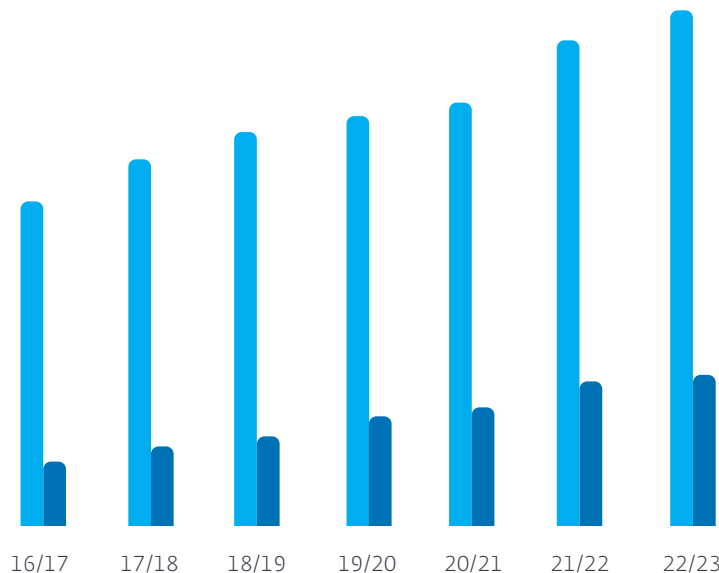
At a glance

Undergraduate and Graduate Studies

	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total enrolled / Bachelor	453	508	542	563	583	666	705
Total enrolled / Master	109	126	137	166	180	215	223

Data from 2016/17 to 2022/23.

Continuing Education

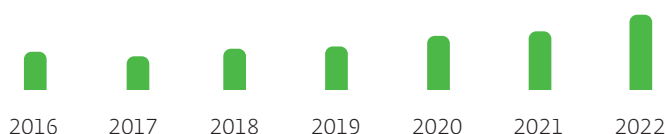|	16/17	17/18	18/19	19/20	20/21	21/22	22/23
Total participants Advanced Studies (10 to 60 ECTS)	167	159	173	265	224	238	287
Total participants Advanced Short Courses (1 to 9 ECTS)	39	127	17	13	178	166	105

Data from 2016/17 to 2022/23.
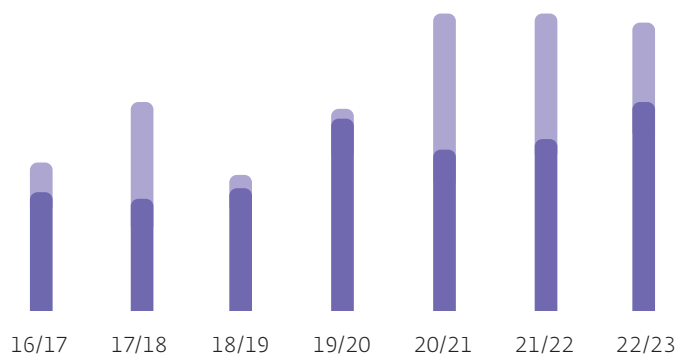
Applied Research

	2016	2017	2018	2019	2020	2021	2022
Evolution of initiated research projects	61	55	65	68	82	88	110

Data from 2016 to 2022.

Organisation Chart

Quality Commission	**DTI Director*:** Milena Properzi	**College of Professors** Co-chairs: Milena Properzi and Andrea Castrovinci
Advisory Commission Chairman: Stefano Modenini		**Departmental College** President: Luca Canetta
Assistant Director Nora Pedrazzini		**Department Services**

DTI Direction

Research Institutes:

		IDSIA[1]	ISEA[2]	ISIN[3]	ISTePS[4]	MeDiTech[5]	MEMTi[6]
Head*: Andrea Graf	**Undergraduate and Graduate Studies**						
Head*: Antonio Bassi	**Continuing Education**						
Head*: Federico Bosi	**Research, Development and Knowledge Transfer**						

[1]Dalle Molle Institute for Artificial Intelligence (IDSIA USI-SUPSI)
Director*: Andrea Emilio Rizzoli

[2]Institute of Systems and Applied Electronics (ISEA)
Director*: Andrea Salvadè

[3]Institute of Information Systems and Networking (ISIN)
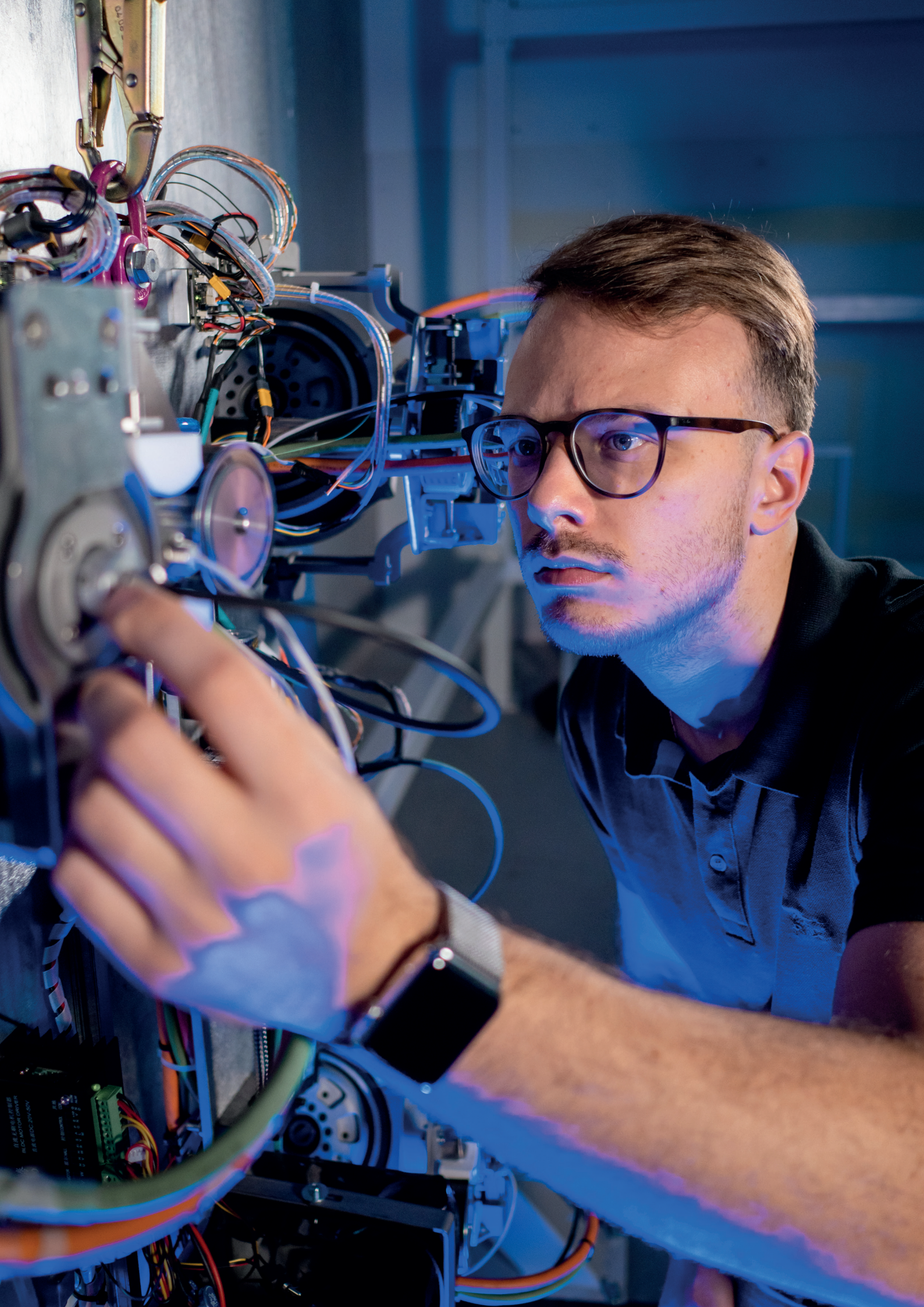Director*: Tiziano Leidi

[4]Institute of Systems and Technologies for Sustainable Production (ISTePS)
Director*: Marco Colla

[5]Institute of Digital Technologies for Personalized Healthcare (MeDiTech)
Director a.i.*: Alessandro Puiatti

[6]Institute of Mechanical Engineering and Materials Technology (MEMTi)
Director a.i.*: Maurizio Barbato

*Members of DTI Departmental Management Board

Organisation Chart, 30 June 2023