



POLITECNICO
MILANO 1863



Laurea Magistrale / Master of Science
in
ELECTRONICS ENGINEERING

prof. Franco ZAPPA

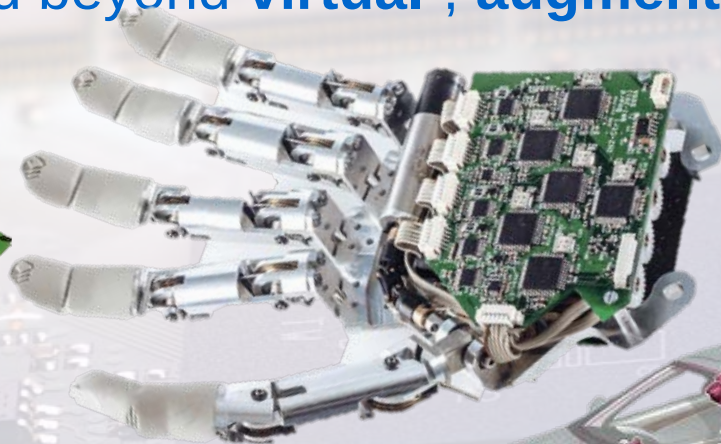
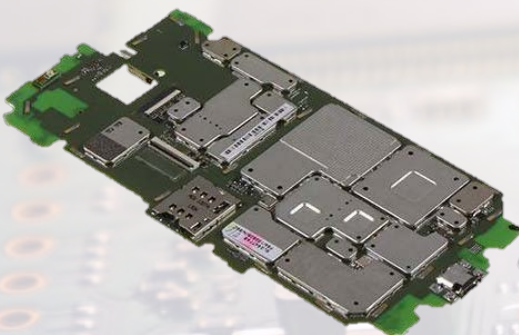


1. what is **ELECTRONICS**
2. **ELECTRONICS** compared to others
3. Laurea Magistrale / Master of Science in **ELECTRONICS ENG**
4. expertizes, skills, employment opportunities
5. research labs in **ELECTRONICS**
6. further info



What is ELECTRONICS: $H_{ardware} + F_{irmware} + S_{oftware}$

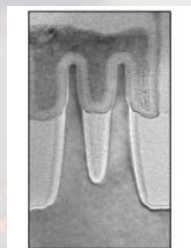
embedded systems, intelligent machines, communication networks ...
smart-, autonomous-, wearable- products and systems
for **real world** and beyond **virtual-, augmented-, mixed-** reality
for **humans and robots**



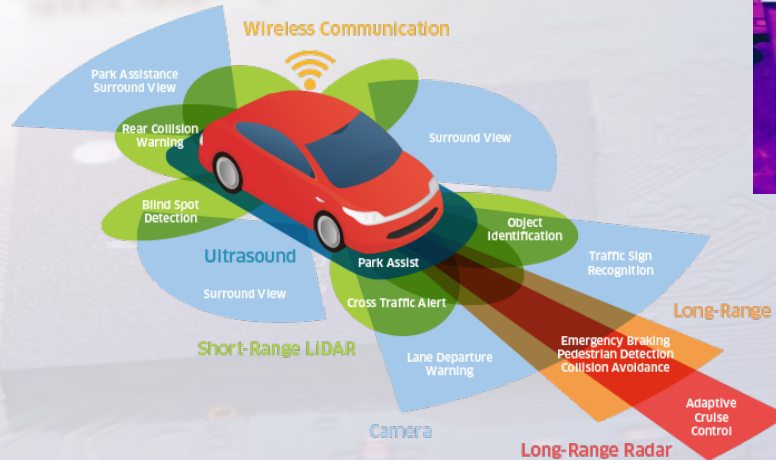
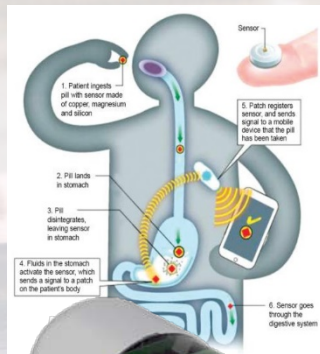


Who is the ELECTRONICS ENGINEER

identify and understand a **need** and invent a **solution**:
conceive, simulate, design, develop, build, validate, install...
devices, components, circuits, products, apparata, systems



14 nm 2nd Generation
Tri-gate Transistor



... for every "smart" task of everyday's modern life!



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POLITECNICO
MILANO 1863

"POLIMI OPEN DAY"

(info day about POLIMI)

ARCHITETTURA

Campus Bovisa Durando

	PRESENTAZIONI (edificio - aula)
Ingegneria Edile e delle Costruzioni	Edificio B8 - 0.5
Ingegneria Edile-Architettura	Edificio B8 - 0.3
Progettazione dell'Architettura + Urbanistica: Città Ambiente Paesaggio	Edificio B8 - 0.6
Progettazione dell'Architettura <i>(in inglese)</i>	Edificio B8 - 0.7
Urbanistica: Città Ambiente Paesaggio + Progettazione dell'Architettura	Edificio B8 - 1.2
Presentazione test Architettura* + prova di ammissione per Urbanistica	Edificio B8 - 1.1

DESIGN

Campus Bovisa Durando

Design della Comunicazione	Edificio B2 - 1.9
Design degli Interni	Edificio B2 - 1.1
Design della Moda	Edificio B2 - 2.8
Design del Prodotto Industriale	Edificio B2 - 2.1
Presentazione Test Design	Edificio B8 - 1.1

INGEGNERIA

Campus Bovisa La Masa - Lambruschini

Ingegneria Aerospaziale	Edificio B12 - L.01
	Edificio B12 - L.02
Ingegneria per l'Ambiente e il Territorio	Edificio B15 - LM.6
Ingegneria dell'Automazione	Edificio BL27 - 03
	Edificio B12 - L.07
Ingegneria Biomedica	Edificio B12 - L.08
Ingegneria Chimica	Edificio B15 - LM.1
Ingegneria Civile	Edificio BL27 - 08
Ingegneria Civile per la Mitigazione del Rischio	Edificio BL28 - 1.2
Ingegneria Edile e delle Costruzioni	Edificio B15 - LM.3
Ingegneria Edile - Architettura	Edificio B15 - LM.4
Ingegneria Elettrica	Edificio BL27 - 01
Ingegneria Elettronica	Edificio B12 - L.06
Ingegneria Energetica	Edificio B12 - L.03
Ingegneria Fisica	Edificio BL27 - 04
	Edificio BL27 - 05
Ingegneria Gestionale	Edificio BL27 - 06
	Edificio BL27 - 07
Ingegneria Informatica (+ orientamento Telecomunicazioni)	Edificio B12 - L.13
Ingegneria Matematica	Edificio BL27 - 02
Ingegneria dei Materiali e delle Nanotecnologie	Edificio B15 - LM.5
Ingegneria Meccanica	Edificio BL28 - AULA
Ingegneria Nucleare (corso di Laurea Magistrale)	Edificio BL28 - 1.1
Ingegneria della Produzione Industriale	Edificio BL28 - 1.2

Ricorda che:

-puoi accedere alle presentazioni solo se ti sei iscritto

-devi presentarti 20 minuti prima dell'inizio di ogni presentazione al *punto iscritti*, indicati alle pagine successive, dove i ragazzi dello staff verificheranno la tua registrazione tramite QR code, che hai ricevuto via mail

CORSO PRESENTATO	TOTALE UDITORI/GIORNATA
Ingegneria Aerospaziale	2.113
Ingegneria Biomedica	2.018
Ingegneria Chimica	1.006
Ingegneria dei Materiali e delle Nanotecnologie	806
ingegneria della Produzione Industriale	189
Ingegneria dell'Automazione	1.122
Ingegneria Elettrica	251
Ingegneria Elettronica	775
Ingegneria Energetica	1.074
Ingegneria Fisica	964
Ingegneria Gestionale	2.081
Ingegneria Informatica+Orientamento Telecomunicazioni	1.821
Ingegneria Matematica	1.057
Ingegneria Meccanica	1.742
Ingegneria Nucleare	410
Presentazione TOL	969



POLITECNICO
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"Presentazioni delle LM"

(info day about "Lauree Magistrali")

POLITECNICO MILANO 1863
UNIVERSITÀ DI INGENGERIA
PRESENTAZIONI DEI CORSI DI LAUREA MAGISTRALE IN INGEGNERIA

Presentazioni dei corsi di Laurea Magistrale in Ingegneria

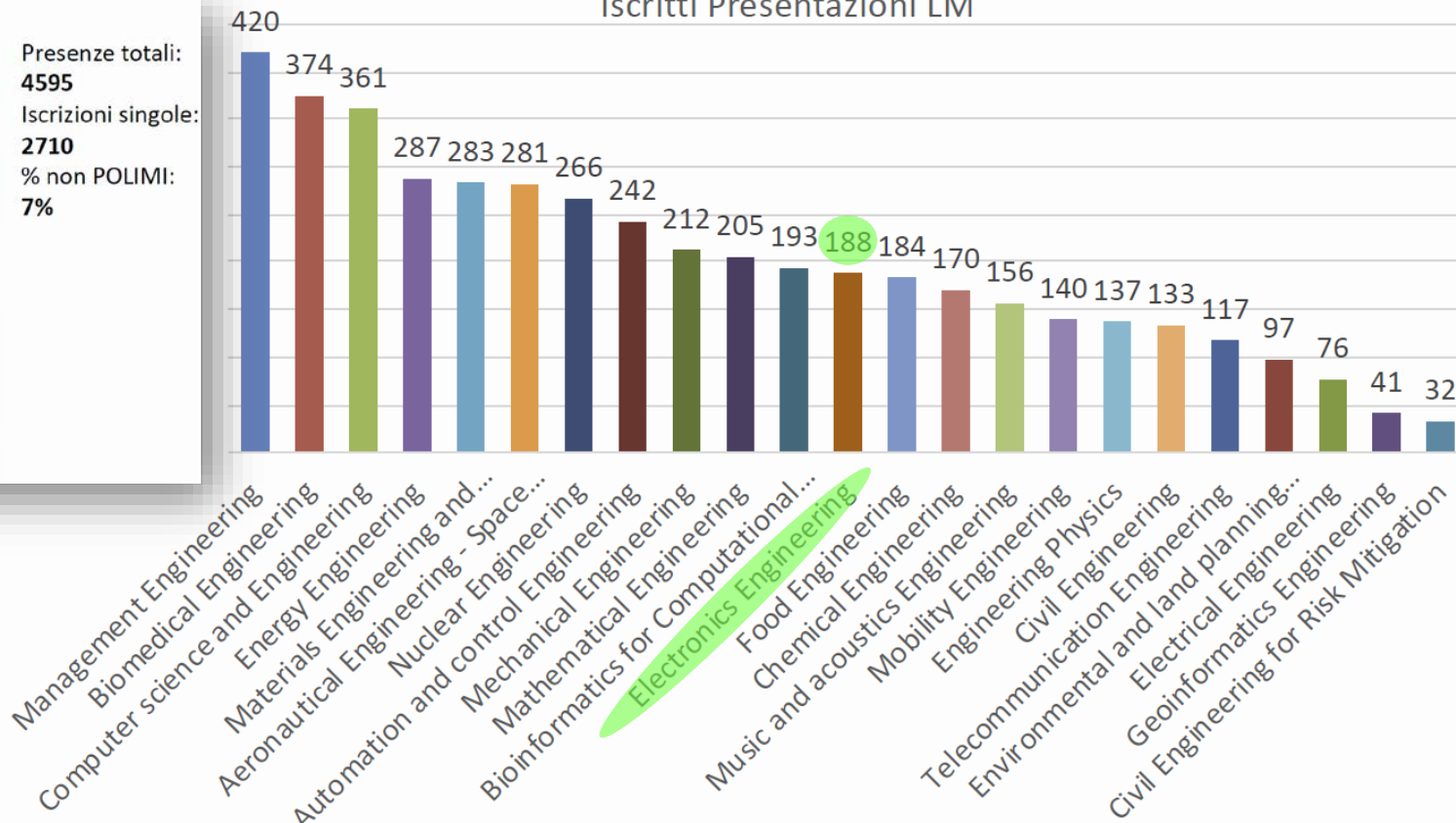
AERONAUTICAL ENGINEERING - SPACE ENGINEERING May 20 5.00 PM - Room B2.07.01 Bresso Campus
AUTOMATION AND CONTROL ENGINEERING May 24 5.00 PM - Room 5.00 Leonardo Campus
BIOINFORMATICS AND COMPUTATIONAL GENOMICS May 05 5.00 PM - Room 5.07 Leonardo Campus
BIOLOGICAL ENGINEERING May 09 5.00 PM - Room 5.02 Leonardo Campus
CHEMICAL ENGINEERING AND INGENIERIA DELLA PREVENZIONE E SICUREZZA May 17 5.00 PM - Room 5.03 Leonardo Campus
CIVIL ENGINEERING May 13 5.00 PM - Room 5.07 Leonardo Campus
CIVIL ENGINEERING FOR RISK MITIGATION May 04 5.00 PM - Room 5.08 Leonardo Campus
COMPUTER SCIENCE AND ENGINEERING May 03 5.00 PM - Room 02 Leonardo Campus
ELECTRONICS ENGINEERING May 14 5.00 PM - Room 5.00 Leonardo Campus
ELECTRICAL ENGINEERING May 17 5.00 PM - Room 02 Leonardo Campus
ENERGY ENGINEERING May 08 5.00 PM - Room B2.07.01 Bresso Campus
ENGINEERING PHYSICS May 24 5.00 PM - Room 5.08 Leonardo Campus
ENVIRONMENTAL AND LAND PLANNING ENGINEERING May 06 5.00 PM - Room 5.07 Leonardo Campus
FOOD ENGINEERING May 09 5.00 PM - Room 5.08 Leonardo Campus
GEOMATICS ENGINEERING May 03 5.00 PM - Room 5.08 Leonardo Campus
MECHANICAL ENGINEERING May 16 5.00 PM - Room 5.02 Leonardo Campus
NUCLEAR ENGINEERING May 01 5.00 PM - Room B2.07.01 Bresso Campus
ROBOTICS ENGINEERING May 01 5.00 PM - Room 02 Leonardo Campus
SAFETY ENGINEERING May 01 5.00 PM - Room B2.07.01 Bresso Campus
WATER AND ACQUEDUCTS ENGINEERING May 02 5.00 PM - Room 5.07 Leonardo Campus
WATER AND ACQUEDUCTS ENGINEERING May 02 5.00 PM - Room B2.07.01 Bresso Campus
MATERIALS ENGINEERING AND NANOTECHNOLOGIES May 10 5.00 PM - Room 5.03 Leonardo Campus
MICROBIAL ENGINEERING May 01 5.00 PM - Room B2.07.01 Bresso Campus
MOLAR ENGINEERING May 16 5.00 PM - Room 02 Leonardo Campus
TELECOMMUNICATIONS ENGINEERING May 04 5.00 PM - Room 02 Leonardo Campus

PER ISCRIVERE: WWW.POLITECNICO.MI/POLIMI/PRESENTAZIONI



Presenze totali:
4595
Iscrizioni singole:
2710
% non POLIMI:
7%

Iscritti Presentazioni LM





Differences among ENGINEERING courses

Some LM are:

- inclusive, **INFORMATIVE**, **TRANSVERSAL**, **GENERALISTIC**, **CONNECTING**



- seeking, **TOOLS**, **UNFOCUSED**, **THEORETICAL**, **MODELLING**



- selective, **FOCUSED**, **VERTICAL**, **PRACTICAL**, **ENABLING**





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Max freshmen at the LAUREE

"Scuola 3I"

"Numeri programmati":

180 max at L ELN

		IMMATRICOLABILI UE	Extra UE	"Marco Polo"	TOTALE
Ingegneria Biomedica	Milano-Leo	480	10	3	490
Ingegneria Gestionale	Milano-Bov	680	15	3	695
	Cremona	120	5	1	125
Ingegneria Matematica	Milano-Leo	340	5	2	345
Ingegneria Fisica	Milano-Leo	180	5	2	185
Ingegneria Chimica	Milano-Leo	220	4	2	224
Ingegneria dei Materiali e delle Nanotecnologie	Milano-Leo	230	10	2	240
Ingegneria Elettrica	Milano-Leo	160	8	2	168
Ingegneria Aerospaziale	Milano-Bov	480	10	3	490
Ingegneria Energetica	Milano-Bov	340	10	3	350
Ingegneria Meccanica	Milano-Bov	600	8	3	608
	Piacenza	130	8	3	138
Ingegneria Elettronica	Milano-Leo	170	10	3	180
Ingegneria Informatica	Milano-Leo	720	15	4	735
	Cremona	120	5	1	125
	IOL	150	0	0	150
Ingegneria dell'Automazione	Milano-Leo	300	10	3	310
Ingegneria della Produzione Industriale	Lecco	150	10	2	160
TOTALE L		5570	148	42	5718



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Expected students at the LAUREE MAGISTRALI

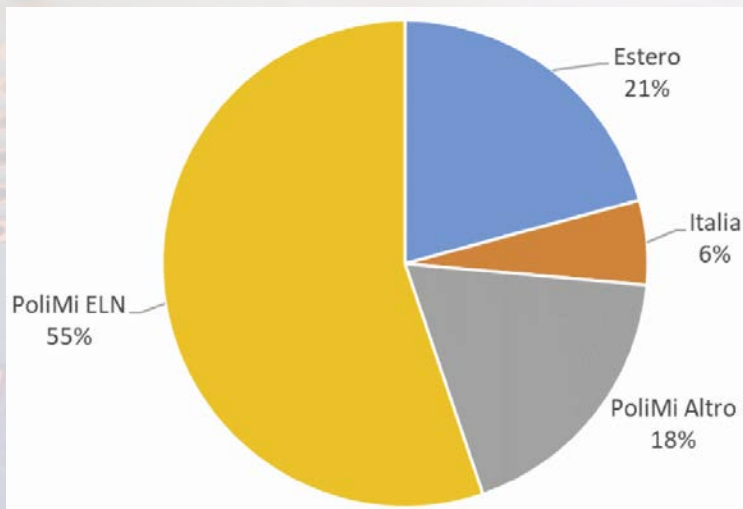
"Scuola 3I"

MAGISTRALE		IMMATRICOLABILI UE	Extra UE	Marco Polo	TOTALE
Biomedical Engineering - Ingegneria Biomedica	Milano-Leo	460	40	3	500
Management Engineering - Ingegneria Gestionale	Milano-Bov	600	150	4	750
Engineering Physics - Ingegneria Fisica	Milano-Leo	100	10	2	110
Mathematical Engineering - Ingegneria Matematica	Milano-Leo	190	10	0	200
Chemical Engineering - Ingegneria Chimica	Milano-Leo	130	20	4	150
Ingegneria della Prevenzione e della Sicurezza nell'Industria di Processo	Milano-Leo	60	10	3	70
Electrical Engineering - Ingegneria Elettrica	Milano-Leo	75	75	4	150
Nuclear Engineering - Ingegneria Nucleare	Milano-Bov	60	20	3	80
Materials Engineering and Nanotechnology - Ingegneria dei Materiali e delle Nanotecnologie	Milano-Leo	200	50	4	250
Aeronautical Engineering - Ingegneria Aeronautica	Milano-Bov	200	25	3	225
Space Engineering - Ingegneria Spaziale	Milano-Bov	100	15	3	115
Energy Engineering - Ingegneria Energetica	Milano-Bov	240	40	3	280
	Piacenza	20	20	1	40
Mechanical Engineering - Ingegneria Meccanica	Milano-Bov	330	60	3	390
	Lecco	50	30	3	80
Telecommunication Engineering - Ingegneria delle Telecomunicazioni	Milano-Leo	70	50	3	120
Electronics Engineering - Ingegneria Elettronica	Milano-Leo	100	30	2	130
Computer Science and Engineering - Ingegneria Informatica	Milano-Leo	370	30	0	400
	Como	0	0	0	0
Music and Acoustic Engineering	Milano-Leo	50	10	0	60
	Cremona	30	10	0	40
Food Engineering	Milano-Leo	60	10	0	70
Mobility Engineering	Milano-Leo	60	10	0	70
Automation and Control Engineering - Ingegneria dell'Automazione	Milano-Leo	170	30	0	200
TOTALE LM		3725	755	48	4480

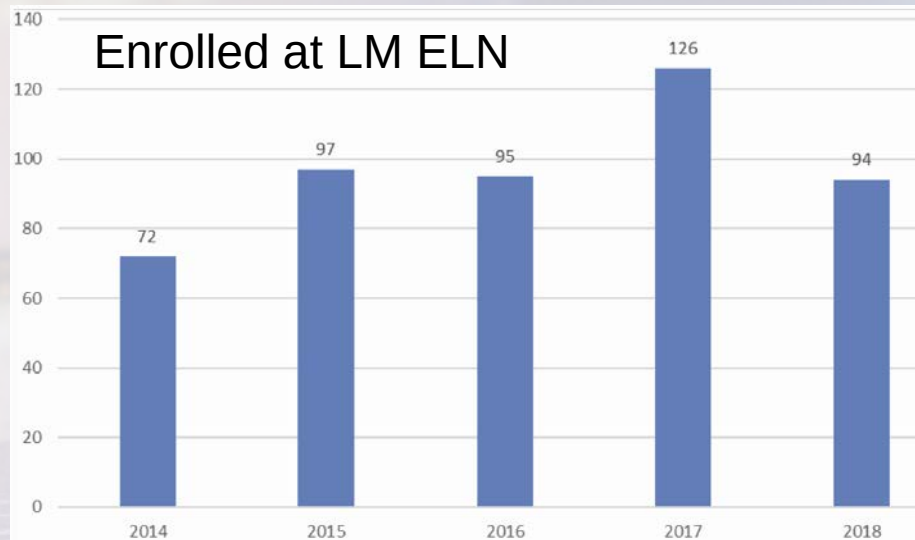
130 new students at LM ELN



Origin from L / B.S.



Enrolled at LM ELN





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LM ELN / M.S.E.E. distribution of marks

Corsi Attivi	Anno	Tipo Corsi
☒ Si	☐ 2015-16 ☐ 2016-17 ☒ 2017-18	☒ LM

Scuola	Anno di Corso
☒ ING_3i	☐ 1 ☐ 1-2 ☐ 2

Corso di Laurea
☒ Seleziona tutto
☐ Aeronautical Engineering - Ingegneria ...
☐ Automation and Control Engineering - I...
☐ Biomedical Engineering - Ingegneria Bi...
☐ Chemical Engineering - Ingegneria Chi...
☐ Computer Science and Engineering - In...
☐ Electrical Engineering - Ingegneria Elett...
☒ Electronics Engineering - Ingegneria Ele...
☐ Energy Engineering - Ingegneria Energ...
☐ Engineering Physics - Ingegneria Fisica
☐ Ingegneria della prevenzione e della sic...
☐ Management Engineering - Ingegneria ...
☐ Materials Engineering and Nanotechnol...
☐ Mathematical Engineering - Ingegneria ...
☐ Mechanical Engineering - Ingegneria M...
☐ Music and Acoustic Engineering
☐ Nuclear Engineering - Ingegneria Nucle...

di Insegnamenti

39

di Iscritti all'Esame

1238

di cui superati

500

% di 30 e Lode

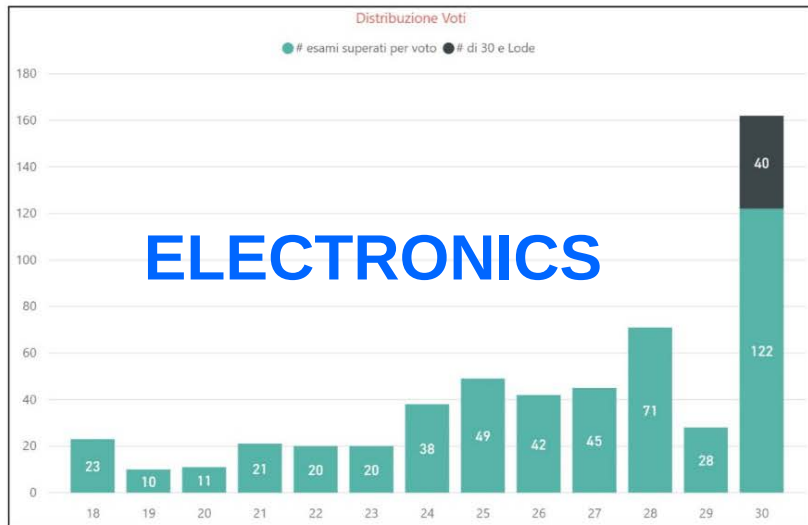
8,00

Voto Medio

26,14

Deviazione Standard

3,10



ELECTRONICS





Domanda di ammissione per ≤ 3 diverse LM

Domanda di ammissione a luglio-settembre (I sem) o gennaio-febbraio (II sem)

Si può accedere sia al primo che al secondo semestre

Conoscenza dell'inglese è **pre-requisito obbligatorio**

Commissione valuta e: **SOGLIA SUL VOTO MEDIO**



Who can enroll to LM ELN

Admitted if:

≥ 23 (L ELN)

or

≥ 24.00 (others)

CLM	regola generale			AES	BIO	CHI	MAT	ATM	TLC	ELT	ELN	ENG prof	ENG prop ENG	ENG prop NUC	FIS	GES CR prop	GES CR prof	GES BV prop1	GES BV prop2	GES BV prof	INF MI/CR	INF CR	INF CO/IOL	IPI_PPG	IPI_PPM	MTM	MEC prof BV	MEC prop BV	MEC prop PC	MEC prof PC	CIV	AMB	ICA	DESIGN	ARCH	EDA
AES	21	K:0.5	N1:6	21									21	21														21	21					24	24	
BIO	22					22																												25	25	
CHI	21.5	K:1	N1:6 N2:6			22																												m	m	
MAT	21	K:1	N1:5 N2:7 >30...				21	m	m							m	m	m	m	m	m	m	m									m	m	m	m	
ATM	23	N1:3	N2:6					22																										m	m	
TLC	24	N1:4						21	21		21					21						21	21	21			21									
ELT	22										21																					m	m	m	m	m
ELN					24			24	24	24	23				24						24					24								m	m	
ENG	25	K:0.5	N1:6 N2:6 >40...	21								21	21	21													21	21	21	21				27	27	
FIS	22						22				22				22																			m	m	
GES	23	K:0.5	N1:5 N2:4.5 ma...													22		22	22					22	22						23	23	23	26	26	23
INF	24																				21	21	21											m	m	
MTM	21.50																									22								24	24	
MEC	25	K:0.5	N1:6	23								23	23	23										23			23	23	23	23				27	27	
MEC LC	25	K:0.5	N1:6	23								23	23	23										23			23	23	23	23				27	27	
NUC				22	22	22	22			22		22			22											22								m	m	
SPA	21	K:0.5	N1:6	21									21	21														21	21		21	21	21	24	24	
SIC																																				



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Dottorato di Ricerca



immissioni da altri Atenei e Internazionali

**"Laurea Magistrale"
e lavoro o R&D**

Laurea Magistrale



immissioni da altri Atenei e Internazionali

"Laurea" e lavoro

Laurea





2. General presentation of the study programme

The Study Programme in Electronics Engineering prepares the student to conceive, design, innovate, validate and disseminate devices, circuits, apparatuses and complex electronic systems and to integrate them into highly multidisciplinary areas, in the most diversified applications and countless high-tech and consumer world markets.

The Study Programme in Electronics Engineering (ELN) is divided into a first-level three-year Bachelor of Science (*Laurea, L*) degree and a second-level two-year Master of Science (*Laurea Magistrale, LM*) degree, with progressively increasing contents and skills. The *Laurea Magistrale* in Electronics Engineering (LM ELN) is equivalent to the Master of Science in Electronics Engineering (M.S.E.E.).

The aim of the LM ELN is to train and complete professional Electronics Engineers with a broad and robust scientific, technological and engineering know-how, so that they acquire the capability of combining the physical-chemical-mathematical aspects of the most advanced sciences with the technological needs of advanced engineering implementations. The LM ELN provides the skills to create enabling technologies, demonstrate innovative applications, design cutting-edge electronic products and systems, integrate them in the most diverse areas, often expanding toward new markets and scenarios, by inventing new fields, and by improving the quality of everyday life.

Electronics is everywhere around us and it is the irreplaceable and enabling basis of all current and future technologies of the Information, Communication, Control, Automation, Energy and Electricity era. Scientific researches and market developments in electronic technologies are continuous, incessant, and increasingly stimulated by the most diverse and demanding applications. For example, ever-faster microprocessors, with low power consumption, but higher and higher computing power, and increasingly dense memories, without defects and of long endurance and short access time, are the essential electronic constituents of any computer and processing system; without such electronic circuits, artificial intelligence would remain only science-fiction. The ultra-sensitive and miniaturized semiconductor sensors, which continually dialogue with each other and towards the outside world, in the most refined robotic systems and in distributed and ubiquitous networks, are fundamental to acquire the real world's signals, understand them, manage them, control them, and implement actions; without such electronic devices, reality would remain only virtual. Electronic devices, from the simplest consumer products of entertainment and gaming to advanced electronic systems for automation and control, communications, information systems, biomedical instrumentation, equipment for energy generation, storage and distribution, avionics, mechatronics and satellite systems, and so on, have become so fundamental that their existence and performance are taken for granted; without such electronic systems there would be no modern world.

Thanks to the success of the LM ELN and the excellence of Electronics Engineers, the design and innovation of electronic devices, electronic circuits, electronic equipment and systems will provide the fundamental building blocks for all areas of modern life, with all its "Smart-" (smart cyber-physical-systems, smart industries, smart manufacturing, smart living, smart mobility, smart lighting, smart cities, smart communities, smart aging, etc.) and "autonomous-" (vehicles, driving, fleet, manufacturing, etc.) features, so invasive in everyday life.

The Master of Science's Electronics Engineer is the inventor of these systems, she/he designs them, develops them, validates them experimentally and eventually installs them into the end-user application. The first task of an Electronics Engineer is to derive models of the physical reality with which his/her electronic systems will interact, to understand, describe, foresee, and verify the interactions with the other mechanical, electrical, energetic, informative, biological, clinical, physical, chemical, nuclear, etc. equipment. It is a refined and multifaceted professional figure, not closed in his world, but oriented to a continuous interaction with the users of these systems. The Electronics Engineer has a propulsive push towards innovation aimed at improving the performance not only of what is electronic-based (e.g., the component, board, instrument, mainframe,

- PROJECTS to train students to put skills into practice;
- CONTEXTS between students and with companies.

As shown in the guidelines for the second-level *Laurea Magistrale* in Electronics Engineering, seven courses offer a total of 12 credits of D.I. Action 1; these are indicated in the following tables with the symbol "d.i." and the number of corresponding credits out of the total number of credits assigned to the course (e.g. the "2.0 d.i." of the "Biochip" subject at the second year, out of the 5 credits total).

Furthermore, in the next academic years other forms of D.I., both in the form of Action 1 and Action 2 activities, will be activated, to allow students to acquire other "soft skills", in addition to technological and scientific knowledge, aimed at improving both public speaking and interactive presentation of achieved results (e.g. the progress of on-going studies or projects), organizational skills, team building and effective teamwork interactions.

Code	Art type	SSD	Course Title	Language	Type	Sem	CFU	CFU Group
012427	B	ING-INF-01	ANALOG CIRCUIT DESIGN	EN	M	1	10.0 (1.0 d.i.)	10.0
014654	B	ING-INF-01	ELECTRONIC SYSTEMS	EN	M	1	10.0	10.0
001555	B	ING-INF-01	ELECTRONIC DEVICES	EN	M	1	10.0	10.0
001827	B	ING-INF-01	MEMS AND MICROSENSORS	EN	M	1	10.0	10.0
001531	B	ING-INF-01	SIGNAL RECOVERY	EN	M	2	10.0	10.0
001584	B	ING-INF-01	DIGITAL INTEGRATED CIRCUIT DESIGN	EN	M	2	10.0	10.0
001574	B	ING-INF-01	PC CIRCUIT DESIGN	EN	M	2	10.0	10.0
014081	B	ING-INF-01	MICROELECTRONIC TECHNOLOGIES	EN	M	2	5.0 (1.0 d.i.)	5.0
014083	B	ING-INF-01	DIGITAL ELECTRONIC SYSTEMS DESIGN	EN	M	2	5.0 (1.0 d.i.)	5.0
—	—	—	Courses to be chosen from Group TAB1	—	—	—	—	5.0

Legend for the "Training Activities" column: "B" are core-courses on characterizing Electronics subjects; "C" are side-courses, i.e. not strictly related to Electronics topics. The more specific, core-courses are those belonging to the specific Scientific Disciplinary Sectors (SSD) "ING-INF / 01 - ELECTRONICS" and also "ING-INF / 02 - Electromagnetic Fields" and "ING-INF / 07 - Electrical Measurements and Electronics".

The 10 credits "ANALOG CIRCUIT DESIGN" core-course provides also 1 credit of Innovative Education (D.I. indicated with "1.0 d.i." in the tables) consisting of lessons delivered with active teaching methods in which the students are asked to answer interactively to questions posed in classroom and at the end of the lessons and by contents addressed in flipped-class mode.

The 5 credits "DIGITAL ELECTRONIC SYSTEM DESIGN" core-course provides 3 credits of D.I. consisting of flipped-class activities with hands-on practice on developmental electronic boards employing configurable electronic FPGA (programmable gate-array) devices and on CAD software tools for the synthesis and simulation of programmable digital electronic systems.

The 5 credit "MICROELECTRONIC TECHNOLOGIES" core-course provides 1 credit of D.I. consisting of a multimedia MOOC (Massive Open Online Course) on some microelectronic manufacturing processing for integrated circuits and of guided tours in laboratories and production rooms of a microelectronic industry.

2 Year courses - Track: PSS - ELECTRONICS ENGINEERING

Code	Art type	SSD	Course Title	Language	Type	Sem	CFU	CFU Group
001580	B	ING-INF-01	MIXED-SIGNAL CIRCUIT DESIGN	EN	M	1	10.0	10.0

000918	B	ING-INF-01	POWER ELECTRONICS	EN	M	1	10.0	10.0
—	—	—	Courses to be chosen from Group TAB1	—	—	—	—	10.0
014085	B	ING-INF-01	BIOCHIP	EN	M	2	5.0 (1.0 d.i.)	5.0
001584	B	ING-INF-01	SEMICONDUCTOR RADIATION DETECTORS	EN	M	2	5.0	10.0
000935	B	ING-INF-01	ELECTRONICS DESIGN FOR BIOMEDICAL INSTRUMENTATION	EN	M	2	10.0	10.0
—	—	—	Courses to be chosen from Group TAB2	—	—	—	—	10.0
—	—	—	Courses to be chosen from Group TAB1	—	—	—	—	10.0
000921	—	—	THESIS AND FINAL EXAM	—	V	1	20.0	20.0
000921	—	—	THESIS AND FINAL EXAM	—	V	2	20.0	20.0

The 5 credit "BIOCHIP" course provides 2 credits of D.I., consisting of a multimedia MOOC (Massive Open Online Course) on microelectronic methodologies for manufacturing electronic devices and biochips, and of some activities where students must design a biochip at the POLI-FAB clean-rooms and laboratories.

Courses of the Group TAB1

Code	Art type	SSD	Course Title	Language	Type	Sem	CFU
012471	C	ING-INF-03	ADVANCED DIGITAL SIGNAL PROCESSING	EN	M	1	10.0 (1.0 d.i.)
004790	C	ING-INF-01	RADAR IMAGING	EN	M	1	5.0
001629	C	ING-INF-01	ADVANCED AND MULTIVARIABLE CONTROL	EN	M	2	10.0
003047	C	ING-INF-04	BIOMATERIALS (C1)	IT	I	2	10.0
003042	C	ING-INF-04	CELLULAR BIOPROCESSING	IT	M	1	10.0
007399	C	FIS-01	ADVANCED OPTICS AND LASERS	EN	M	1	10.0
005942	C	ING-INF-01	DIGITAL SYSTEMS DESIGN METHODOLOGIES	EN	I	2	10.0
073011	C	ING-INF-06	BIOPROCESSING OF THE MOTOR SYSTEM	IT	M	1	5.0
009282	C	BIO-10	BIOMATHEMATICS AND FUNCTIONAL GENOMICS	IT	M	1	5.0
006617	C	FIS-01	PHYSICS OF PHOTONIC LASER PROCESSES	EN	M	1	5.0
013351	C	ING-INF-01	MODEL IDENTIFICATION AND DATA ANALYSIS	EN	I	1	10.0
000801	C	FIS-03	QUANTUM OPTICS AND INFORMATION	EN	M	2	5.0
003062	C	ING-INF-04	AUTOMATION AND CONTROL IN VEHICLES	EN	M	2	5.0
014512	C	ING-INF-01	DIGITAL COMMUNICATION	EN	I	1	10.0 (1.0 d.i.)
000849	C	ING-INF-01	ADVANCED COMPUTER ARCHITECTURES	EN	M	2	5.0
000914	C	ING-INF-04	CONTROL OF INDUSTRIAL ROBOTS	EN	M	1	5.0
000907	C	ING-INF-01	EMBEDDED SYSTEMS	EN	I	1	10.0
006600	C	MAT-08	NUMERICAL METHODS IN MICROELECTRONICS	EN	M	2	5.0
012430	C	ING-INF-03	QUANTUM COMMUNICATIONS	EN	M	2	5.0
004840	C	FIS-03	SOLID STATE PHYSICS A	EN	M	2	5.0
006331	C	ING-INF-01	ADVANCED CIRCUIT THEORY	EN	M	2	5.0

In TAB1 there are 5 and 10 credit electives taught in Italian that students can select.

Courses of the Group TAB2

Code	Art type	SSD	Course Title	Language	Type	Sem	CFU
000918	B	ING-INF-01	POWER ELECTRONICS	EN	M	1	10.0



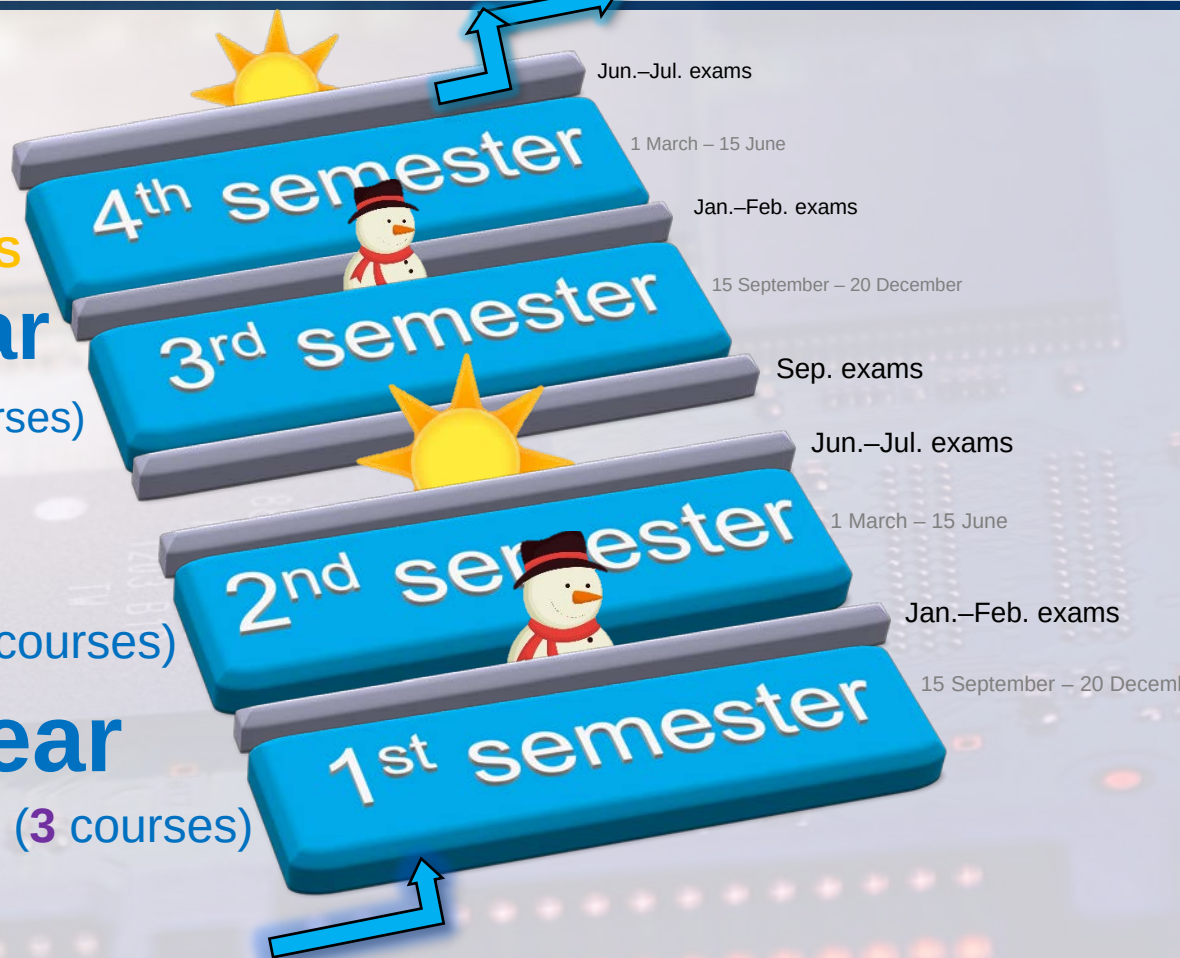
10 cfu (1 course)
plus 20 cfu THESIS

60 cfu second year

30 cfu (4 courses)

60 cfu first year

30 cfu (3 courses)





in English 

100 cfu total in about **12** courses
(25 cfu of choices)

20 cfu of experimental thesis
(at POLIMI labs or internship)

Moreover: **ERASMUS**,
DOPPIA LAUREA

	tipologia	Nome Insegnamento	Sem	CFU	di cui di D.I.	CFU Gruppo
1° anno LM ELN	caratterizzante	ANALOG CIRCUIT DESIGN	1	10	1	10
	caratterizzante	ELECTRONIC SYSTEMS	1	10		10
	caratterizzante	ELECTRON DEVICES	1	10		10
	caratterizzante	MEMS AND MICROSENSORS	1	10		10
	caratterizzante	SIGNAL RECOVERY	2	10		10
	caratterizzante	DIGITAL INTEGRATED CIRCUIT DESIGN	2	10		10
	caratterizzante	RF CIRCUIT DESIGN	2	10		10
	caratterizzante	DIGITAL ELECTRONIC SYSTEMS DESIGN	2	5	3	5
	caratterizzante	MICROELECTRONIC TECHNOLOGIES	2	5	1	5
	affine	<i>Insegnamenti a scelta dal Gruppo TAB1</i>	--	--		5
2° anno LM ELN	caratterizzante	MIXED-SIGNAL CIRCUIT DESIGN	1	10		10
	caratterizzante	POWER ELECTRONICS	1	10		10
	affine	<i>Insegnamenti a scelta dal Gruppo TAB1</i>	--	--		10
	caratterizzante	BIOCHIP	2	5	2	5
	caratterizzante	SEMICONDUCTOR RADIATION DETECTORS	2	5		10
	caratterizzante	ELECTRONICS DESIGN FOR BIOMEDICAL INSTRUM.	2	10		10
	affine	<i>Insegnamenti a scelta dal Gruppo TAB1 o TAB2</i>	--	--		10
				THESIS AND FINAL EXAM		20



LM ELN / M.S.E.E. elective courses (your own choice)

Insegnamenti del Gruppo TAB1

SSD	Denominazione Insegnamento	Sem	CFU	di cui di D.I.
FIS/03	PHYSICS OF PHOTOVOLTAIC PROCESSES	1	5	
FIS/03	ADVANCED OPTICS AND LASERS	1	10	
FIS/03	QUANTUM OPTICS AND INFORMATION	2	5	
FIS/03	SOLID STATE PHYSICS A	2	5	
ING-IND/31	ADVANCED CIRCUIT THEORY	2	5	
ING-INF/03	DIGITAL COMMUNICATION	1	10	1
ING-INF/03	ADVANCED DIGITAL SIGNAL PROCESSING	1	10	1
ING-INF/03	RADAR IMAGING	1	5	
ING-INF/03	QUANTUM COMMUNICATIONS	2	5	
ING-INF/04	CONTROL OF INDUSTRIAL ROBOTS	1	5	
ING-INF/04	MODEL IDENTIFICATION AND DATA ANALYSIS	1	10	
ING-INF/04	AUTOMATION AND CONTROL IN VEHICLES	2	5	
ING-INF/04	ADVANCED AND MULTIVARIABLE CONTROL	2	10	
ING-INF/05	EMBEDDED SYSTEMS	1	10	
ING-INF/05	DIGITAL SYSTEMS DESIGN METHODOLOGIES	2	10	
ING-INF/05	ADVANCED COMPUTER ARCHITECTURES	2	5	
ING-IND/34	BIOMATERIALI [C.I.]	2	10	
ING-IND/34	BIOINGEGNERIA CELLULARE	1	10	
ING-INF/06	BIOINGEGNERIA DEL SISTEMA MOTORIO	1	5	
BIO/10	BIOINFORMATICA E GENOMICA FUNZIONALE	1	5	
MAT/08	NUMERICAL METHODS IN MICROELECTRONICS	2	5	

Insegnamenti del Gruppo TAB2

SSD	Denominazione Insegnamento	Sem	CFU	di cui di D.I.
caratterizzante	BIOCHIP	2	5	2
caratterizzante	DIGITAL ELECTRONIC SYSTEMS DESIGN	2	5	
caratterizzante	DIGITAL INTEGRATED CIRCUIT DESIGN	2	10	
caratterizzante	ELECTRON DEVICES	1	10	
caratterizzante	ELECTRONICS AND ELECTROACOUSTIC FOR SOUND ENG.	2	10	
caratterizzante	ELECTRONICS DESIGN FOR BIOMEDICAL INSTRUM.	2	10	
caratterizzante	MEMS AND MICROSENSORS	1	10	
caratterizzante	MICROELECTRONIC TECHNOLOGIES	2	5	1
caratterizzante	MIXED-SIGNAL CIRCUIT DESIGN	1	10	
caratterizzante	POWER ELECTRONICS	1	10	
caratterizzante	RF CIRCUIT DESIGN	2	10	
caratterizzante	SEMICONDUCTOR RADIATION DETECTORS	2	5	
caratterizzante	SENSOR SYSTEMS	1	5	3
caratterizzante	ANTENNAS	2	5	
caratterizzante	ELECTROMAGNETIC COMPATIBILITY	1	5	
caratterizzante	MICROWAVE ENGINEERING	2	5	
caratterizzante	PHOTONIC DEVICES	2	10	
caratterizzante	RF SYSTEMS	1	10	
caratterizzante	OPTICAL MEASUREMENTS	1	5	

- proposed choices, among many others

Only one track

(PSS – ELECTRONICS ENGINEERING)

Examples of paths:

- advanced electronic **systems**
- **devices** for photonics, biochips, nanotechnologies
- microelectronic **integrated circuits**
- electronics for **medicine and biotechnology**

School of Industrial and Information Engineering
Electronics Engineering (Milano Leonardo) - 2019/2020

10 credits in electives;
20 credits for the Master Thesis; one credit out of 20 is specifically meant for the acquisition of additional language skills.

7.2. Mode of study

The course is full-time; it includes attendance to lectures, exercise classes and laboratory activities, as well as personal study.
The entire course is taught in English, with only a few electives taught in Italian.

7.3. Detailed learning objectives

1 Year courses - Track: PSS - ELECTRONICS ENGINEERING

The Study Plan of the LM ELN provides a single course programme, with courses mostly in English and possibly with some courses taught in Italian. The organization of the Study Plan was deliberately kept extremely straightforward, to favour as possible choices among electives and to offer maximum freedom in the choice of a personalized Study Plan, open to the interests and attitudes of each student.

In the first year of the LM ELN there are some courses considered solid and automatically approved.
In the first year of the LM ELN there are some courses considered preparation of every electronic student and designed to deepen the knowledge of electronic systems and for processing electronic signals: "Power Electronics for Sound Engineers" and "Signal Recovery". Moreover, all some electives can be selected in order to reach an extremely high level of specialization. This structure makes it possible for the student to choose specific areas of advanced scientific and technological development. The examples shown are far from being exhaustive. In the following, here are some paths that can be followed in the first year of the LM ELN, based on the specialization in Electronics Engineering. The Study Plan lends itself to valid paths from the extremely diversified in the final applications.

Advanced Electronic Systems Design - The student who has interests in the application of electronic technologies for health, medicine and biotechnology finds a dedicated offer in the application of "Electronics Design for Biomedical Instrumentation", "Biochip", "Semiconductor Radiation Detectors", "Digital Electronic System Design", "Biogenetica Cellulare" and others. The aforementioned courses can be selected to form the Study Plan. In fact, electronic technologies are now mandatory also in the medical industry. Thanks to electronic technologies, it has been possible to develop and make available to the human body and intervention techniques (biotechnology, PET positron-emission tomography) or assisted surgery. Miniaturized systems (biotechnology, PET positron-emission tomography) or assisted surgery. Identification of pathogens, and electronic devices for the identification of proteins, DNA, and bacteria are on the way to reach the market. The curriculum in Electronics Engineering explores the design criteria and micro-fabrication processes of these new bio-electronic systems and prepares the future graduate to be a leader in this area of science and industry.

Design of microelectronic

Data: 23/Mar/2019
Pag: 13/20

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Electronics Engineering (Milano Leonardo) - 2019/2020

The student interested in the design of electronic devices for digital and analog electronics, optoelectronic devices or of sensors, can find a specific offer, for example, in the core-courses "Electron Devices", "MemS and Microsensors", "Microelectronic Technologies", "Semiconductor Radiation Detectors", "Biochip", "Photonic Devices", "Quantum Optics and Information" and "Numerical Methods in Microelectronics". The miniaturization of today's integrated technologies and the development of new enabling technologies are the engines of modern electronics, the main drivers of performance boost and ubiquity of components and electronic systems in daily life. To be able to operate successfully in this area an electrical engineer must have strong skills in fundamental physics and principles of operation of the most important electronic devices, integrated micro- and nano-electronic technologies and possible future innovative lines of modern electronics. The curriculum in Electronics Engineering offers courses, in order to complete a high-level training in electronic devices and integrated technologies.

Microelectronic Integrated Circuits Design - Students interested in the design of integrated circuits and System-on-Chips of increasing complexity find a dedicated offer, for example, in courses like "Digital Integrated Circuit Design", "RF Circuit Design", "Power Electronics", "Mixed-Signal Circuit Design", "Embedded Systems", "Advanced Circuit Theory" and others. The enormous development of the digital society is, in fact, made possible by the fabrication of integrated circuits on a single silicon chip housing now more than a billion transistors featuring dimensions of few tens of nanometres. This trend opens up continuous new perspectives, such as wireless connection to many Gb-second, massive computing power and large memory systems, and poses very advanced design challenges, for example to design circuits with high performance and very low power consumption and/or operating at frequencies above 100 GHz. The curriculum in Electronics Engineering provides a high-level education above 100 GHz. The knowledge of physics and technology - at the base of the working principles of the new nanoscale devices - with the ability to design advanced circuit architectures to target those complex applications.

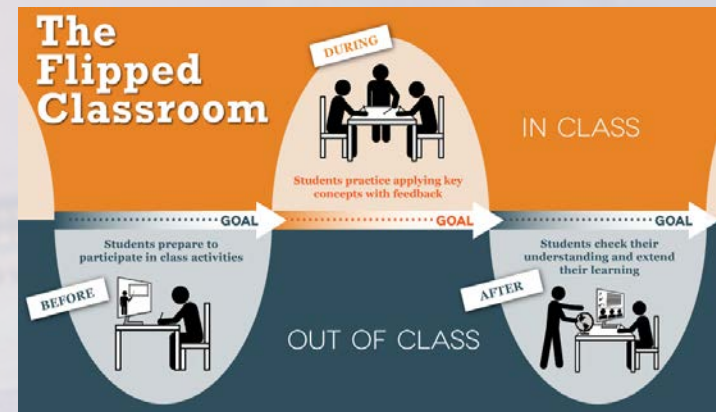
Electronics for Medicine and Biotechnology - The student who has interests in the application of electronic technologies for health, medicine and biotechnology finds a dedicated offer in the application of "Electronics Design for Biomedical Instrumentation", "Biochip", "Semiconductor Radiation Detectors", "Digital Electronic System Design", "Biogenetica Cellulare" and others. The aforementioned courses can be selected to form the Study Plan. In fact, electronic technologies are now mandatory also in the medical industry. Thanks to electronic technologies, it has been possible to develop and make available to the human body and intervention techniques (biotechnology, PET positron-emission tomography) or assisted surgery. Miniaturized systems (biotechnology, PET positron-emission tomography) or assisted surgery. Identification of pathogens, and electronic devices for the identification of proteins, DNA, and bacteria are on the way to reach the market. The curriculum in Electronics Engineering explores the design criteria and micro-fabrication processes of these new bio-electronic systems and prepares the future graduate to be a leader in this area of science and industry.

In addition to core-courses "characterizing" the Electronics programme, other "complementary" side courses are available, organized in two groups listed in tables TAB1 and TAB2. The core-courses (labelled "B" in the following tables) are those specifically related to Electronics, namely those belonging to the Scientific Disciplinary Sector (SSD) "ING-INF / 01 - Electronics", but also to "ING-INF / 02 - Electromagnetic fields" and "ING-INF / 07 - Electrical and Electronic Measurements".



ACTION 1 – curricular (gives credits):

- *soft-skills* with cross-contents
- *flipped-class*
- co-tutoring with companies
- **M**_{assive} **O**_{pen} **O**_{nline} **C**_{ourses}, www.pok.polimi.it



ACTION 2 – extracurricular (just in Diploma Supplement)

- *Kick-starter Workshop* Public Speaking Mnemonic Goal Mapping
 Problem solving Project Management Pitch
- *Projects* for training Entrepreneurial mindset Efficient Communication
- *Contest*, challenges, entrepreneurship





Example of weekly timetable

Data	Dove	09.00	10.00	11.00	12.00	13.00	14.00	15.00	16.00	17.00	18.00	19.00	20.00
Lunedì	D.1.2						[lezione] ANALOG CIRCUIT DESIGN (dal 17/09/2018 al 17/12/2018)						
	E.G.6	[lezione] CONTROL OF INDUSTRIAL ROBOTS (dal 17/09/2018 al 17/12/2018)											
Martedì	D.0.4			[lezione] ELECTRONIC SYSTEMS (dal 09/10/2018 al 18/12/2018)									
	S.1.3							[lezione] MEMS AND MICROSENSORS (dal 18/09/2018 al 18/12/2018)					
	E.G.8							[esercitazione] MEMS AND MICROSENSORS (dal 09/10/2018 al 11/12/2018)					
	D.0.4	[lezione] MEMS AND MICROSENSORS (dal 09/10/2018 al 18/12/2018)											
Mercoledì	D.1.2					[lezione] ANALOG CIRCUIT DESIGN (dal 19/09/2018 al 19/12/2018)							
	N.1.2								[lezione] MEMS AND MICROSENSORS (dal 19/09/2018 al 19/12/2018)				
	D.1.2	[lezione] CONTROL OF INDUSTRIAL ROBOTS (dal 19/09/2018 al 19/12/2018)											
Giovedì	E.G.2	[esercitazione] ANALOG CIRCUIT DESIGN (dal 20/09/2018 al 20/12/2018)											
	E.G.4					[lezione] ELECTRONIC SYSTEMS (dal 20/09/2018 al 20/12/2018)							
	E.G.1								[lezione] MEMS AND MICROSENSORS (dal 20/09/2018 al 20/12/2018)				
Venerdì	L.26.14												
	D.1.1	[lezione] ANALOG CIRCUIT DESIGN (dal 21/09/2018 al 21/12/2018)				[lezione] ELECTRONIC SYSTEMS (dal 21/09/2018 al 21/12/2018)				[lezione] ANALOG CIRCUIT DESIGN (dal 21/09/2018 al 21/12/2018)			
Sabato													

Insegnamenti selezionati		Denominazione Insegnamento		Docente	Cfu	Anno corso	Semestre	Data inizio	Data fine	Rimuovi
Visualizza	Legenda	Ing. Ind-Inf (Mag.) (ord. 270) - MI (476) Electronics Engineering - Ingegneria Elettronica								
☒		052427 - ANALOG CIRCUIT DESIGN		Lacaita Andrea Leonardo	10.00	--	1	17/09/2018	21/12/2018	
☒		088724 - ELECTRONIC SYSTEMS		Zappa Franco	10.00	--	1	20/09/2018	21/12/2018	
☒		095162 - MEMS AND MICROSENSORS		Langfelder Giacomo	10.00	--	1	18/09/2018	20/12/2018	
☒		090914 - CONTROL OF INDUSTRIAL ROBOTS		Rocco Paolo	5.00	--	1	17/09/2018	19/12/2018	
Aggiorna										

- about 24 h of
- about 3 h of
- some free time for

LESSONS and EXERCISE CLASSES
LABS
lunch, relax, study, enjoy



1. what is ELECTRONICS
2. ELECTRONICS compared to others
3. Laurea Magistrale / Master of Science in **ELECTRONICS ENG**
4. expertizes, skills, employment opportunities
5. research labs in ELECTRONICS
6. further info



LM ELN / M.S.E.E. objectives





- **spot** what to solve and how
- **define** specs, requirements, constraints, costs, pros/cons
- **select** design methodologies and technologies
- **design** electron devices
- **develop** integrated circuits, electronic boards, mixed systems
- **exploit** sensors, actuators, μ P, FPGA, DSP, ... at best
- **integrate** electronics into applications (atm, bio, ene, mec, inf, tlc ...)
- **validate** through instrumentation
- **manage** "ilities" in plants and systems (reliability, manufacturability, testability ...)
- **profit**



- **microelectronics** for semiconductors / integrated circuits
- **high-tech industries** (mechatronics, avionics, energy, automotive, space...)
- **companies** for smart electronics (infotainment, telecomm, computers...)
- **industrial automation** and **robotics** for manufacturing
- **infrastructures** for communications / networks / cloud / grid
- **R&D** genetics / pharmacology / medicine
- **start-up & spin-off** companies
- **consultancy** and **entrepreneurship**
- **public/private scientific/technological organizations**
- **... Ph.D.**



POLIMI ranking for ELECTRONICS

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Engineering - Electrical & Electronic

Engineering - Electric... Read more about [Electrical Engineering Degrees](#)

RANK UNIVERSITY LOCATION

2019 University search By location

1	Massachusetts Institute of Technology (MIT)	More	United States
2	Stanford University	More	United States
3	ETH Zurich - Swiss Federal Institute of Technology	More	Switzerland
4	University of California, Berkeley (UCB)	More	United States
5	University of Cambridge	More	United Kingdom
6	Nanyang Technological University, Singapore (NTU)	More	Singapore
=7	Harvard University	More	United States
=7	Imperial College London	More	United Kingdom

=9	EPFL - Ecole Polytechnique Fédérale de Lausanne	More	Switzerland
=9	National University of Singapore (NUS)	More	Singapore
11	University of Oxford	More	United Kingdom
12	Tsinghua University	More	China
13	University of California, Los Angeles (UCLA)	More	United States
14	Georgia Institute of Technology	More	United States
15	California Institute of Technology (Caltech)	More	United States
16	Carnegie Mellon University	More	United States
17	The University of Tokyo	More	Japan
18	University of Toronto	More	Canada
19	KTH Royal Institute of Technology	More	Sweden
=20	KAIST - Korea Advanced Institute of Science & Technology	More	South Korea

=20	Technical University of Munich	More	Germany
22	The Hong Kong University of Science and Technology	More	Hong Kong
23	Politecnico di Milano	More	Italy
24	Delft University of Technology	More	Netherlands
25	University of Illinois at Urbana-Champaign	More	United States
26	Peking University	More	China
27	Seoul National University	More	South Korea
28	Shanghai Jiao Tong University	More	China
29	University of Texas at Austin	More	United States
=30	Princeton University	More	United States

=30	The University of Hong Kong	More	Hong Kong
32	University of Michigan	More	United States
33	RWTH Aachen University	More	Germany
34	Tokyo Institute of Technology	More	Japan
35	The University of Melbourne	More	Australia
36	The University of New South Wales (UNSW Sydney)	More	Australia
37	National Taiwan University (NTU)	More	Taiwan
38	The University of Manchester	More	United Kingdom
39	Zhejiang University	More	China
=40	Purdue University	More	United States
=40	University of California, San Diego (UCSD)	More	United States
=42	Politecnico di Torino	More	Italy
=42	University of British Columbia	More	Canada



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Employment rates of LM ELN al POLIMI



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occupati

94,6%



in quanto tempo

90,3%

Entro 6 mesi*

9,7%

7-12 mesi

* inclusi i laureati che hanno trovato un impiego contestualmente alla laurea



retribuzione mensile netta

€ 1.647



dove lavorano



Italia **88,6%**

Estero **11,4%**

12,5% italiani che lavorano all'estero
100% stranieri che lavorano in Italia



dimensione aziendale



+500 addetti **37,1%**

50-499 addetti **25,7%**

1-49 addetti **37,2%**



contratti



Tempo indeterminato **60%**

Tempo determinato **8,6%**

Apprendistato **22,8%**

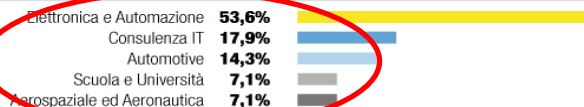
Stage **0%**

Altro **8,6%**

Autonomo **0%**



settori occupazionali (top 5)



CARATTERISTICHE DELLA PROFESSIONE DI INGEGNERE ELETTRONICO A CINQUE ANNI DAL TITOLO



Retribuzione
mensile netta

1.914 €



Utilizzo elevato,
nel lavoro, delle
competenze acquisite
all'università

62,7%

Rapporto 2018

ALMA LAUREA



1. what is ELECTRONICS
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4. expertizes, skills, employment opportunities
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6. further info



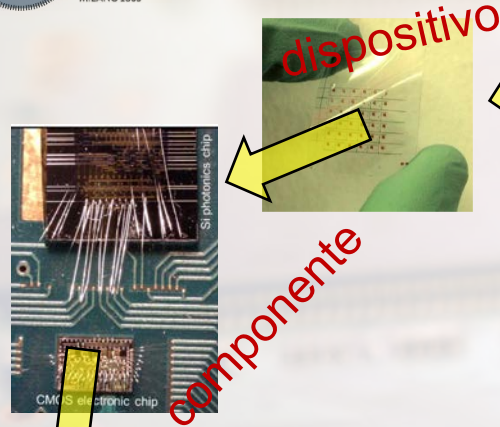
MM2





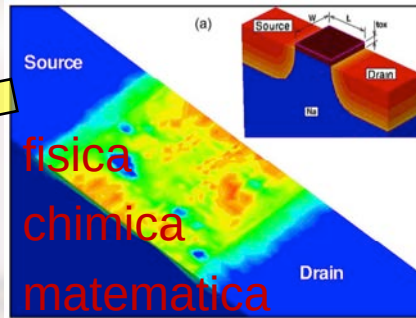
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R&D in ELECTRONICS @ polimi

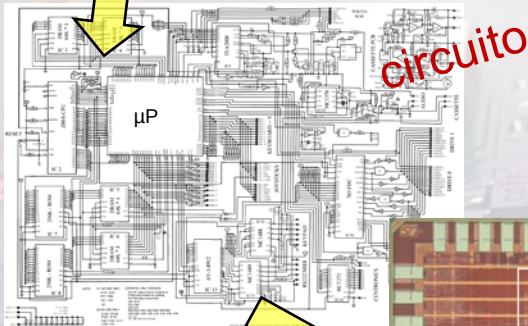


dispositivo

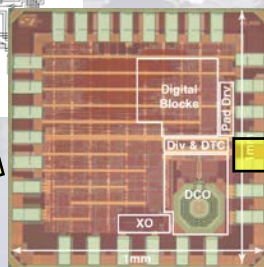
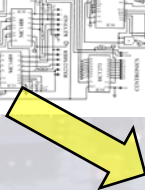
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fisica
chimica
matematica



circolo



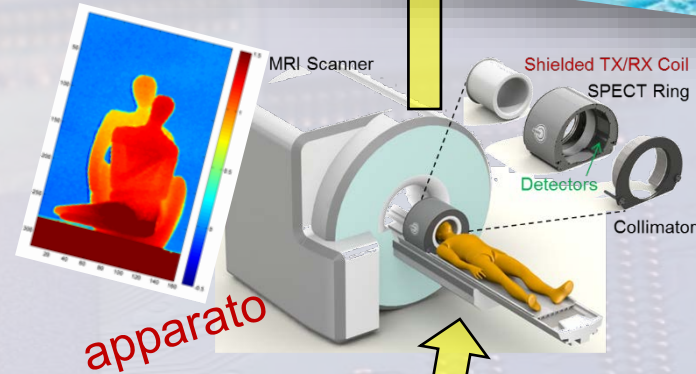
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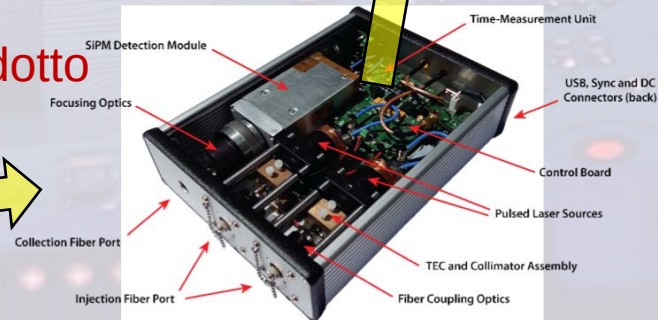
prodotto



sistema



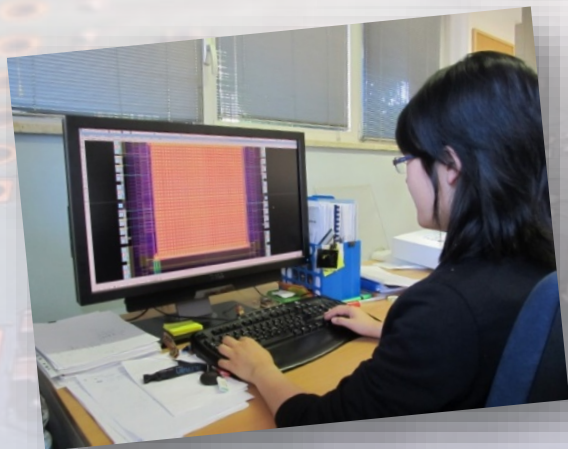
apparato





ELECTRONICS laboratories at POLIMI

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Microelectronic processing at POLIMI: POLI-FAB

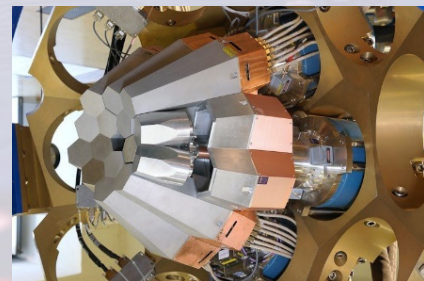
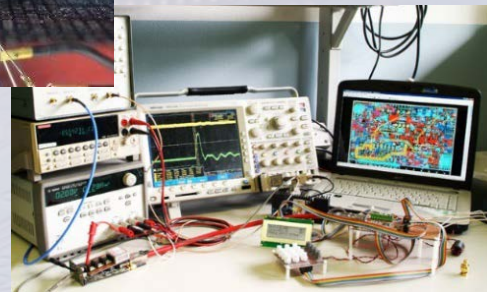
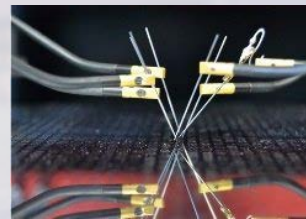
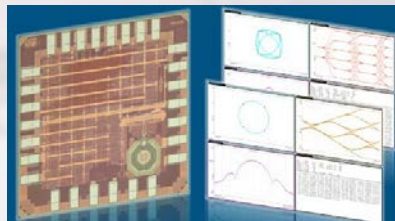
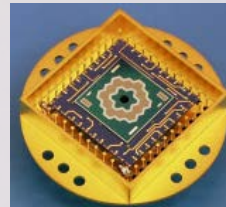
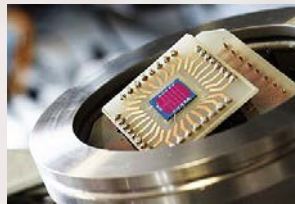


www.polifab.polimi.it

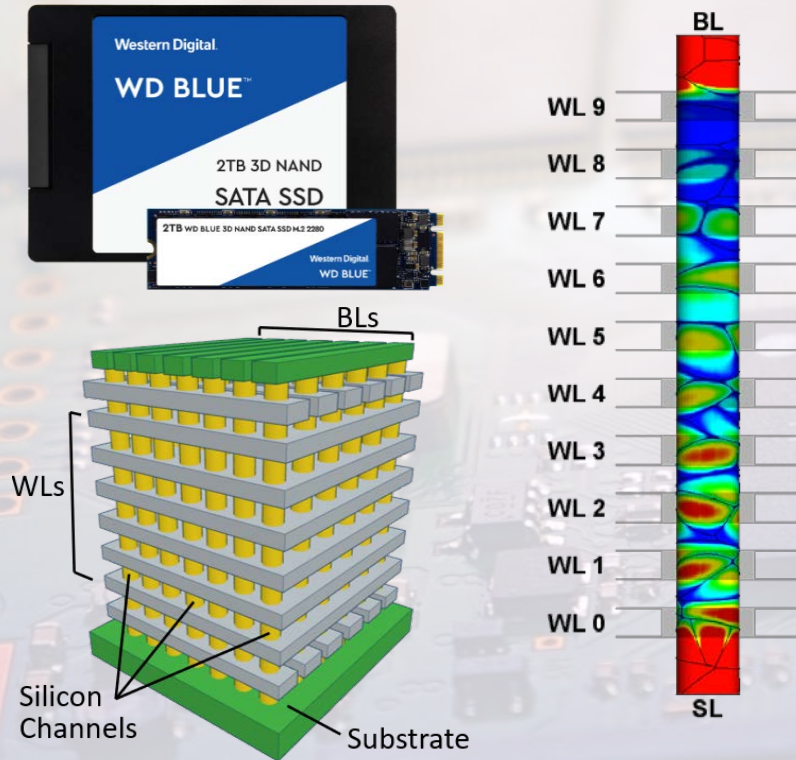




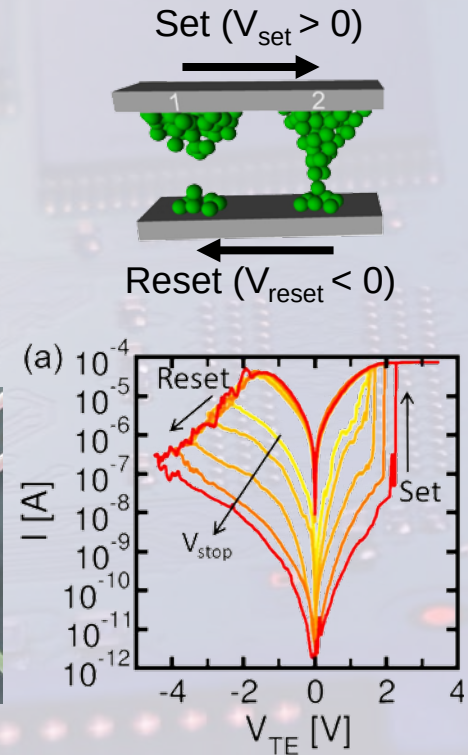
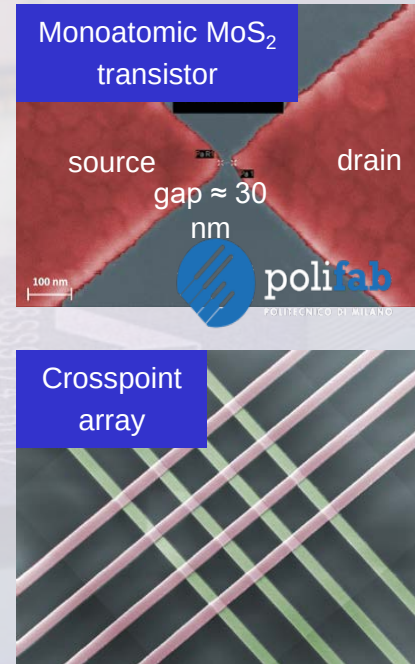
- Nano-electronics devices
- Electronic circuits design
- Digital systems
- Smart microsensors and microsystems
- Single-photon detectors and applications
- Radiation detectors and applications



3D memory characterization and modeling

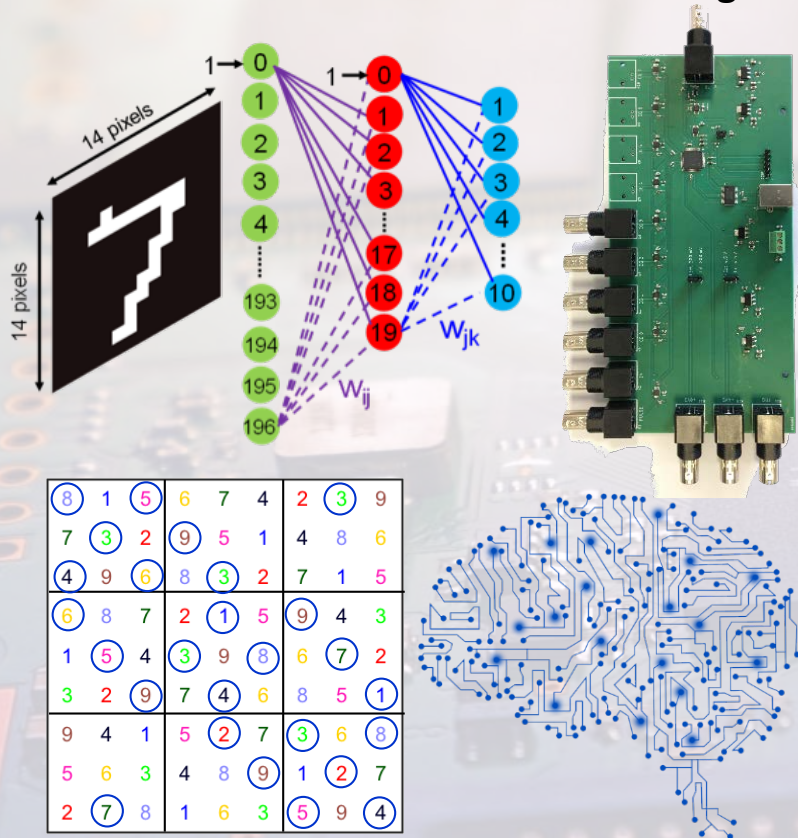


Emerging device fabrication, char. and modeling

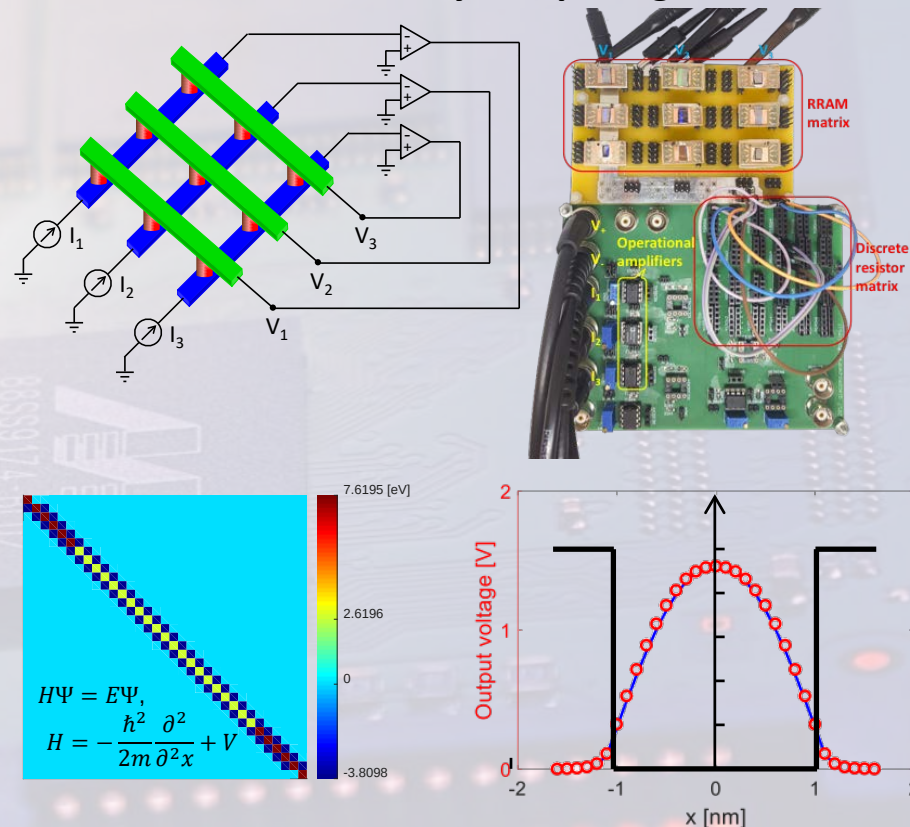




Neural networks and machine learning

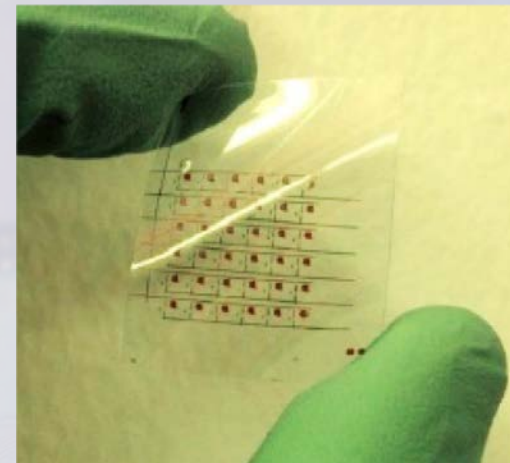


In-memory computing

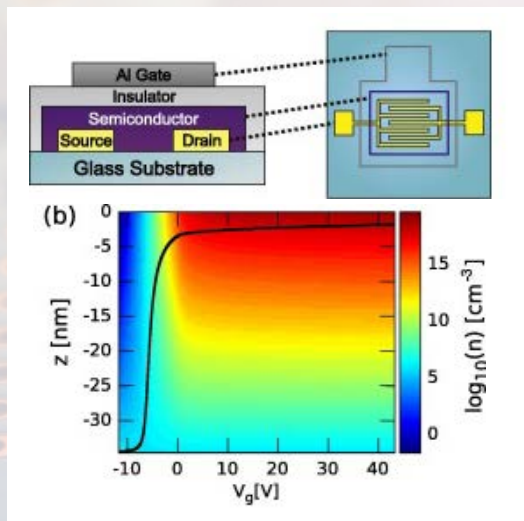




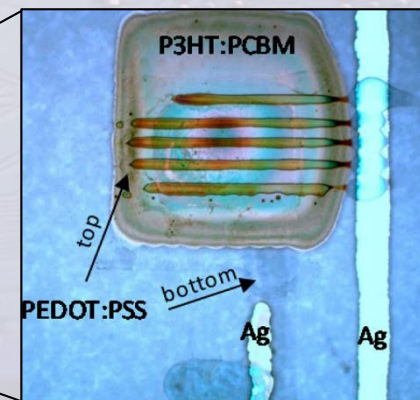
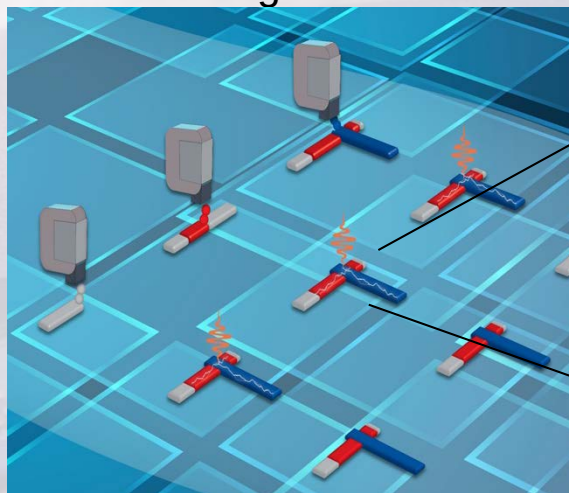
Printed, Large Area Imager



Organic semiconductors:
image sensor ...



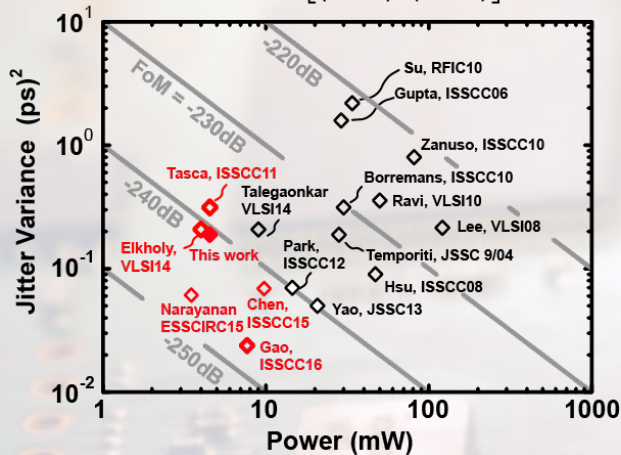
Organic semiconductors:
device modeling and simulation



...single pixel



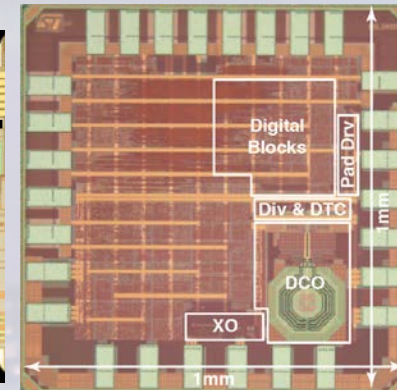
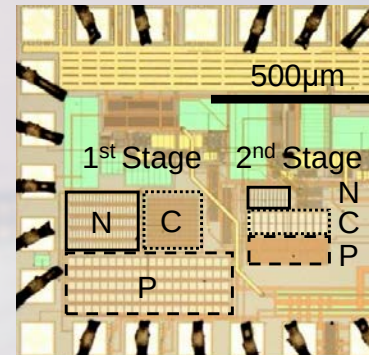
$$FoM = 10 \cdot \log \left[\left(\frac{\text{Jitter}}{1s} \right)^2 \cdot \left(\frac{\text{Power}}{1mW} \right) \right]$$



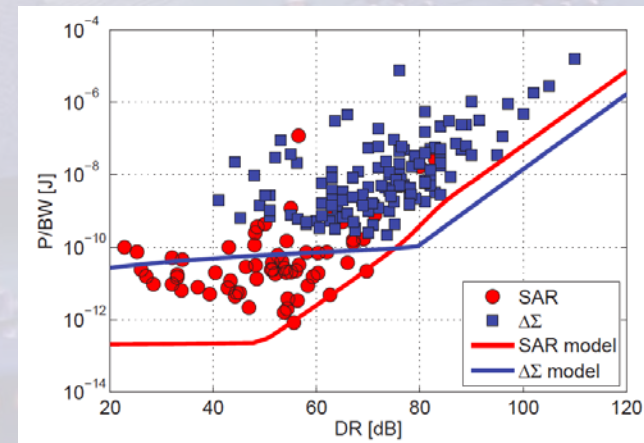
Fundamental limits of
Phase Locked Loops
(PLLs)

RF frequency synthesizers
(1-30 GHz) for wireless
applications (WiFi, LTE,
5G, IoT)

digitally-assisted analog
design

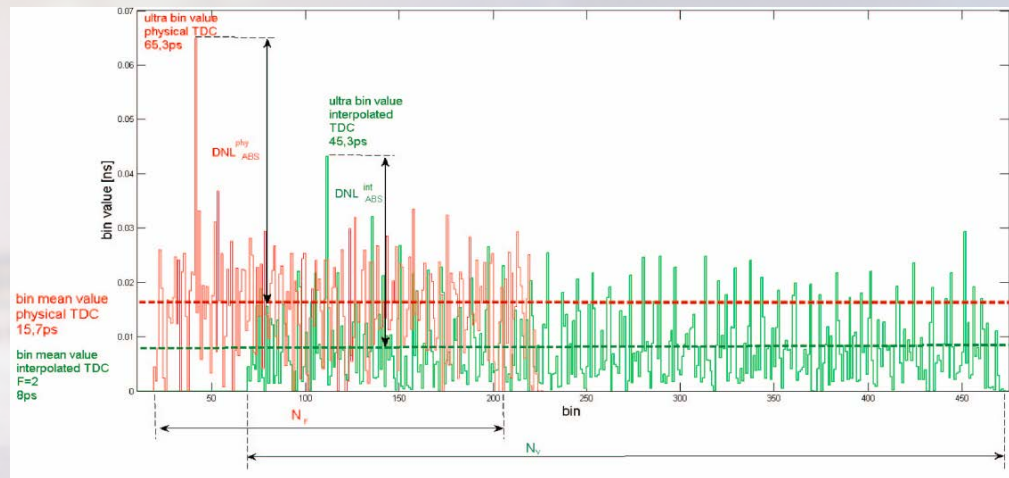
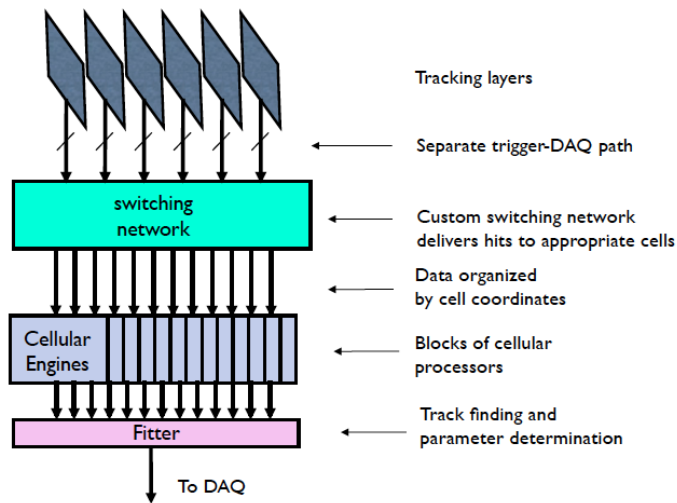


Fundamental power limits of SAR and $\Delta\Sigma$
Analog-to-Digital Converters
analog and mixed-signal (analog/digital)
electronics for low-noise signal detection of
MEMS sensors





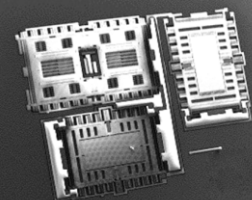
Digital real-time general-purpose processor for high performance timing of events (for nuclear science to medical imaging, for audio and video signal processing)



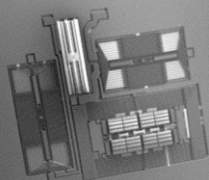
Digital processing architectures for System-on-Chip characterized by high performance, flexibility, scalability, low power and low cost



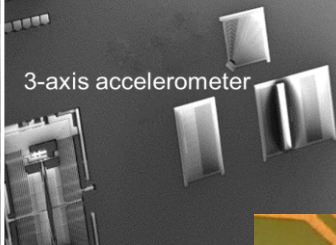
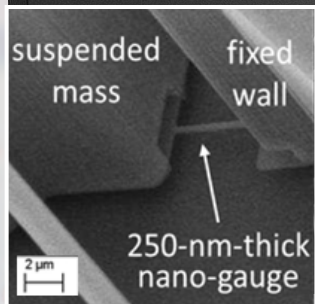
Advanced MEMS and NEMS
for low-noise, high-stability
inertial and magnetic sensors



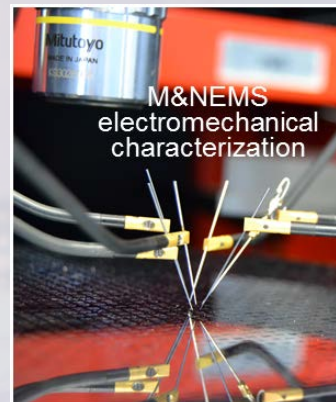
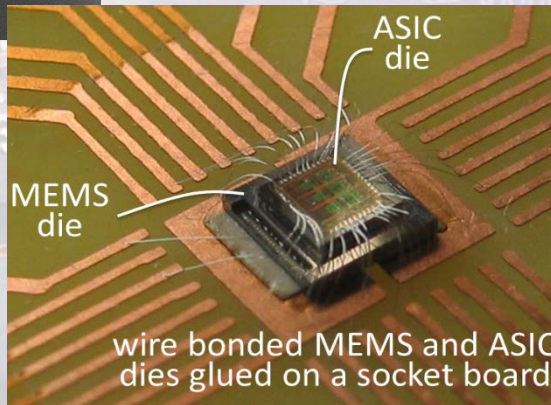
3-axis gyroscope



3-axis magnetometer



3-axis accelerometer



M&NEMS
electromechanical
characterization



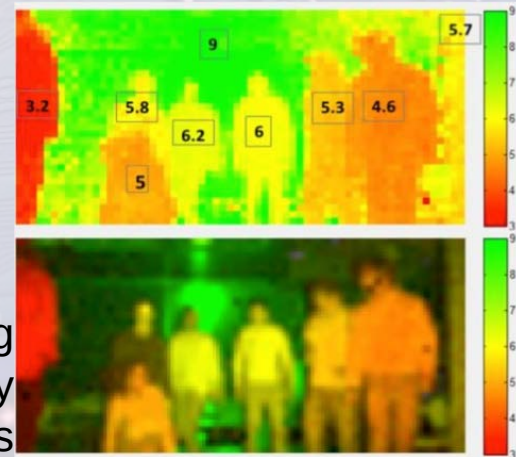
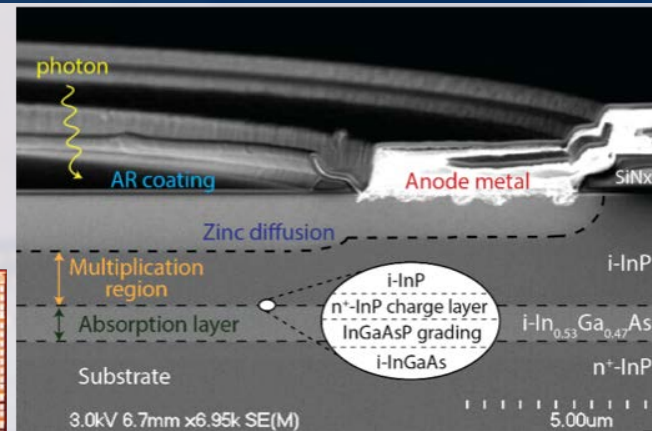
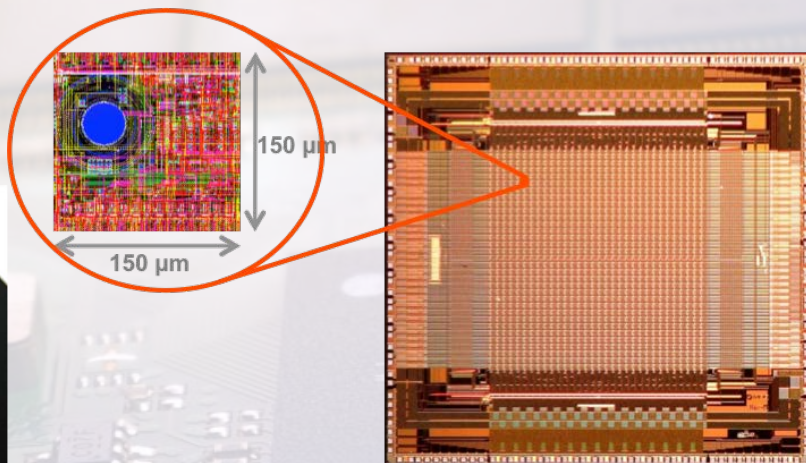
vibration and rate
test of automotive
gyroscopes

Die-level and wafer-level
characterization electronics for
MEMS/NEMS and actuators

Ultra-low-power, low-noise mixed-signal
electronics for sensors in consumer and
biomedical applications



Design, fabrication and characterization of Single Photon Avalanche Diodes (SPAD) in Silicon, CMOS and InGaAs/InP technology



Single molecule spectroscopy for new drugs discovery and for studying Alzheimer and Parkinson

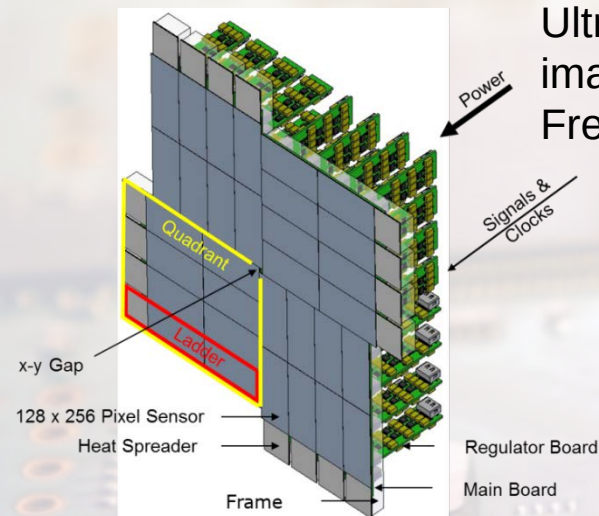
Imagers for 3D photon counting (LIDAR) from automotive safety to deep space explorations



POLITECNICO
MILANO 1863

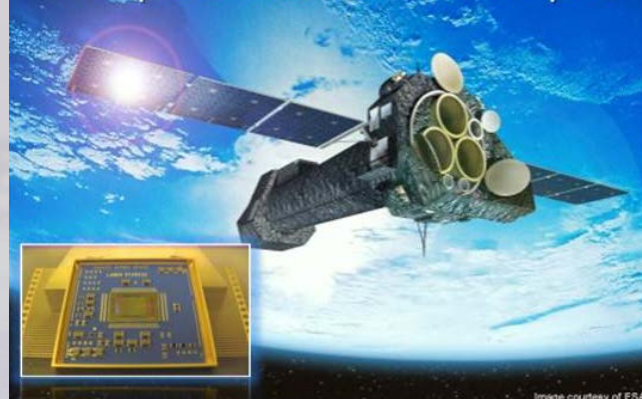
ELN R&D at POLIMI: Radiation detectors and applications

Ultra-fast and large-format X-ray imagers for the European X-ray Free Electron Laser (XFEL)

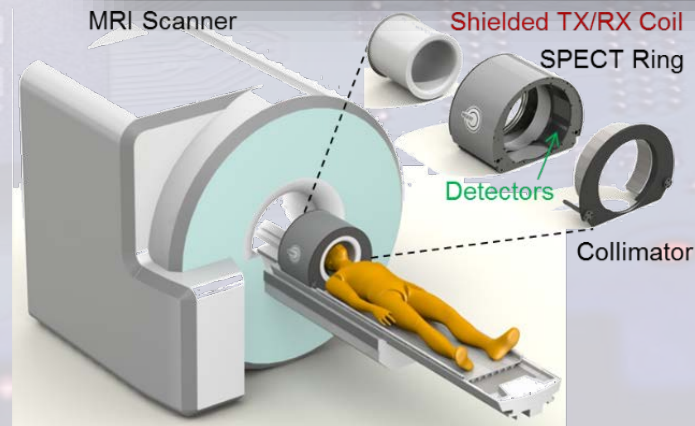
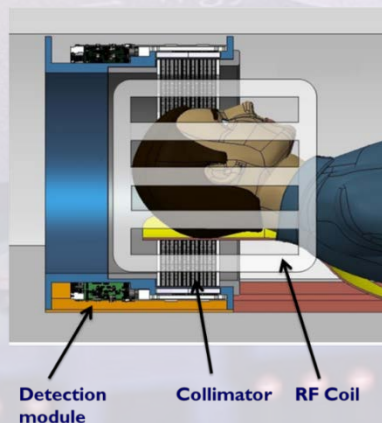


Ultra low-noise low-power ASICs for X-Gamma Ray Space Telescopes

Ultra low-noise low-power ASICs for Space Radiation Telescopes



Sensors and ASICs for Multi-modality imaging systems





1. what is ELECTRONICS
2. ELECTRONICS compared to others
3. Laurea Magistrale / Master of Science in **ELECTRONICS ENG**
4. expertizes, skills, employment opportunities
5. research labs in ELECTRONICS
6. further info



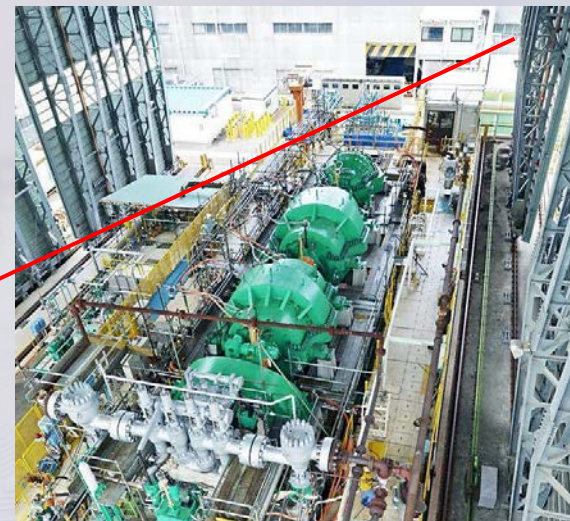
ELECTRONICS is not ELECTRICAL engineering

~~production, transmission,
distribution of electric energy~~



~~wide-area power-grid~~

~~heavy industry~~

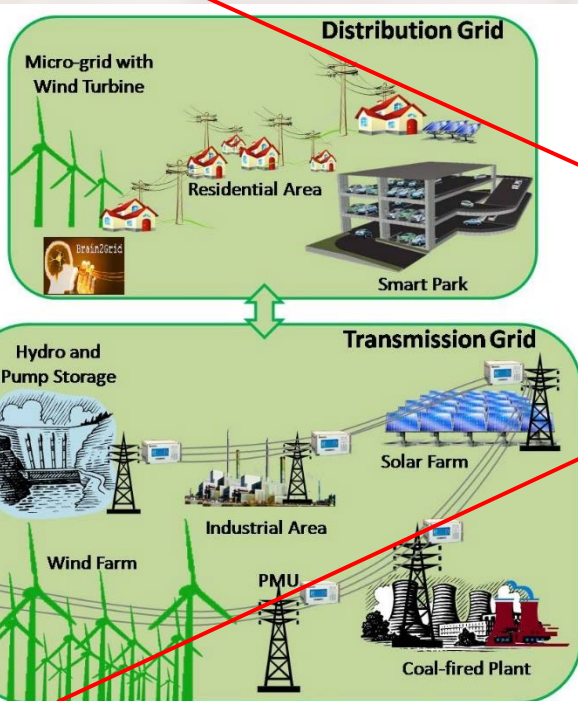


~~electrical machines~~

~~e-vehicles~~

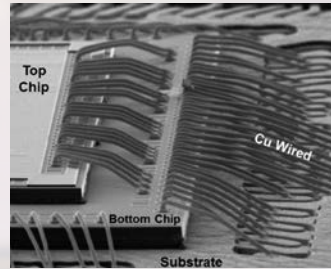


~~electric traction~~





ELECTRONICS is:



- **low-voltage** (<380 V), **low-current** (<10 A), **low-power** (<1 kW)
- for **ICT** (Information and Communication Technologies)
- for "smart" (instead of powerful) devices and machines
- for **wearable / implantable** devices
- for **personal health / wealth**

