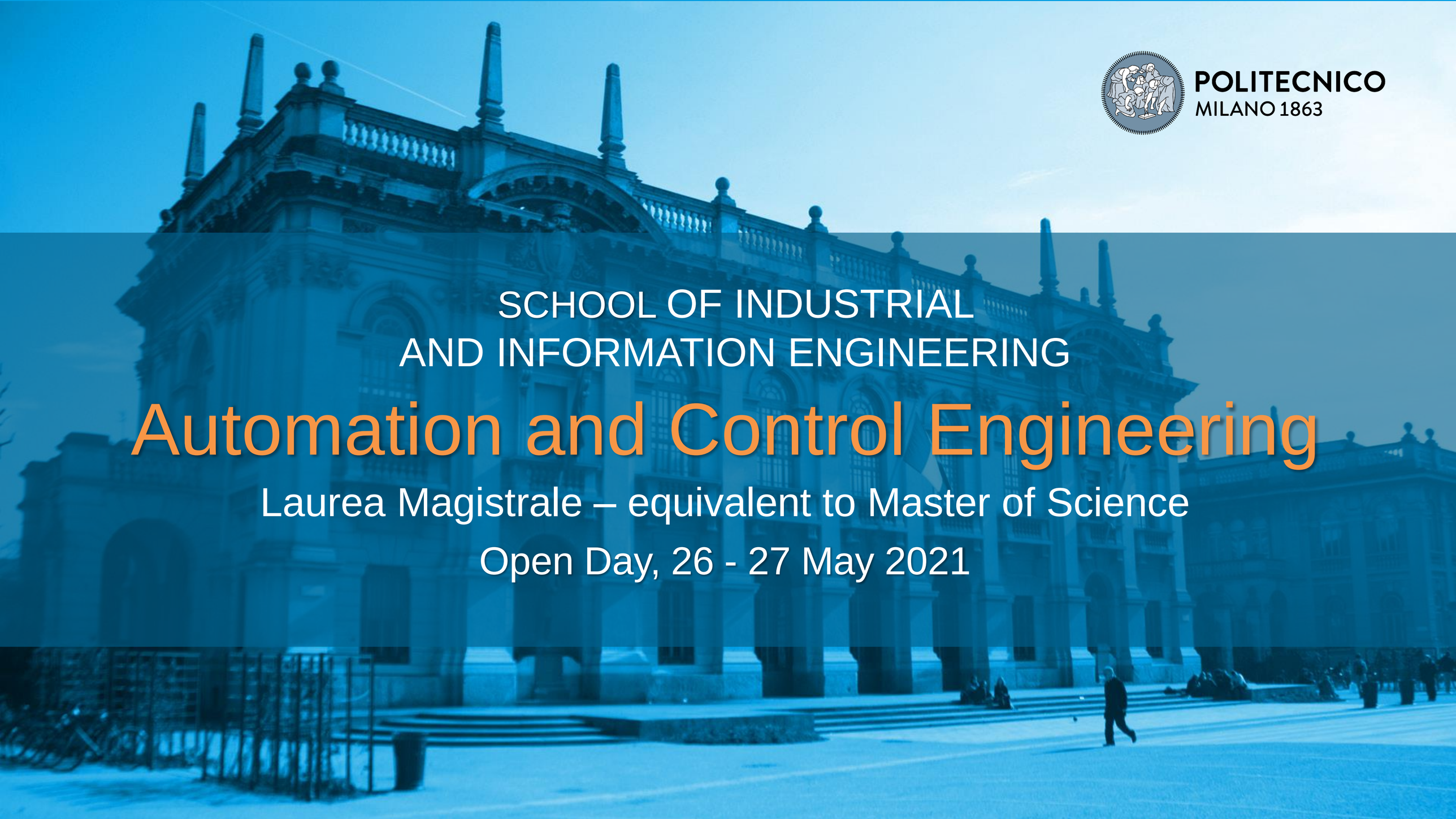

POLITECNICO
MILANO 1863

SCHOOL OF INDUSTRIAL
AND INFORMATION ENGINEERING

Automation and Control Engineering

Laurea Magistrale – equivalent to Master of Science

Open Day, 26 - 27 May 2021

Politecnico di Milano

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MILANO 1863

More than **46.300** students including about **6.700** international studenti

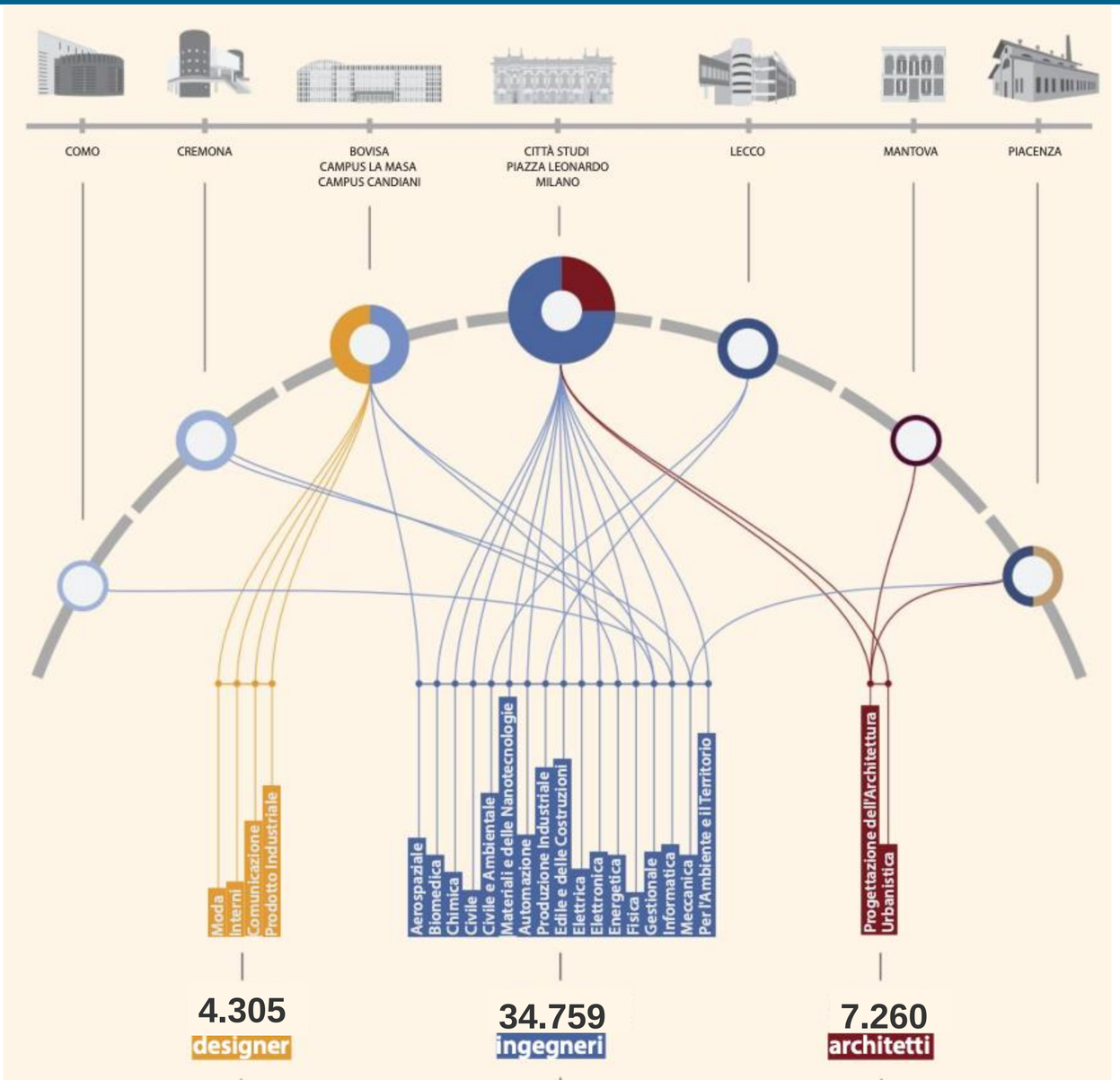
More than **1.400** teaching and more than **1.200** administrative and technical support staff

4 Schools
- Architecture Urban Planning Construction Engineering
- Design
- Civil, Environmental and Land Management Engineering
- Industrial and Information Engineering

12
Departments

Classificied **n. 1** in Italy, **n. 7** in Europe, **n. 20** in the world
under the ‘’Engineering & Technology’’ category
QS World University Ranking 2020

Politecnico di Milano: Campuses



Como

Cremona

Milano Bovisa

Milano Leonardo

Lecco

Mantova

Piacenza

- engineering
- design
- architecture

Automation Engineering

Study Programme in Automation Engineering:

- offered within the School of Industrial and Information Engineering
- based at Milano Leonardo Campus

Automation Engineering

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1 YEAR

2 YEAR

3 YEAR

Automation Engineering Laurea
(equivalent to Bachelor of Science)

1 YEAR MS

2 YEAR MS

Automation and Control Engineering
Laurea Magistrale
(equivalent to Master of Science)

PhD

PhD Programme in Information
Technology, Systems and Control

Attractiveness of the MSc programme

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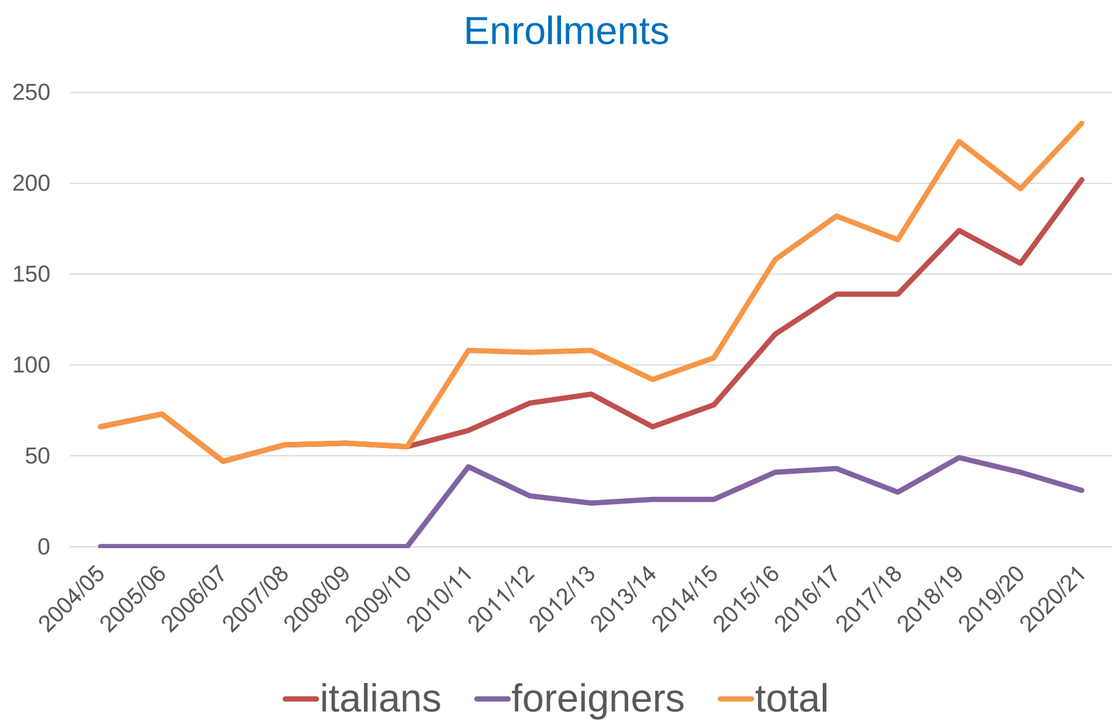
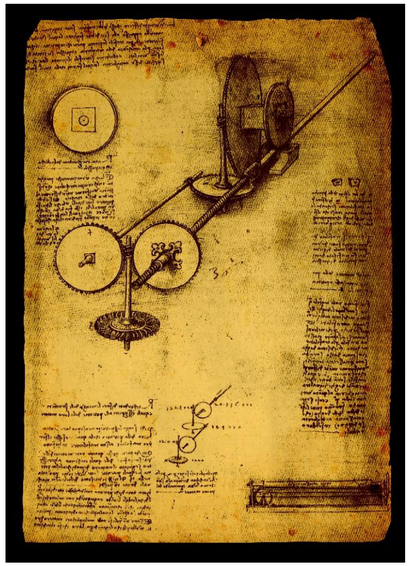
Year	Italians	Foreigners	Total
2004/05	66	0	66
2005/06	73	0	73
2006/07	47	0	47
2007/08	56	0	56
2008/09	57	0	57
2009/10	55	0	55
2010/11	64	44	108
2011/12	79	28	107
2012/13	84	24	108
2013/14	66	26	92
2014/15	78	26	104
2015/16	117	41	158
2016/17	139	43	182
2017/18	139	30	169
2018/19	174	49	223
2019/20	156	41	197
2020/21	202	31	233



Learning objectives

The Automation and Control Engineering MSc Programme aims at training engineers …



… able to design, implement and manage automation systems characterized by a strong technological content, in inherently multidisciplinary contexts

Competences of our MSc students

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- solid background on the mathematical tools necessary for the analysis and design of complex automation systems
- a thorough understanding of the technologies and processes typical of industrial sectors where automation plays an increasingly important role
- ability to explore and evaluate the offer and market trends in the field of instrumentation and system components, in view of innovative applications
- familiarity with the most advanced techniques for identification and data analysis, simulation, optimization and control of dynamical systems of all kinds, and ability to integrate them in an effective and creative manner
- aptitude for teamwork and ability to embrace the principles and methods of organization

Programme requirements

Single curriculum, organized in two years, four semesters, with courses taught in English, except for a few optional ones in Italian. Most courses are held at Leonardo Campus, a few at Bovisa Campus.

Students have to earn 120 credits according to their study plan:

- 60 credits of mandatory courses:
  - 45 on qualifying subjects (systems and control, identification, converters and drives, applied mechanics)
  - 15 credits on subsidiary subjects (computer science, electronics, measurements, industrial production technologies)
- 40 credits of complementary courses
- 20 credits for a final thesis on new methods and techniques for automation and control with application in high-tech areas

Programme structure

1st year

2nd year

Course title	Credits (CFU)	Semester
Computer aided manufacturing	10	1
Dynamics of mechanical systems	10	1
Model identification and data analysis: • Statistical learning • System identification and prediction	10	1
Advanced and multivariable control	10	2
Dynamics of electrical machines and drives	10	2
Complementary courses	10	2

Programme structure

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1st year

2nd year

Course title	Credits (CFU)	Semester
Software Engineering (for Automation)	5	2
Automation and Control Laboratory	5	2
Complementary courses	30	1, 2
Thesis	20	1, 2

Course offer

Courses can be classified in the following categories:

- methodological, on advanced techniques of learning from data, identification, simulation, optimization and control
- technological, on process instrumentation including advanced actuation and measurement systems for control applications
- application-oriented, on the application of control and automation to key areas such as industry, energy, and transportation
- experimental and professionalizing, including a lab course and a project work with companies to reach a full mastery of methods and techniques, and improve soft skills

Automation and Control Laboratory

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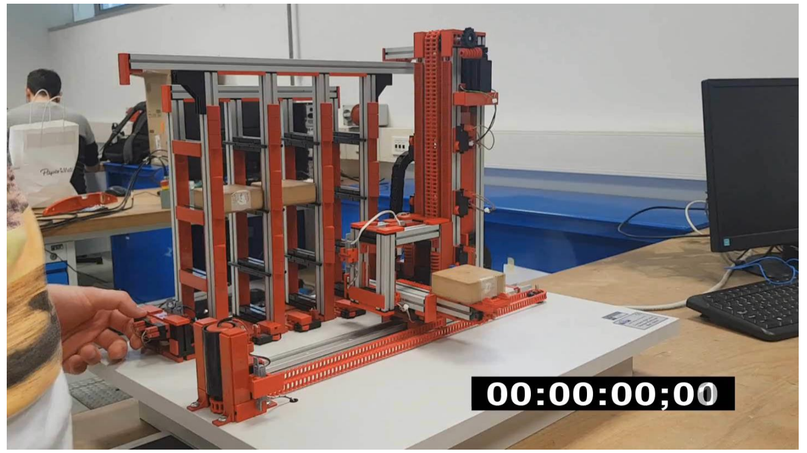
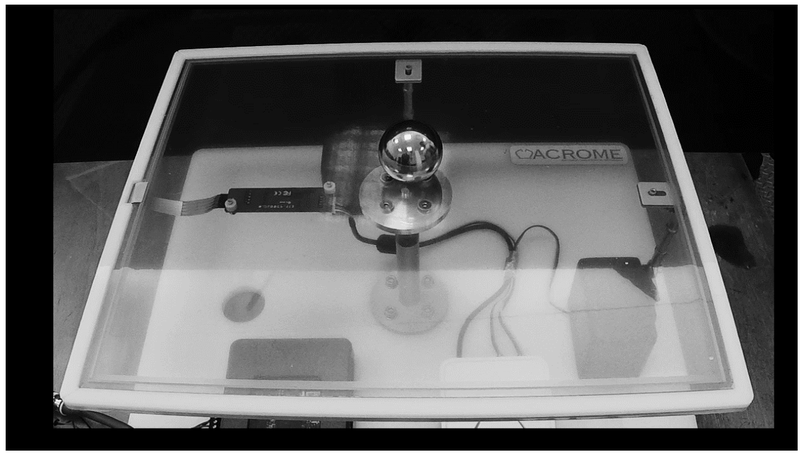
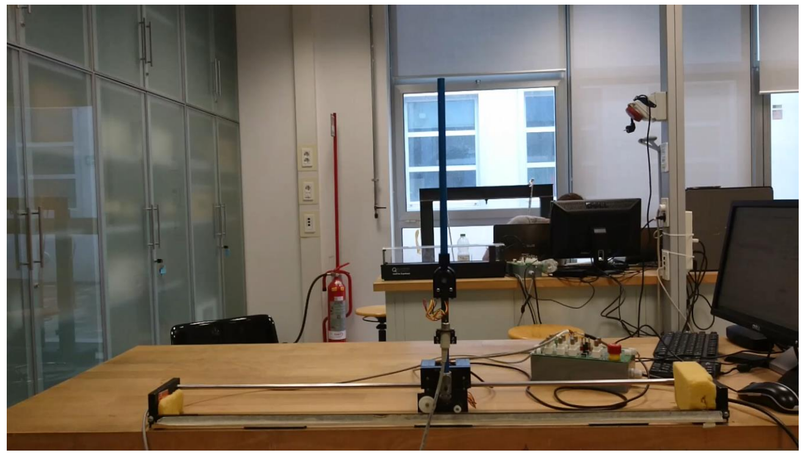
- course held in a lab
- students divided in groups, working on various experimental set-up
- mandatory course in the second semester of the second year







Project work

Project works are innovative courses in collaboration with companies

- companies propose open innovation topics, on design activities in the field of automation and control
- each project work is run under the supervision of an academic and an industrial tutor
- students work in small groups during the semester
- at the end they prepare a report and discuss the project in front of the academic and the industrial tutor and the other students

Elective courses on core topics

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Course title	Credits (CFU)
Advanced measurement systems for control applications	5
Advanced process control	5
Advanced topics in automation and control engineering	5
Automation and control in autonomous vehicles	5
Automation and control in electric and hybrid vehicles	5
Automation of energy systems	5
Constrained numerical optimization for estimation and control	5
Control of industrial robots	5
Control of mobile robots	5
Data driven control system design	5
High-tech entrepreneurship	5
Networked control	5
Nonlinear control	5
Numerical analysis	5
Power electronics and supplies	5
Production systems control	5
Robust control	5
Safety in automation systems	5
Simulation techniques and tools	5
Systems theory	5
Vibration Control and Diagnostics of Mechanical Systems	5

Thesis

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	Thesis with reviewer “Tesi”	Thesis without reviewer “Tesina”
Expected outcome	an innovative project in the field of automation and control	a (maybe less) innovative project in the field of automation and control
Reviewer required	yes	no
Maximum increment for the final grade	7/110	4/110

Training beyond the MSc programme

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Massive Online Open Courses (MOOCs) – www.pok.polimi.it

POLIMI portal of free online courses to support students in their academic and professional career. A certificate of attendance is provided if the final test is passed.

Passion in action – www.polimi.it/en/programmes/innovative-teaching

open participation teaching activities that the Politecnico offers to its students to support the development of transversal, soft and social skills. Acquired skills will be accredited on the Diploma Supplement.

Degree awards

Degree awards for the Best MSc Thesis in Automation and Control Engineering entitled to

- prof. Claudio Maffezzoni
  for the best thesis on the Application of advanced techniques for automation and control in highly technological fields

- prof. Nicola Schiavoni
  for the best thesis on the Development of innovative methodologies for automation and control

Honours Programme

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Honours Programme ‘Scientific Research in Information Technology’

- extracurricular programme to train MSc students in conducting scientific research in Information technology
- the Honours Programme title is reported in the students' transcript together with a description of the conducted activities
- three main topics for Automation and Control Engineering:
  - Theory and application of control systems
  - Optimization and control of complex systems
  - Robotics, Mechatronics, and Industrial Automation

International mobility

Opportunities for gaining experience abroad:

- study mobility
  attending courses or working on the thesis
- double degree
  two degrees in three years with at least 60 CFU of exams @POLIMI

www.polimi.it/en/services-and-opportunities/experience-abroad/

Some research areas

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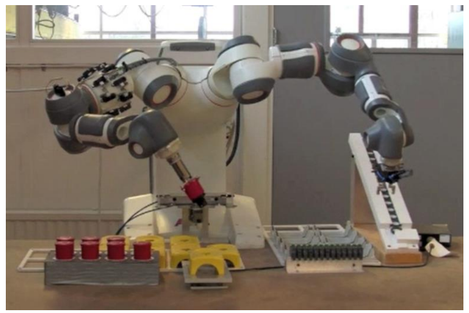
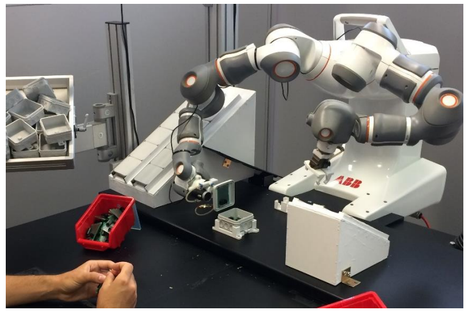
- automation in vehicles and transportation systems
- collaborative robotics and mechatronics
- automation in energy systems and integration of renewables






Automation in vehicles and transport

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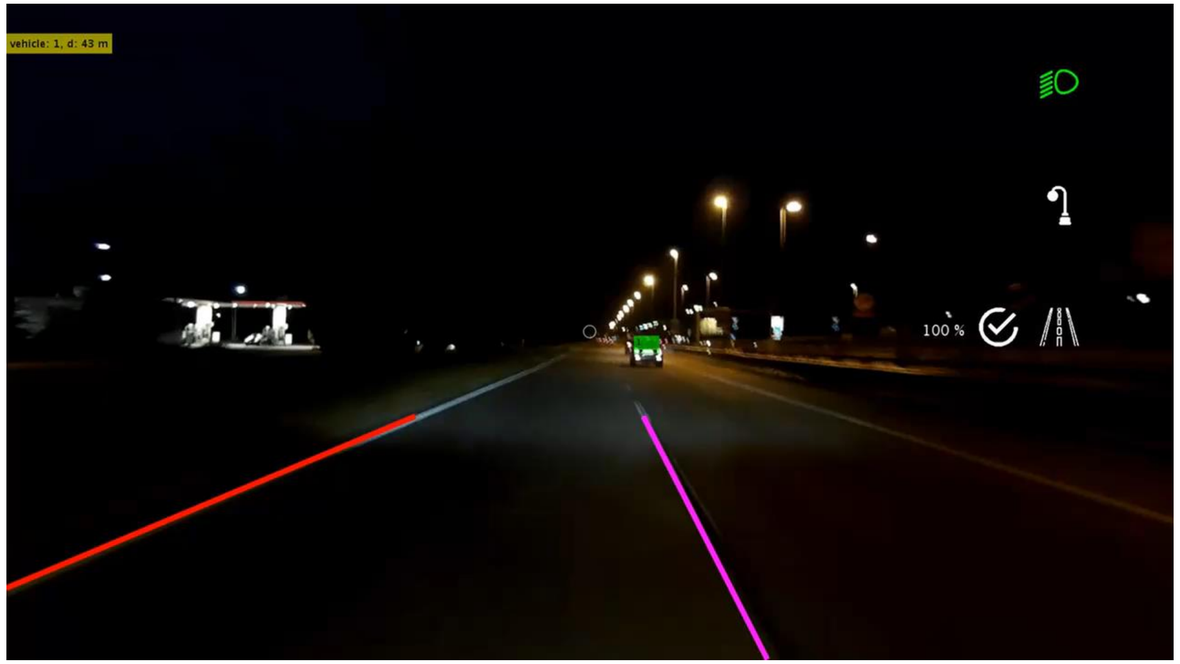
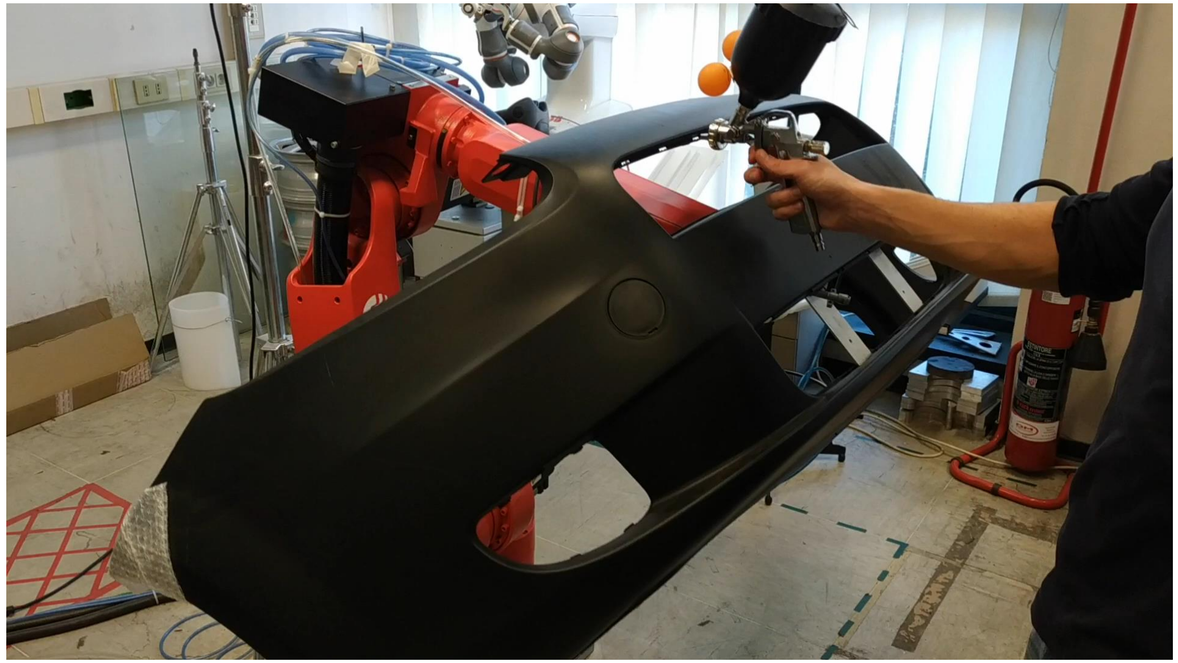
self-charging e-bike



advanced driver assistance system

Collaborative robotics

with a dual-arm robot



with an industrial manipulator

Mechatronics

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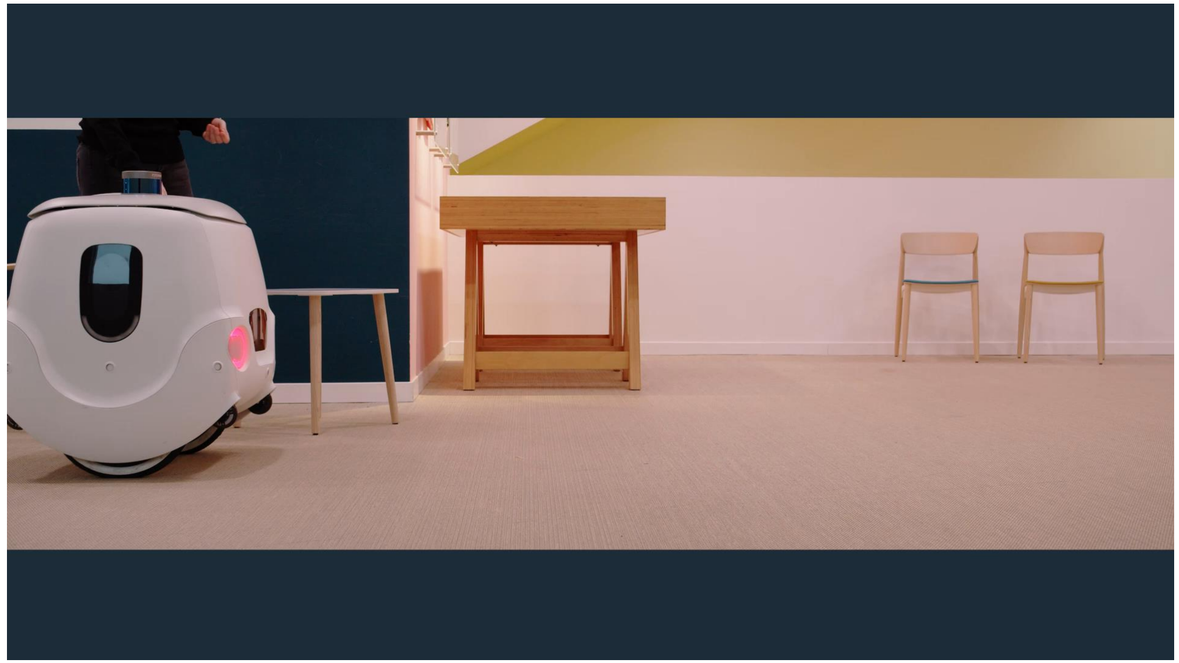
in the countryside



in town

Energy systems and renewables

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power kite to convert wind energy into electricity

Study of methods and algorithms

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New applications call for the development of suitable methods and algorithms for

- prediction
- learning from data
- planning and trajectory tracking
- predictive control in presence of constraints
- verification and control of cyber-physical systems
- distributed optimization of interconnected systems

…

Career opportunities

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- companies that produce hardware and software for automation
- companies that design and manufacture machines or plants with high level of automation
- companies that manage automated production plants
- corporations or companies that manage large-scale networks and services
- engineering and consulting firms that design and project complex, economically challenging and technologically advanced plants and systems

Offers for Automation Engineers

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TOTAL OFFERS: 3446

Jobs: 2638	77%
Internship: 808	23%

WHERE THEY WORK

Italy	92%
Abroad	8%

TOP 10 SECTORS

Electronics and Automation	17%
Metallurgy and Metalworking	13%
ICT	11%
Mechanics and Installation	10%
Business Consultancy	7%
Automotive	4%
Energy Oil&Gas	4%
Business Services	4%
Scientific Research and Dev	4%
IT Consultancy	4%

Career Service – 2019

Employment statistics

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2020 Survey – MSc students graduated in 2018

EMPLOYED*	EMPLOYED WITHIN 6 MONTHS*	NET MONTHLY SALARY
97%	92%	€ 1.650
1 YEAR AFTER GRADUATION	PERCENTAGE CALCULATED ON EMPLOYED WITHIN 1 YEAR AFTER GRADUATION	

Career Service

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EVENTS PHOTO AND VIDEO USEFUL LINKS

AUTOMATION AND CONTROL ENGINEERING

PROGRAMME STUDENTS BACHELOR DEGREE MASTER OF SCIENCE CAREERS

www.ccsatm.polimi.it

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