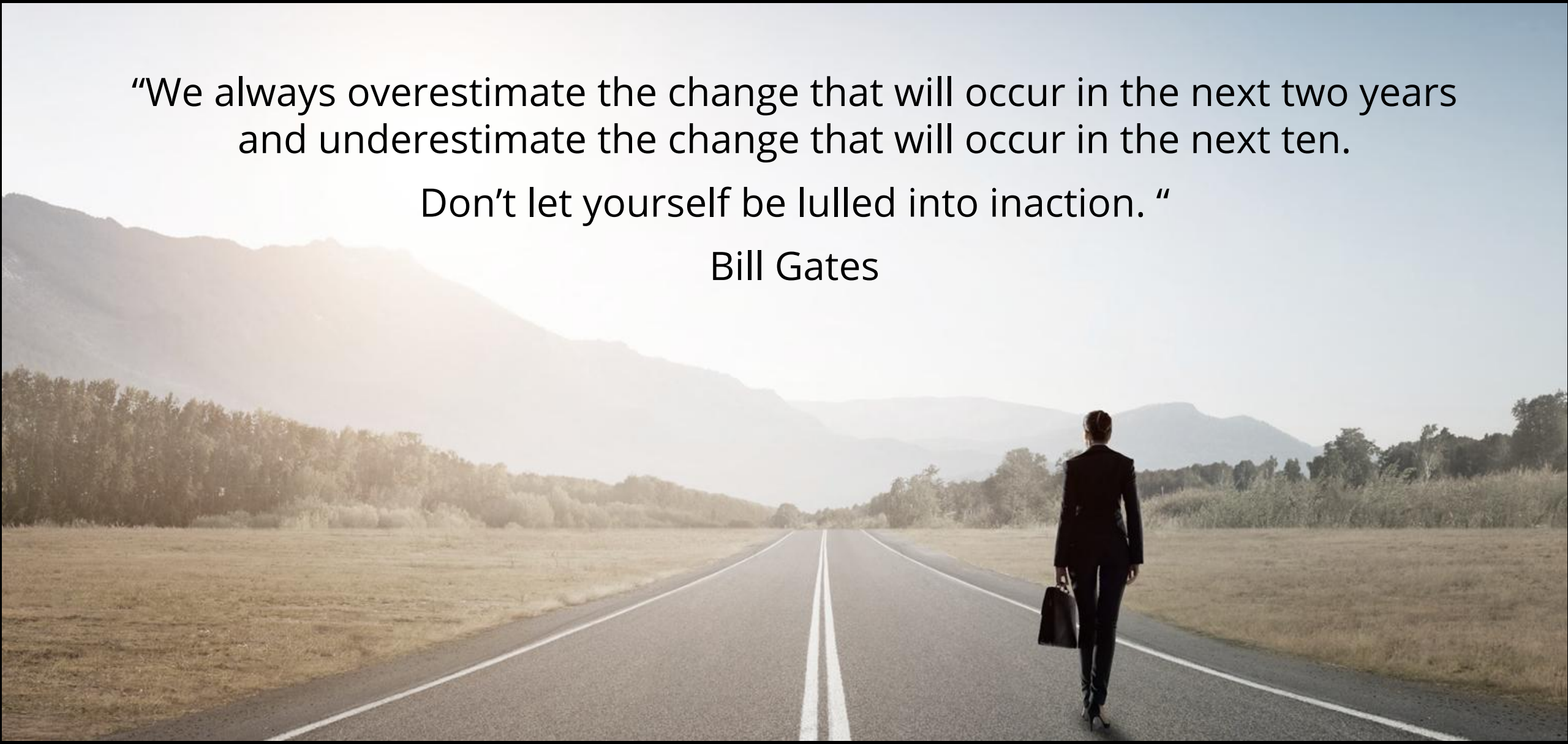
Laurea Magistrale in

ELECTRONICS ENGINEERING FOR AUTOMATION AND SENSING

UNISANNIO DING



"We always overestimate the change that will occur in the next two years and underestimate the change that will occur in the next ten.

Don't let yourself be lulled into inaction. "

Bill Gates

FUTURE TECHNOLOGIES: THE ESSENTIAL 10

EMERGING TECHNOLOGIES

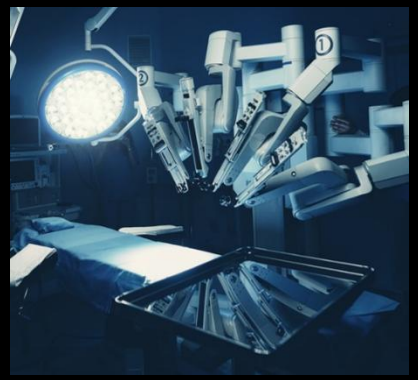
- Quantum
- Augmented/Virtual Reality
- Artificial Intelligence
- Intelligent Process Atomation
- Photonics
- IoT
- 6G
- Drones
- Biotech
- Robotics

SECTOR APPLICATIONS

Autonomous systems

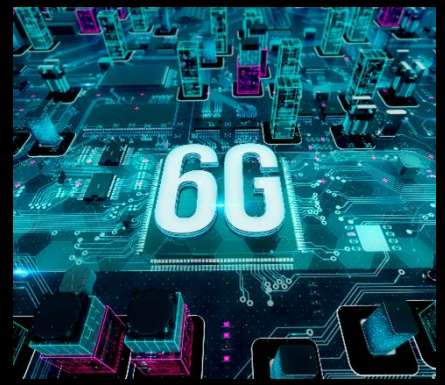
Precision farming

Health care



Remote Sensing

6G Communications



...TO NAME A FEW...

Outlook: Autonomous Systems

Drones: impact in industries, including delivery, agriculture,, and emergency response, with their increased capabilities and integration of advanced technologies like AI and 5G.

Transport: one out of 10 vehicles are expected to be completely autonomous in 2030 increasing safety, reduced traffic congestion, and improved mobility for people and goods.

Production: self-controlled, flexible, and self-optimizing production process that can control themselves.

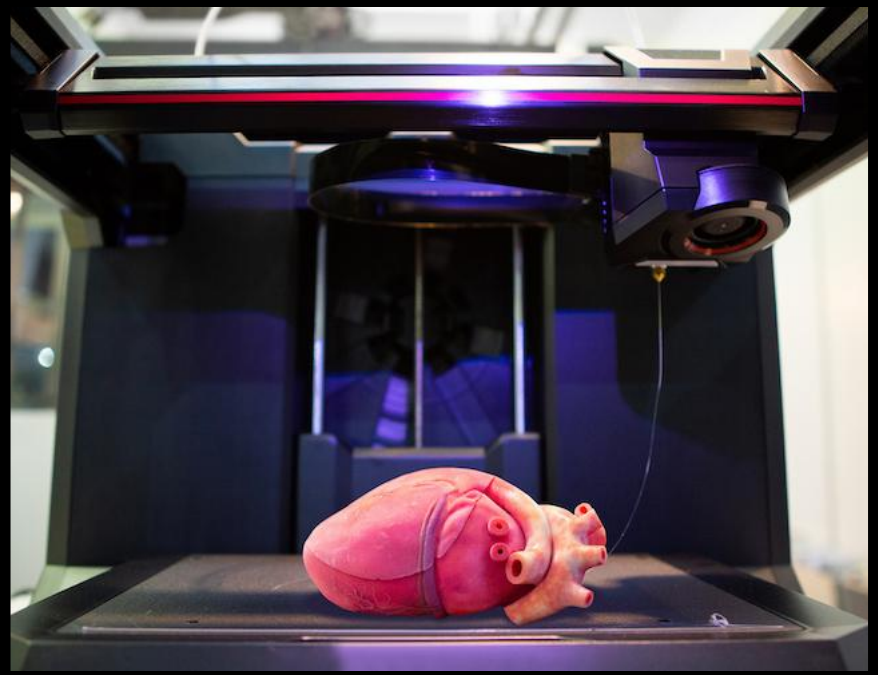
Outlook: Precision Farming

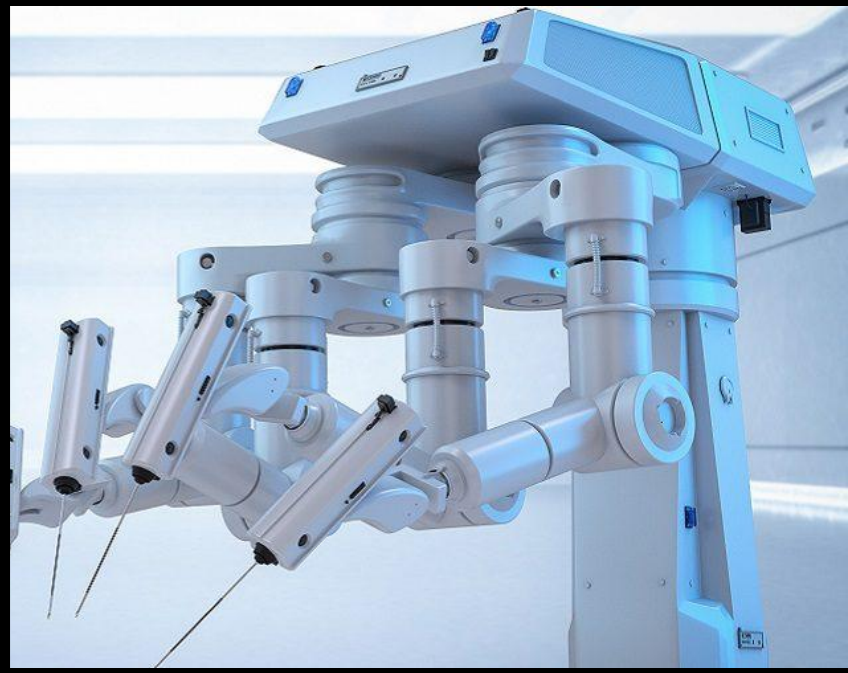
Aerial Imaging: drones and satellites help monitoring crops and analyzing their growth with the help of GIS technology.

New generation Sensors: IoT soil sensors can improve farming by accurately measuring soil composition getting chemical balances and moisture content just right is crucial for optimizing results.

Automated Machinery and Robotics: Self-driving tractors and smaller robotic vehicles are revolutionizing farming by performing tasks like planting, harvesting, analyzing conditions, and removing weed.

Outlook: Healthcare



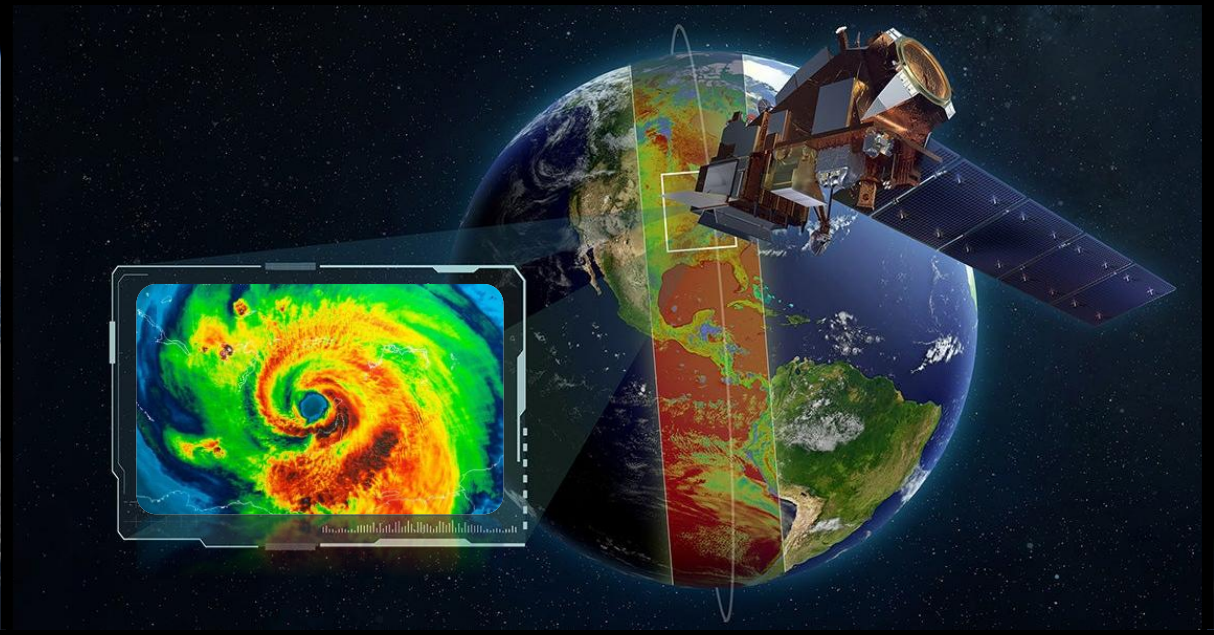


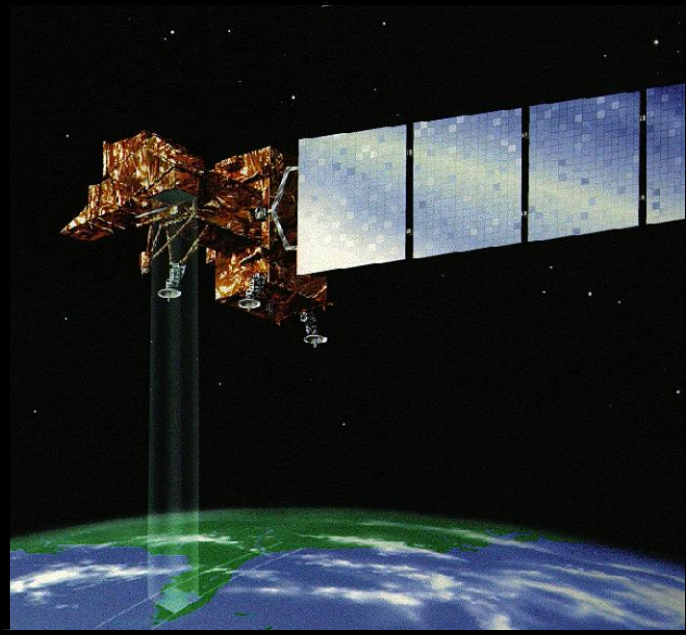
Home-spital: Using cloud-edge-device synergies to bring healthcare services into patients' homes.

Artificial organ design: 3D printing will allow creation of bionic body parts.

Precision medicine and treatment plans: More accurate drug trials shifting treatment from "one-size-fits-all" to "bespoke".

Outlook: Remote Sensing



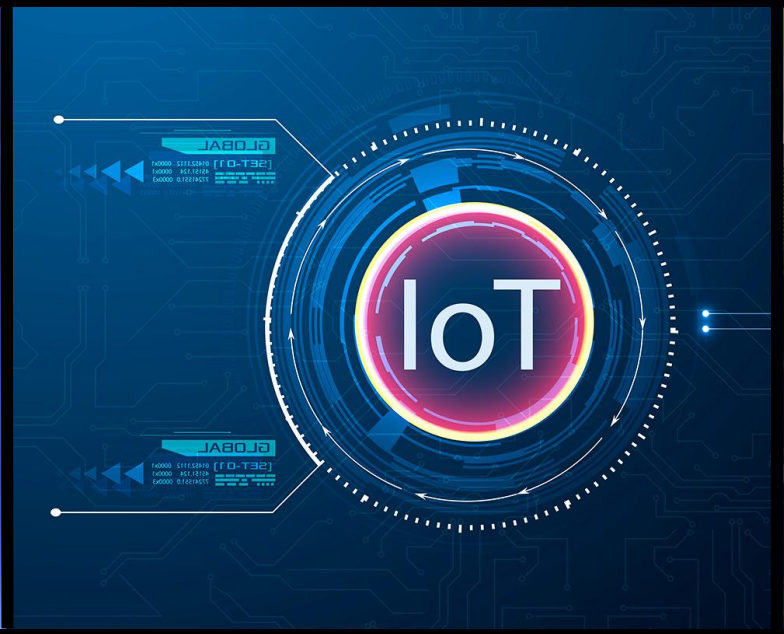


Earth Observation: rapid progress in sensors pushes the use of remote sensing data for many applications, from agriculture to climate change, health and urban planning.

Emergency: miniaturization in electronic technology introduces the use of micro/nano satellite constellations with reduced revisit time for continuous control of natural hazards and faster response to disasters.

Support to Decision Makers: Machine Learning allows the analysis of massive data from satellites and other sources to provide Decision Support Systems in many civil and emergency applications.

Outlook: 6G Communications



Ultra-high data rates and low latency: real-time communication.

Massive connectivity: billions of devices and sensors.

Intelligent networking: artificial intelligence capabilities.

Energy efficiency and sustainability.

Our Language: English

Global Lingua franca: the interconnected technological word speaks English.

Improve career prospects: increase chances of getting better jobs opportunities, both nationally and internationally.

Simplify access to Info: access to Cutting-Edge Research and Technologies.

Our Manifesto

Automation

FIRST YEAR

Semester 1

Measurements for Automation and industrial production
Programmable Electronic Circuits
Statistical Learning

Semester 2

Applied Thermodynamics and Mechanics
Electronics of Digital Integrated Systems
Modern Control
Multiphysics modelling

SECOND YEAR

Semester 1

Advanced Control and Applications
Distributed measurement systems
Dynamics and Control of Switched Electronic Systems
Free choice course

Semester 2

Learning for dynamics and control
Internships and thesis

Sensing Technologies

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Optoelectronics and Photonics
Wave-based sensors and diagnostics

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FOUNDATION

Automation and Sensing Technologies

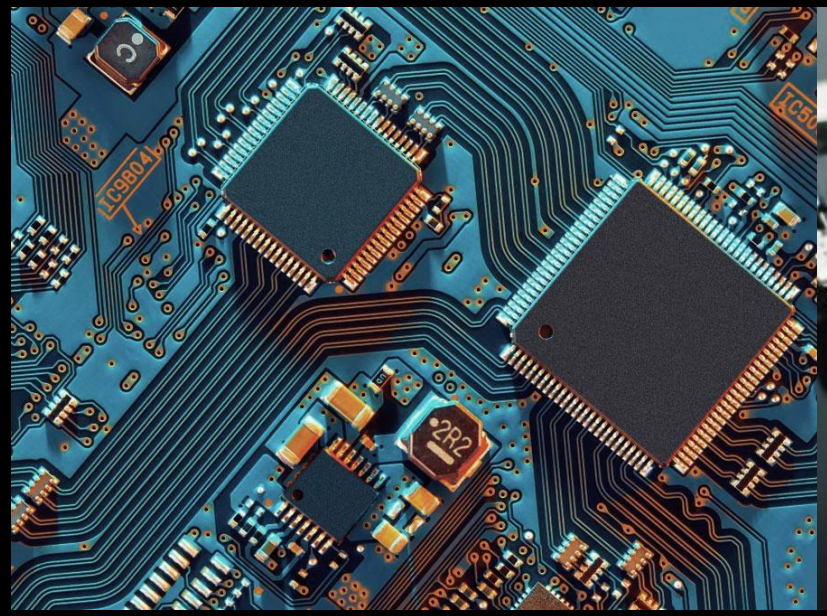
WHY: in-depth understanding of design, model, control and simulate modern electronic engineering. systems

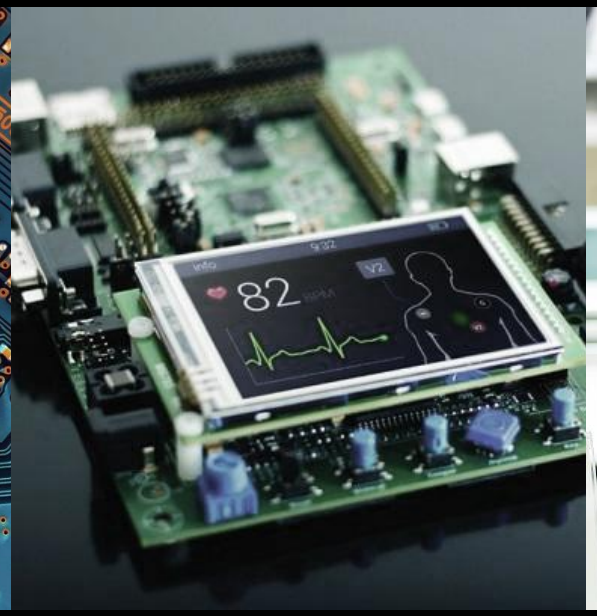
WHAT: Learn how to improve the efficiency, safety and performance of electronic engineering systems.

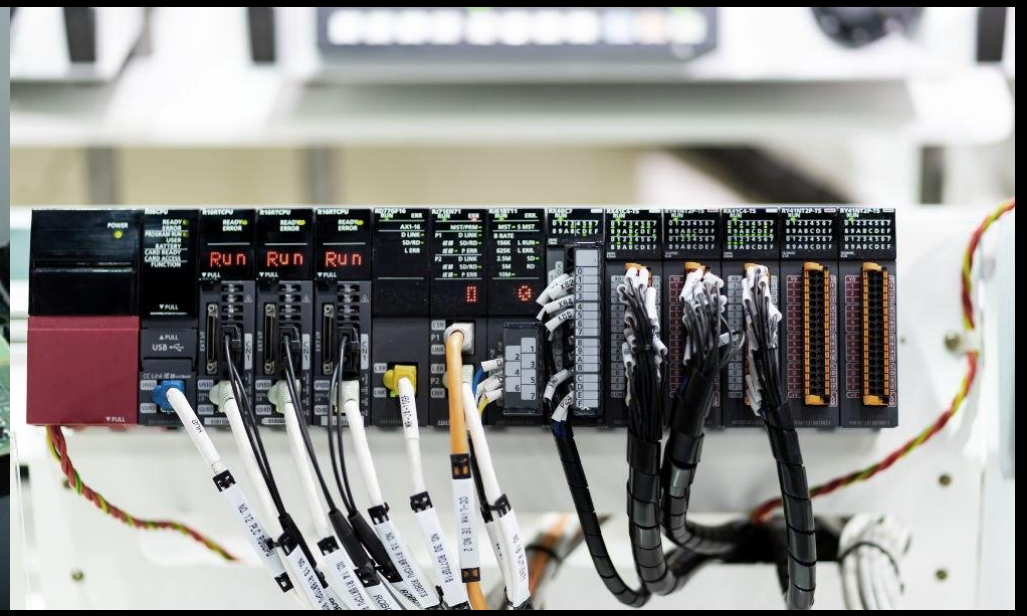
HOW: Statistical Learning (9 CFU), Modern Control (9 CFU), Multiphysics Modelling (9 CFU), Applied Thermodynamics and Mechanics (6 CFU).

MASTERING DIGITAL ELECTRONIC SYSTEMS

Automation and Sensing Technologies







WHY: Digital Electronic systems are the basic building blocks for controlling most automation and sensing technologies.

WHAT: Learning methods and techniques to implement digital electronic circuits and systems with special focus on programmable and reconfigurable intelligent systems.

HOW: Programmable Electronic Circuits (9 CFU), Electronics of Digital Integrated Systems (9 CFU), Real Time Measurements Systems (9 CFU).

Mastering Measurements for Industry

Automation



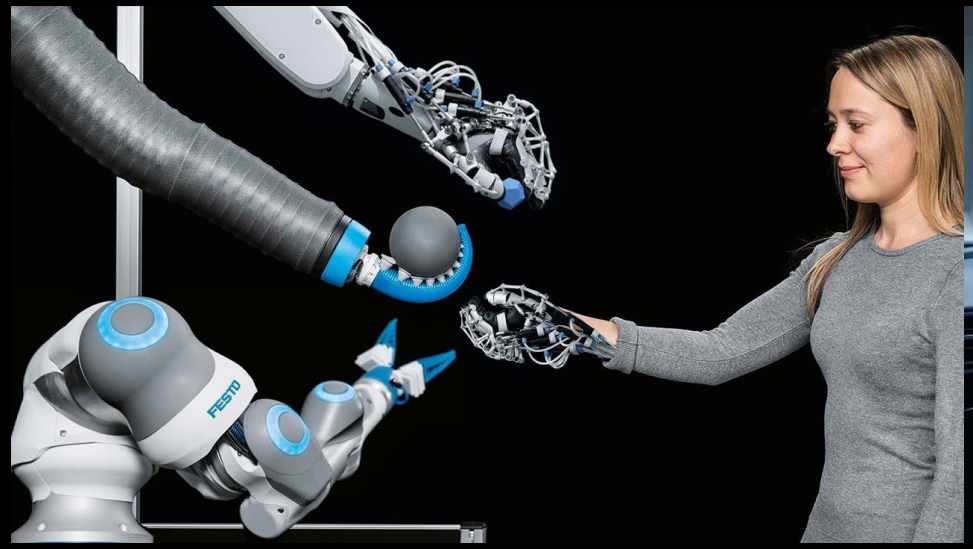
WHY: Smart manufacturing and Industrial IoT systems require the implementation of automatic and distributed measurement systems for quality control with real-time or quasi-real-time capabilities.

WHAT: Learning the fundamental principles of sensors and data acquisition systems used in industrial applications, design, and implementation of multi-sensor-based automatic and distributed measurement systems for remote monitoring of industrial processes.

HOW: Measurements for automation and industrial production (9 CFU), Distributed measurement systems (9 CFU).

Mastering Autonomous Control

Automation



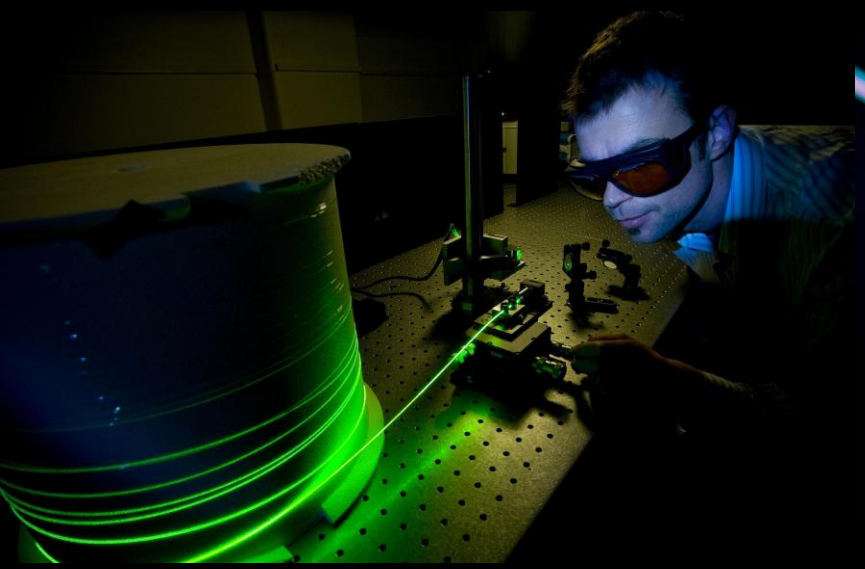
WHY: ‘autonomy’ is a feature increasingly required in systems engineering

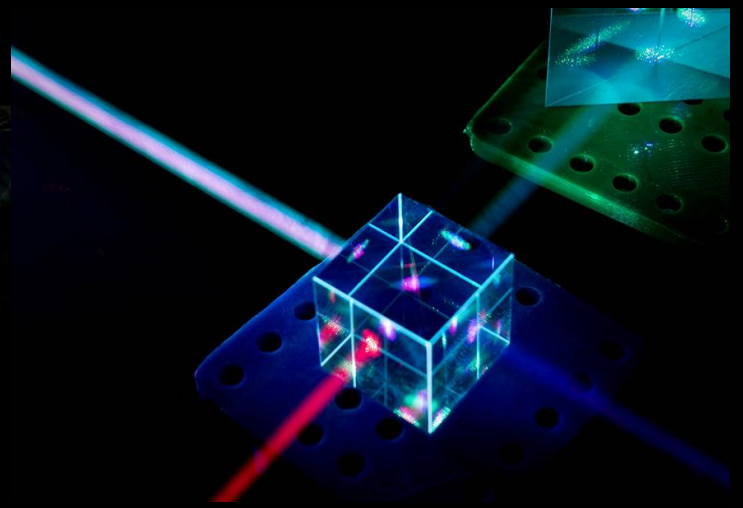
WHAT: focus on electronic power converters and electric drivers as key components in autonomous systems.

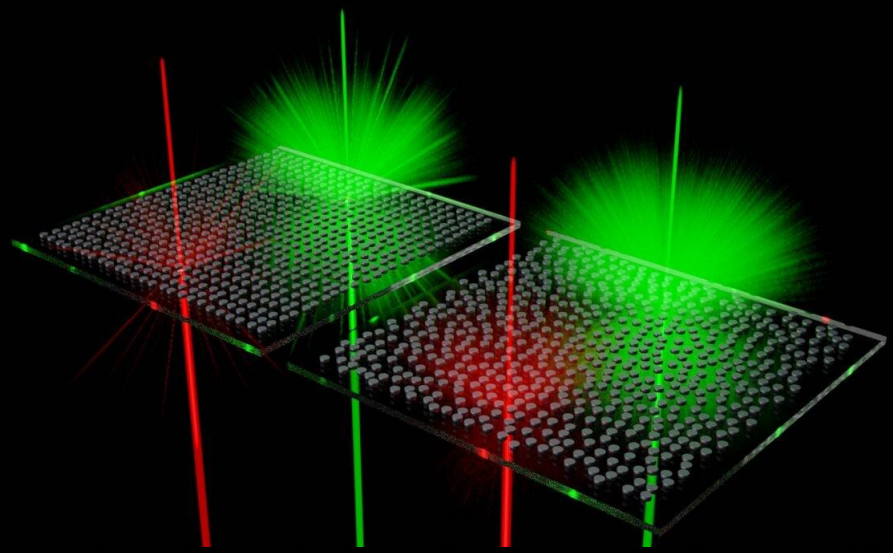
HOW: Dynamic and control of switched Electronic Systems (9 CFU), Advanced Control and Applications (6 CFU), Learning for dynamics and Control (6 CFU).

Mastering Optics and Photonics

Sensing Technologies







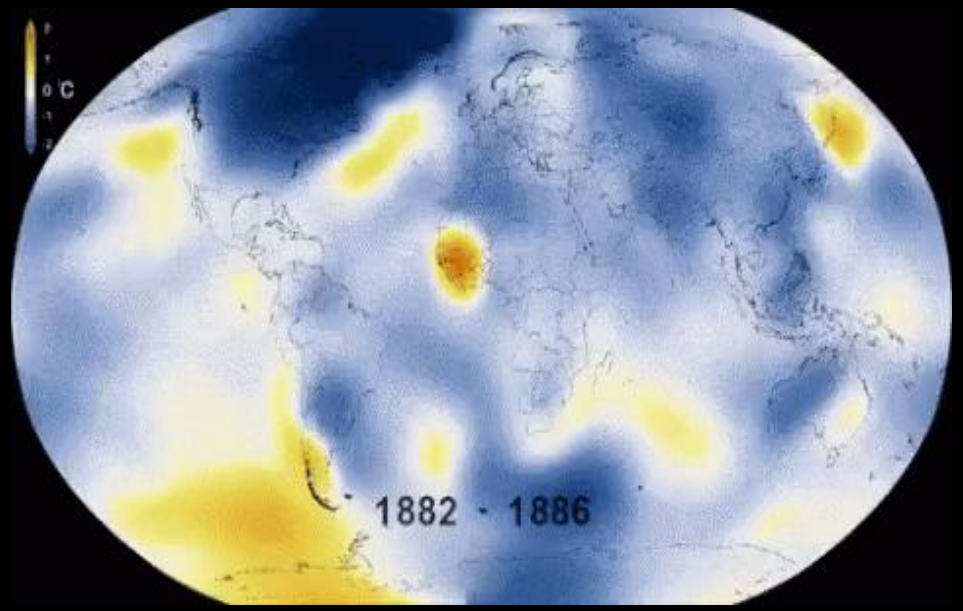
WHY: Key Enabling Technology spreading across several sectors, from optical data communications to sensing, imaging, lighting and displays, to the manufacturing sector, to life sciences, safety and security.

WHAT: Learning the fundamental principles of photonics and light-matter interactions, formulating and analyzing problems related to photonic structures/processes, understanding processes for manipulating the fundamental properties of light at nano-scale, with special focus on sensing application.

HOW: Optoelectronics and Photonics (9 CFU), Nano-optics (9 CFU), Optical and Photonic sensors Lab (6 CFU)

Mastering Remote Sensing

Sensing Technologies



WHY: Governments and scientists need accurate data to understand how our planet is evolving. Satellites offer clear evidence of the changes occurring on Earth and provide the overall picture by gathering long-term series of data to comprehend their consequences. The key to sustain life on our planet might come from space.

WHAT: Learning the fundamental principles of Remote Sensing, the main sensors used for Earth Observation and the key parameters of a satellite mission. Formulating and analyzing problems related to advanced processing of satellite data.

HOW: Sensors for Earth Observation (9 CFU), Earth monitoring and mission analysis Lab (6 CFU).

PLACEMENT

Employment rate % (def. ISTAT – Forze di Lavoro)	Distanza dalla laurea		
	1 year	3 years	5 years
Ing. Elettronica (LM-29)	93,8	96,9	93,8

net monthly salary 1810 €
(average, 5 years after graduation)

Ing. Elettronica (LM-29)

Fonte: AlmaLaurea (profilo dei laureati) Anno di indagine: 2021

PLACEMENT

WHERE

Semiconductor, integrated circuit and general electronic component companies

Consumer electronic device companies
(Audio, video, telephony computing, etc.)

High-tech electromechanical companies
aviation, transportation, aerospace, energy, etc.

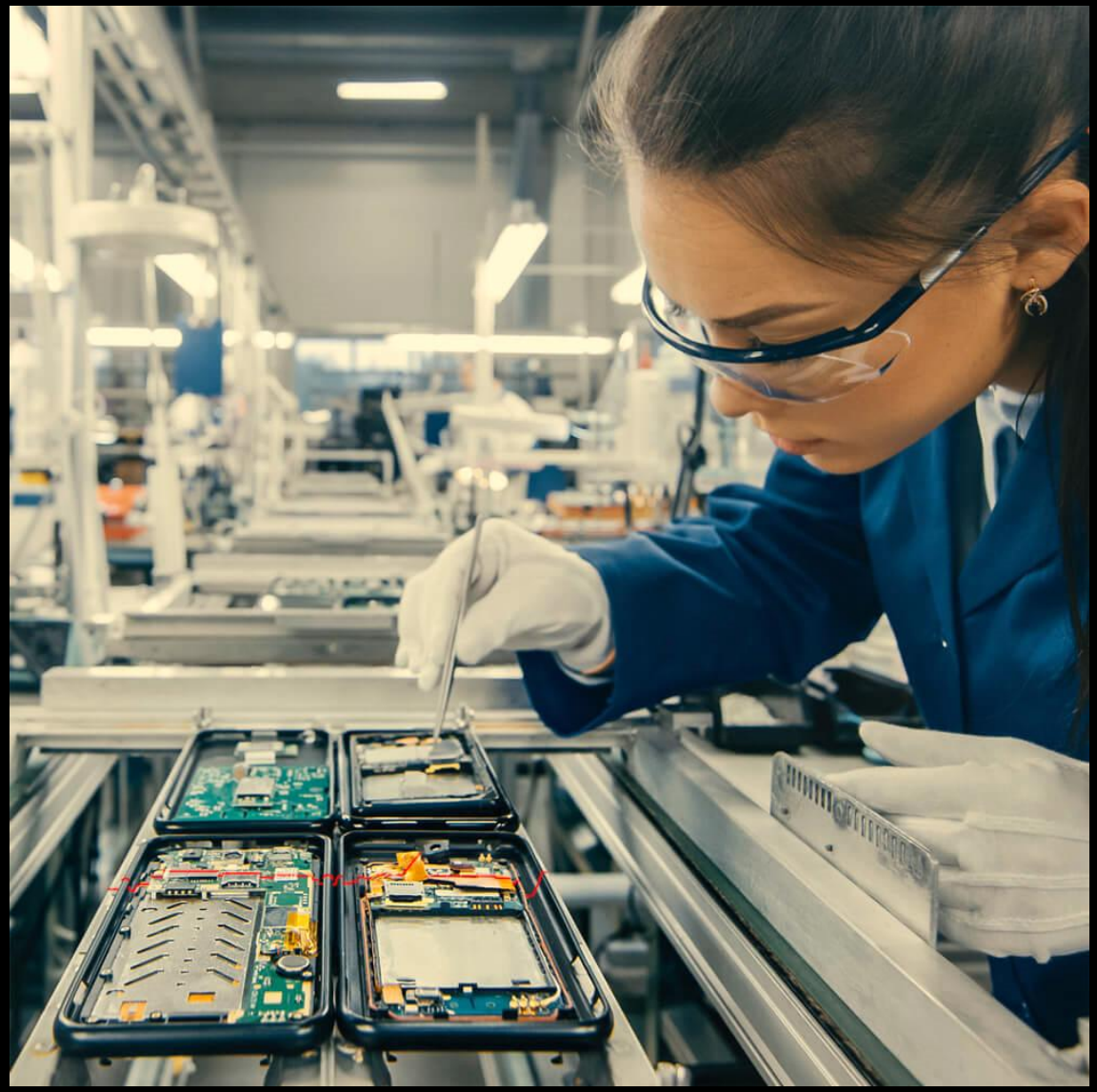
Electronic and optoelectronic equipment companies

Plant engineering, automation and robotics companies

WHAT

Design, development, engineering, production, characterization, and maintenance of products and services

...but also Researcher in Universities, public and private research centers, freelancer, consultant, startupper,....



Our connections with the industrial world

Employment rate (in the first year after degree): 100% (93.8%)

ThalesAlenia Space
MBDA MISSILE SYSTEMS
LEONARDO
ERICSSON
AGCOM AUTORITÀ PER LE GARANZIE NELLE COMUNICAZIONI
STMicroelectronics
LFOUNDRY Solutions for great visions
BETA 80 GROUP
RINA
SITAEL
CIRA Centro Italiano Ricerche Aerospaziali
MES Group
mapsat
CIMA S.r.l.
teoresi group
migma s.r.l.
MOM
INTELLIGENTIA sistemi intelligenti per l'industria
CONTRADER
POWERFLEX

Academic Startup and Spin-off

Mantid
Progettazione antenne e sistemi radar

Nesy
Progettazione reti e sistemi di controllo prototipali

OFTEN MEDICAL
Aghi intelligenti basati su fibre ottiche

Electronics Engineering for Automation and Sensing

Building together our future

UNISANNIO DING

Info: a.cusano@unisannio.it

FUTURE TECHNOLOGIES