



UNIMORE

UNIVERSITÀ DEGLI STUDI DI
MODENA E REGGIO EMILIA

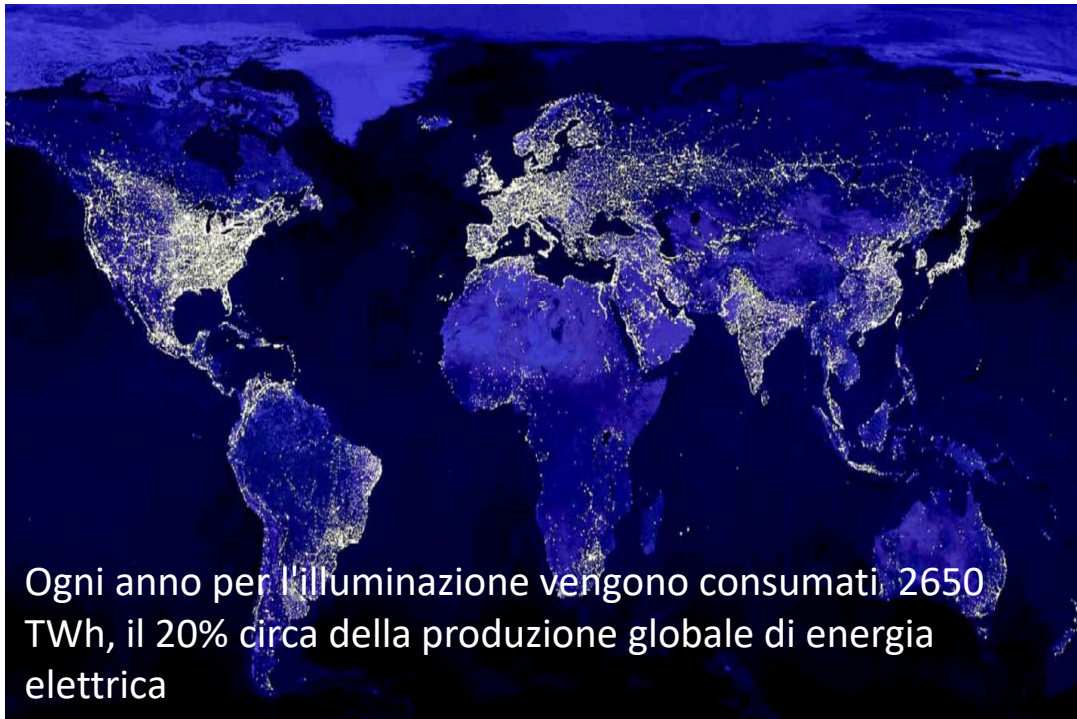
Dipartimento di Ingegneria
“Enzo Ferrari”

**Laurea Magistrale in
Electronic Engineering**

Prof. Roberto Zanasi

Dov'è l'Elettronica

Illuminazione



100W



20W



10W

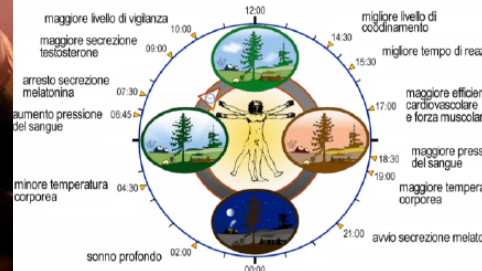


1800 16V GTI
12.2km/l



1600 TDI 18.5km/l
122km/l

Ciclo Circadiano



Dov'è l'Elettronica

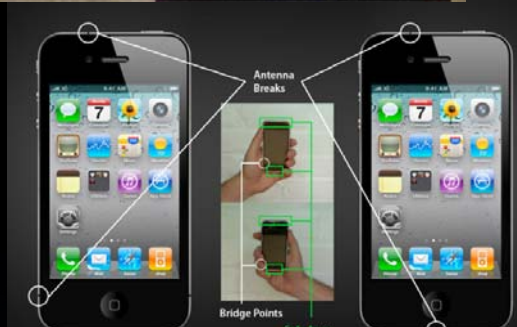
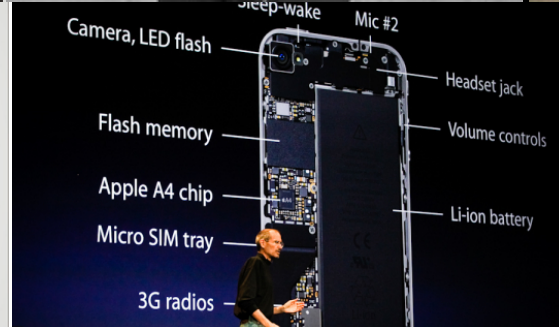
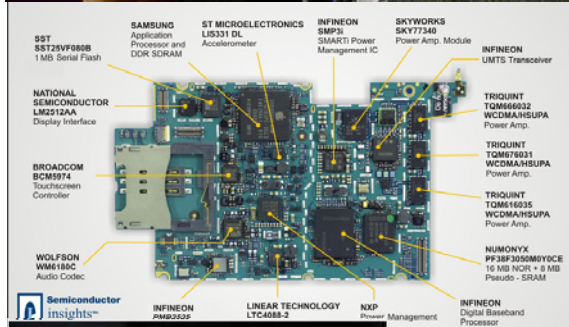
Casa



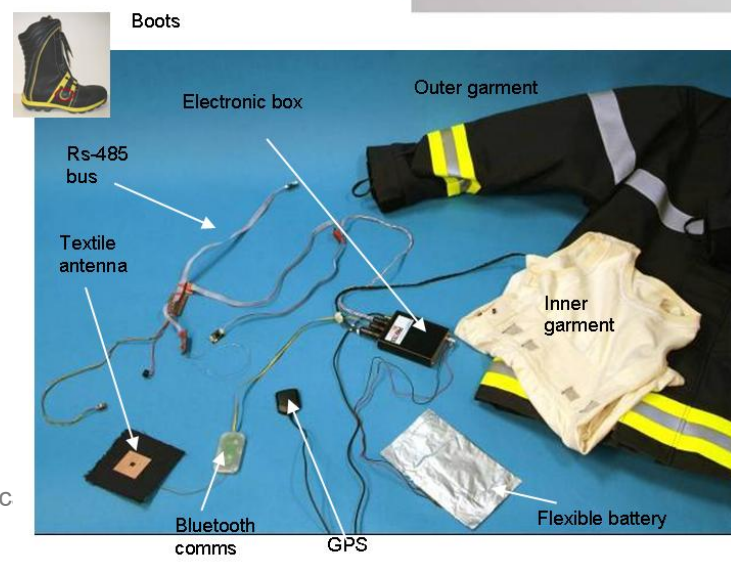
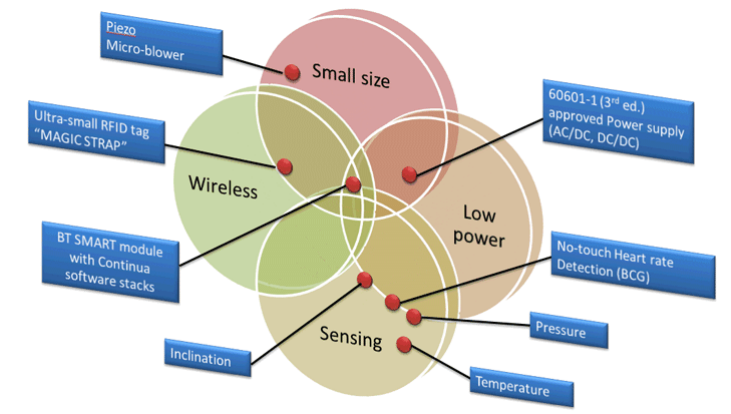
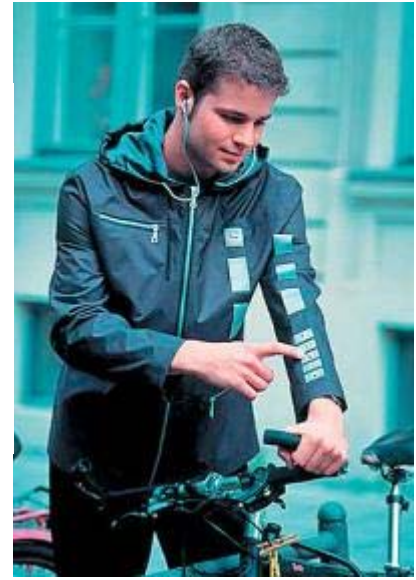
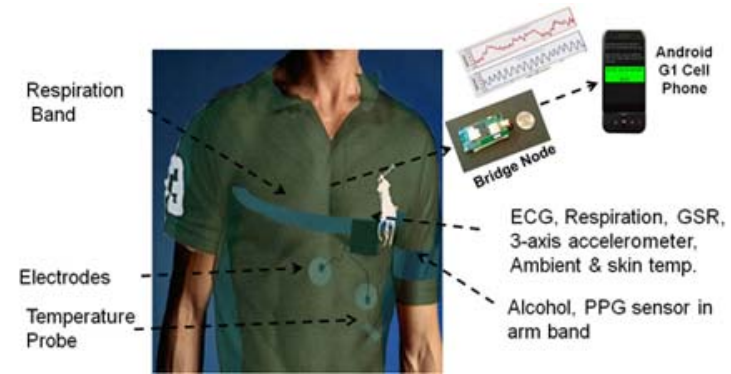
-25% rispetto termoceramico
-58% rispetto gas



Dov'è l'Elettronica Telefono

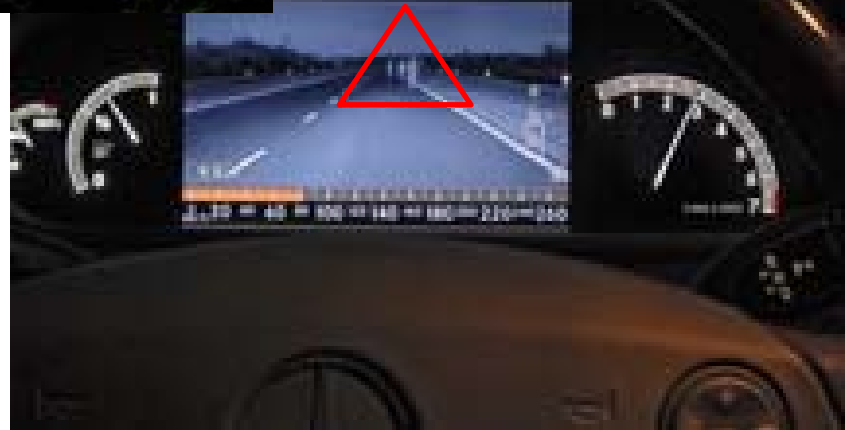
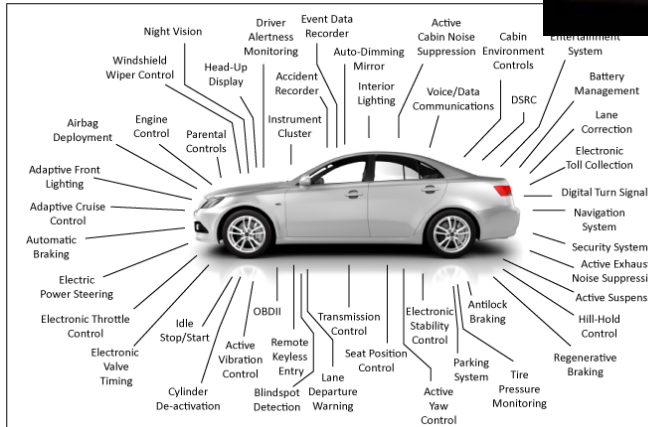


Dov'è l'Elettronica Indumenti



Dov'è l'Elettronica

L'Auto



Ingegneria Elettronica

Riguarda

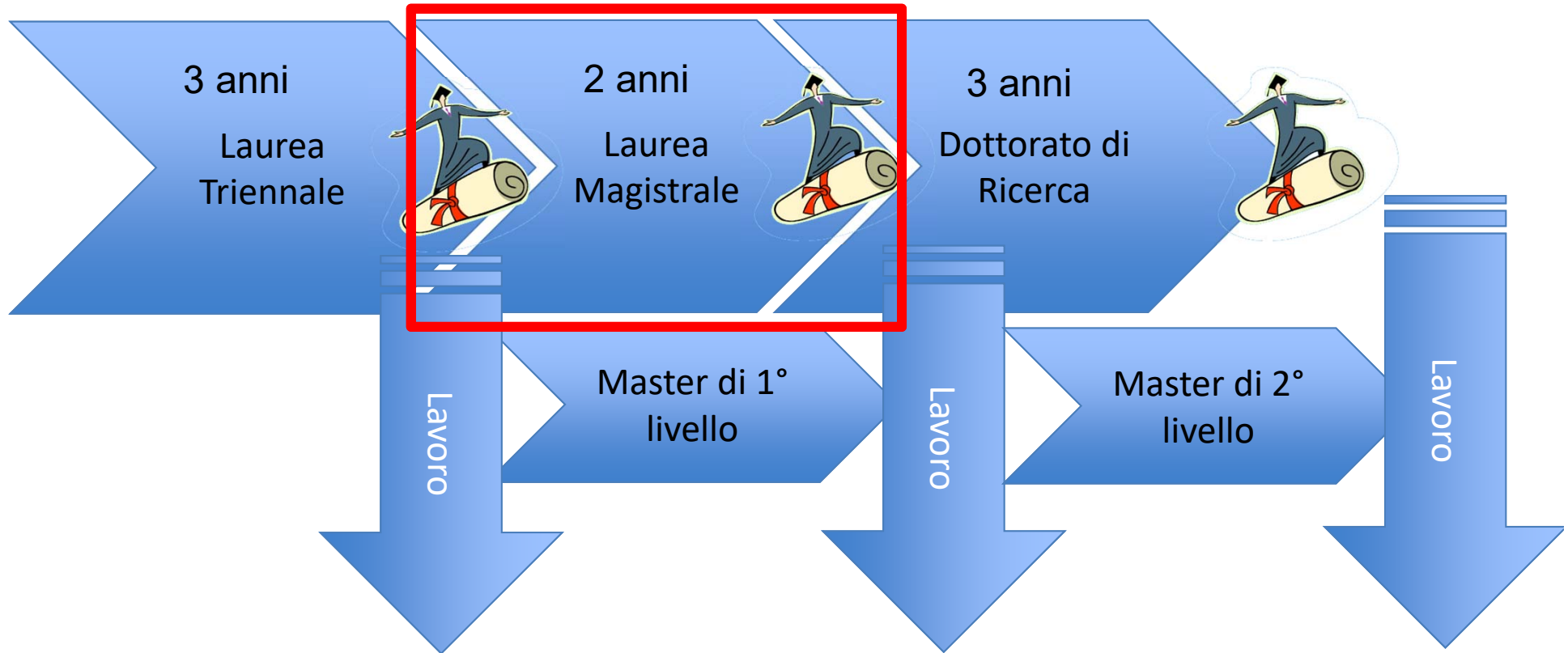
- l'ideazione,
- la progettazione
- la realizzazione



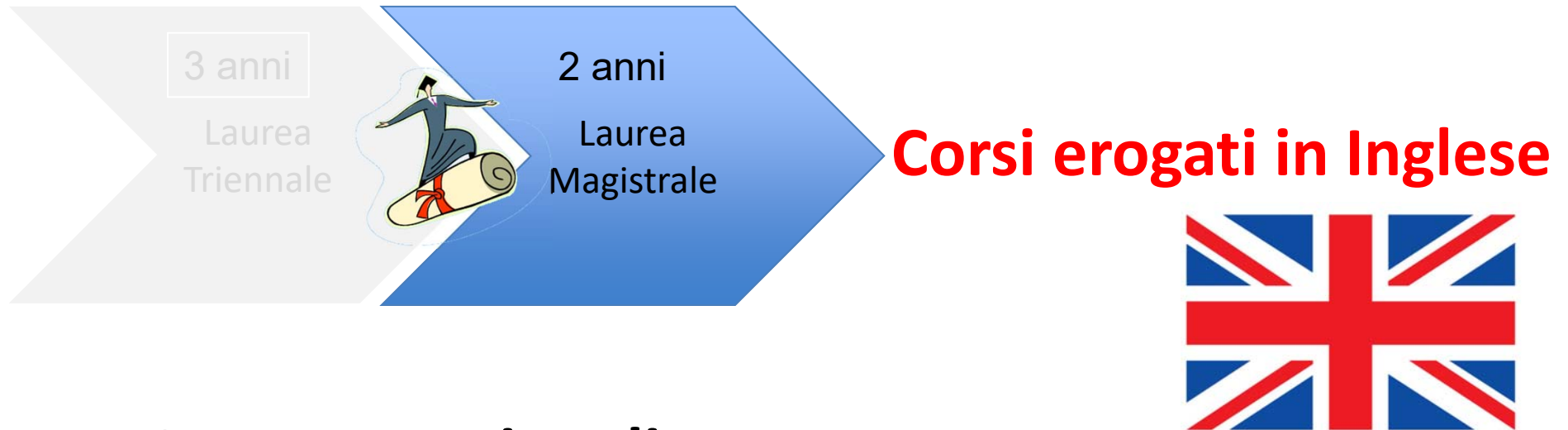
Fortemente interdisciplinare

di tutte le infrastrutture tecnologiche su cui si regge il mondo dell'ICT

L'offerta didattica universitaria



Corsi di **Laurea Magistrale**



Due Lauree Magistrali:

- ➔
1. **Electronics Engineering: EE**
 2. **Advanced Automotive Electronic Engineering: AAEE**

Contenuti del **Corso di Laurea** **Magistrale in Electronics Engineering**

Permette di approfondire le proprie competenze e punta sulla formazione per i settori:

- dell'**automazione industriale** (controllo di sistemi elettromeccanici a elevata dinamica, robotica industriale, sistemi di attuazione basati su tecnologie innovative a elevata efficienza energetica)
- delle **nuove tecnologie “intelligenti e connesse”** (basta pensare a Internet of Things, ai sistemi autonomi, ai nuovi dispositivi elettronici per la bioingegneria, per i sistemi ispirati al cervello umano)

I corsi sono tenuti in **lingua Inglese** e consentono di acquisire anche quel gergo tecnico per un facile inserimento nel mondo del lavoro e della ricerca internazionale.

É prevista come **prova finale** un'importante attività sperimentale o di progettazione anche in collaborazione con aziende e centri di ricerca internazionali.

Contenuti del Corso di Laurea Magistrale in Electronics Engineering

| | | | |
|------------------------------|---|------------|--|
| C | Percorso comune | | |
| Primo Anno | | | |
| C | Electron Devices and Components (9) | C | Analog and Mixed Circuit Design (9) |
| C | Techniques and Systems for Digital Communications (9) | C | Instrumentation and Measurement Methods (9) |
| C | System and Control Theory (6) | C | Photonics and Microwaves (9) |
| IA | Power Electronics (9) | SCS | Networking Technologies and Protocols (9) |
| Secondo Anno | | | |
| C | Embedded Systems Design (6) | C | Analog and Mixed Signal Circuit Design (9) |
| IA | Modeling and Control of Electromechanical Systems (6) | SCS | Nanoelectronics and Bioelectronics (6) |
| IA | High Performance Electric Drives and Laboratory (12) | SCS | Advanced Photonics (6) |
| IA | Reliability and Safety for Industrial applications (6) | SCS | Networked Control Systems (6) |
| C | Final examination (15) | SCS | Learning Algorithms for Smart Connected Systems (6) |
| Insegnamenti a scelta | | | |
| | Electronics Design Laboratory (6) | | Tecnologie di Infrastrutture di Reti (6) |
| | Industrial Robotic Systems (6) | | Industrial Co-Teaching (6) |
| | Tirocinio (9) | | |
| IA | Curriculum “Industrial Automation” | SCS | Curriculum “Smart Connected Systems” |

Iscrizione al **Corso di Laurea Magistrale in Electronics Engineering**

Nell'A.A. 2019/2020:

- sarà ancora possibile iscriversi al Corso di Laurea Magistrale in Electronics Engineering **con solo il livello B1 sulla lingua Inglese.**

Dall'A.A. 2020/2021 in poi:

- sarà possibile iscriversi al Corso di Laurea Magistrale in Electronics Engineering **solo se si possiede un livello B2 sulla lingua Inglese.**

LM in Electronics Engineering: Visiting Professors

| | A.A. 2017/2018 | Nome del Corso |
|----|---|--|
| 1) | Prof. Sinopoli Bruno (Carnegie Mellon University, USA) | <i>Network Control System: Robustness and Security</i> |

| | A.A. 2018/2019 | Nome del Corso |
|----|--|--|
| 1) | Prof. Volnei Pedroni (Università UTFPR in Brasile) | <i>Digital Design with VHDL and FPGAs</i> |
| 2) | Prof. Raphael Clerc (Università Jean Monnet in Francia) | <i>Green Photonics: New devices for Sensing, Lighting and Solar Energy</i> |
| 3) | Prof. Chris Gerada (Università Nottingham in Inghilterra) | <i>Advanced Electrical Machines for Green Transportation</i> |
| | | |
| | A.A. 2019/2020 | Nome del Corso |
| 1) | Prof. Ashraf Alam (Università di Purdue, USA) | <i>Principles of Electronic Nanobiosensors</i> |

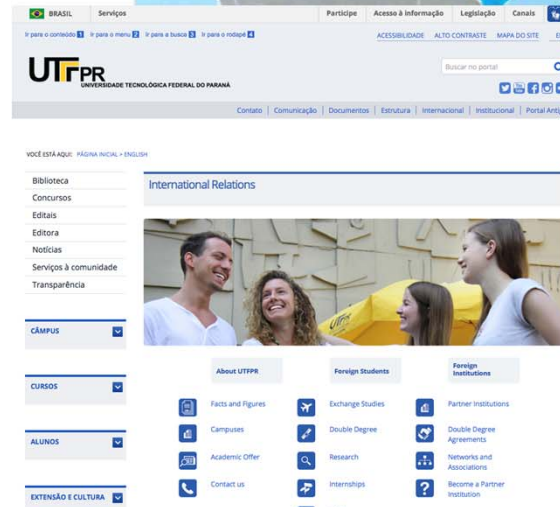
Questi corsi tenuti da qualificati Visiting Professors provenienti da importanti Università straniere sono un'utile occasione per:

1. aumentare il livello di internazionalizzazione del nostro Corso di Laurea in Electronics Engineering;
2. creare nuovi contatti con Università straniere (possibilità di Stage e Tesi di Laurea svolte all'estero);
3. portare a Modena importanti competenze su nuovi argomenti di ricerca;
4. mettere in contatto le aziende del nostro territorio produttivo con le competenze di ricerca presenti in importanti Università straniere.

LM in Electronics Engineering: Double Degree

UNIMORE ha attivato un Doppio-Diploma / Double Degree (DD) con la *Universidade Tecnológica Federale del Paraná* (UTFPR).

Alcuni studenti selezionati possono frequentare un anno in Italia e un anno in Brasile, alla fine con la discussione della Tesi ottengono due Lauree: quella italiana e quella brasiliana.

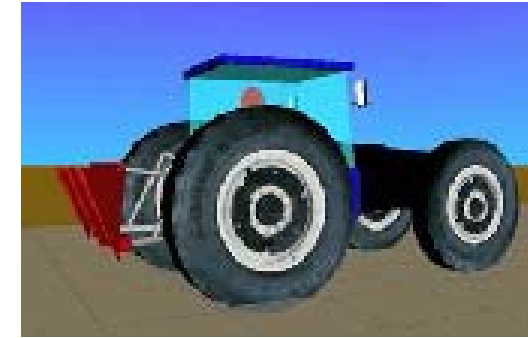
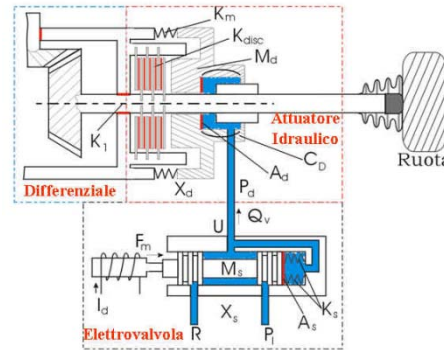


Modeling and Control in Automotive

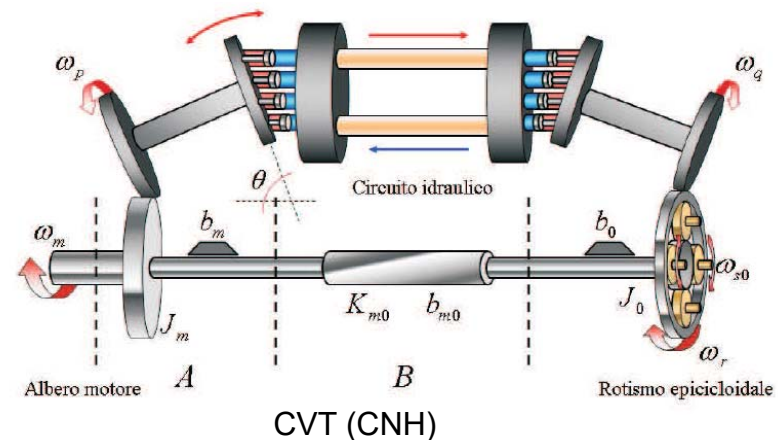
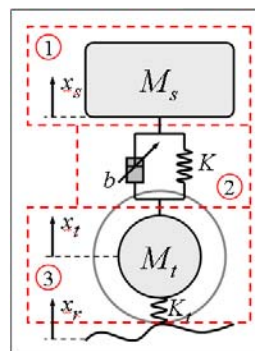
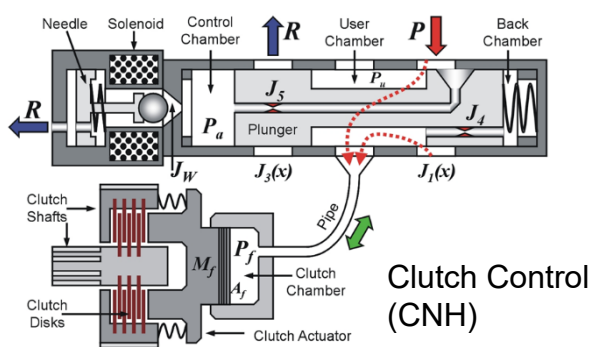
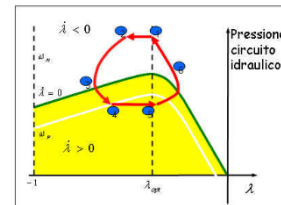
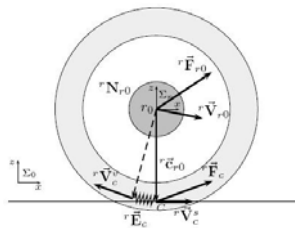
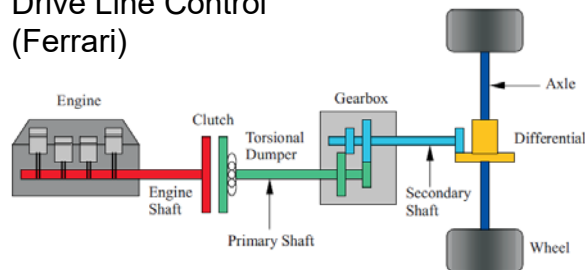
Modeling and control of electro-mechanical systems in automotive.

All the subsystems are modeled using the Power-Oriented Graphs Technique.

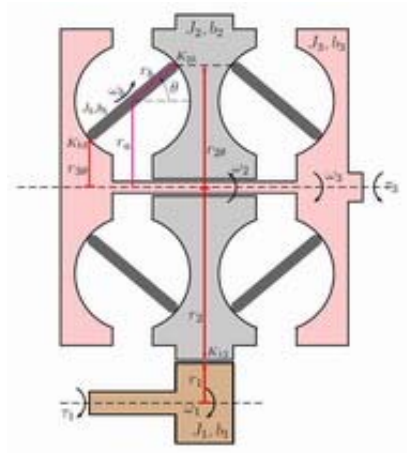
Examples: clutch, gear-box, differential, car suspensions, car dynamics, driveline, hybrid systems, tire-ground interaction, CVT, ...



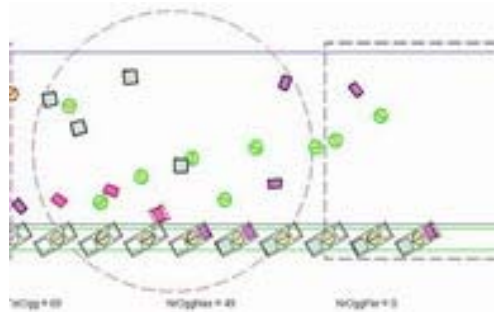
Drive Line Control (Ferrari)



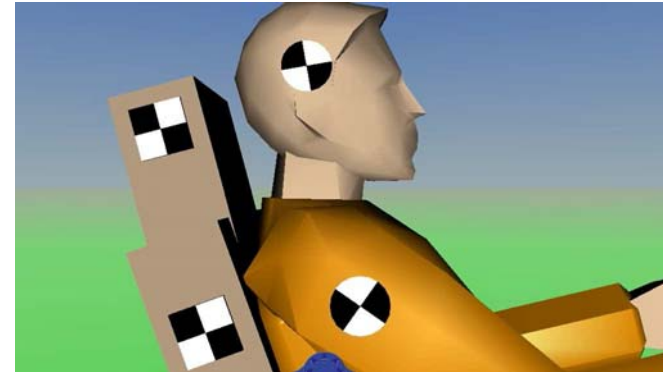
Modeling and Control of Electromechanical Systems



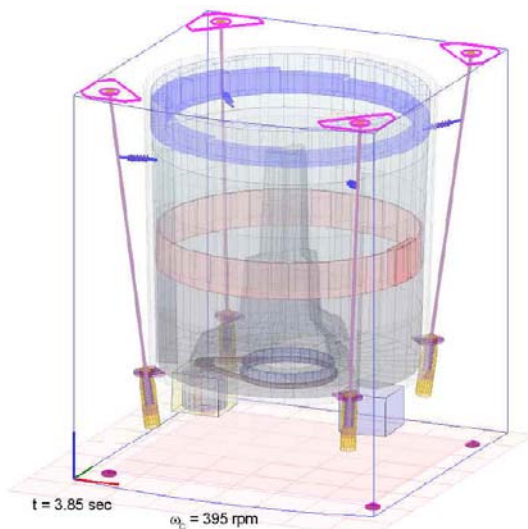
KERS (Lamborghini)



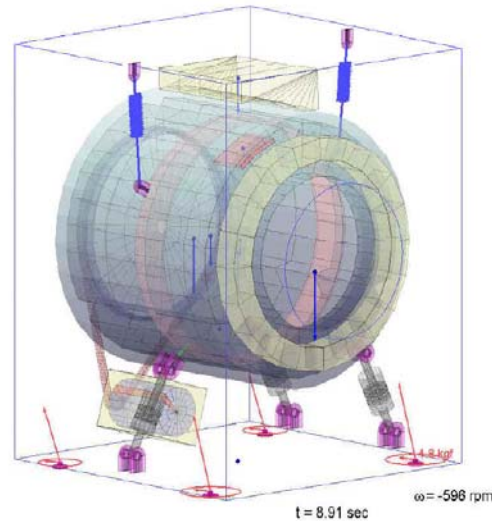
Pick and place (ELAU)



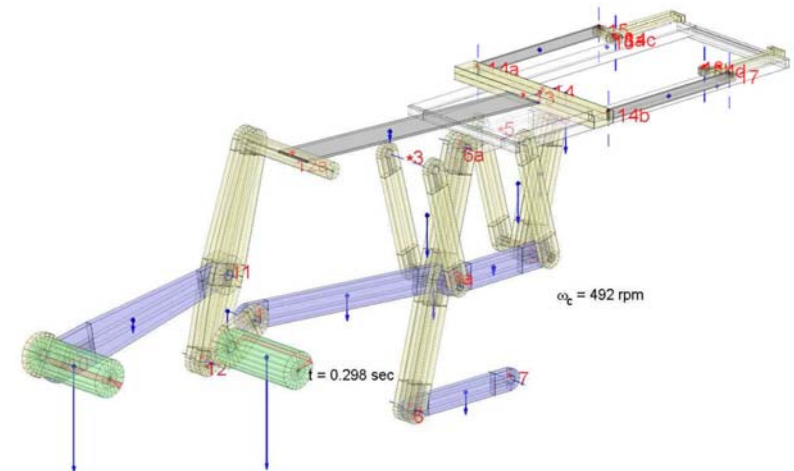
Gear change control (Ferrari)



Vertical washing machine (Electrolux)

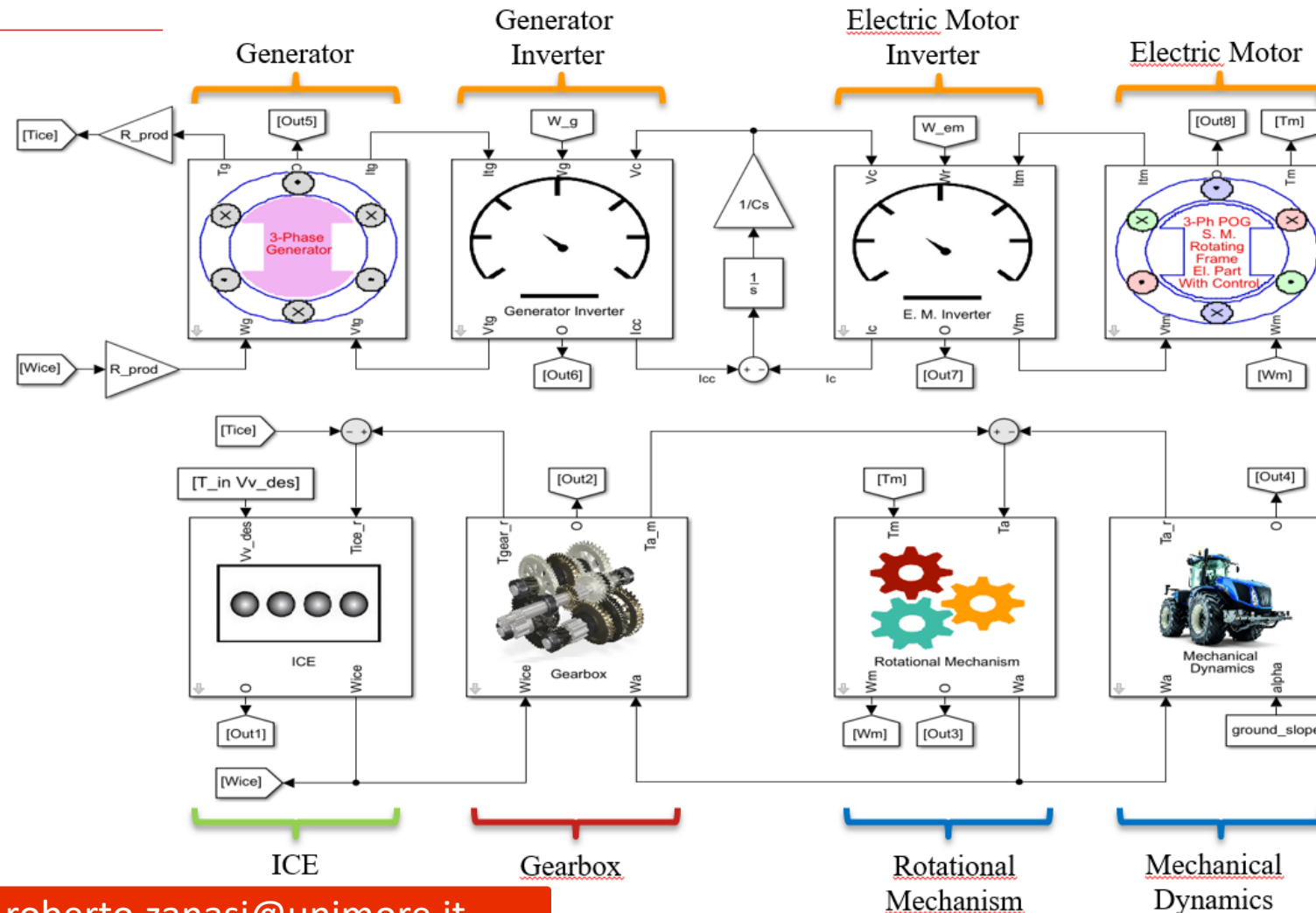


Vertical washing machine (Electrolux)

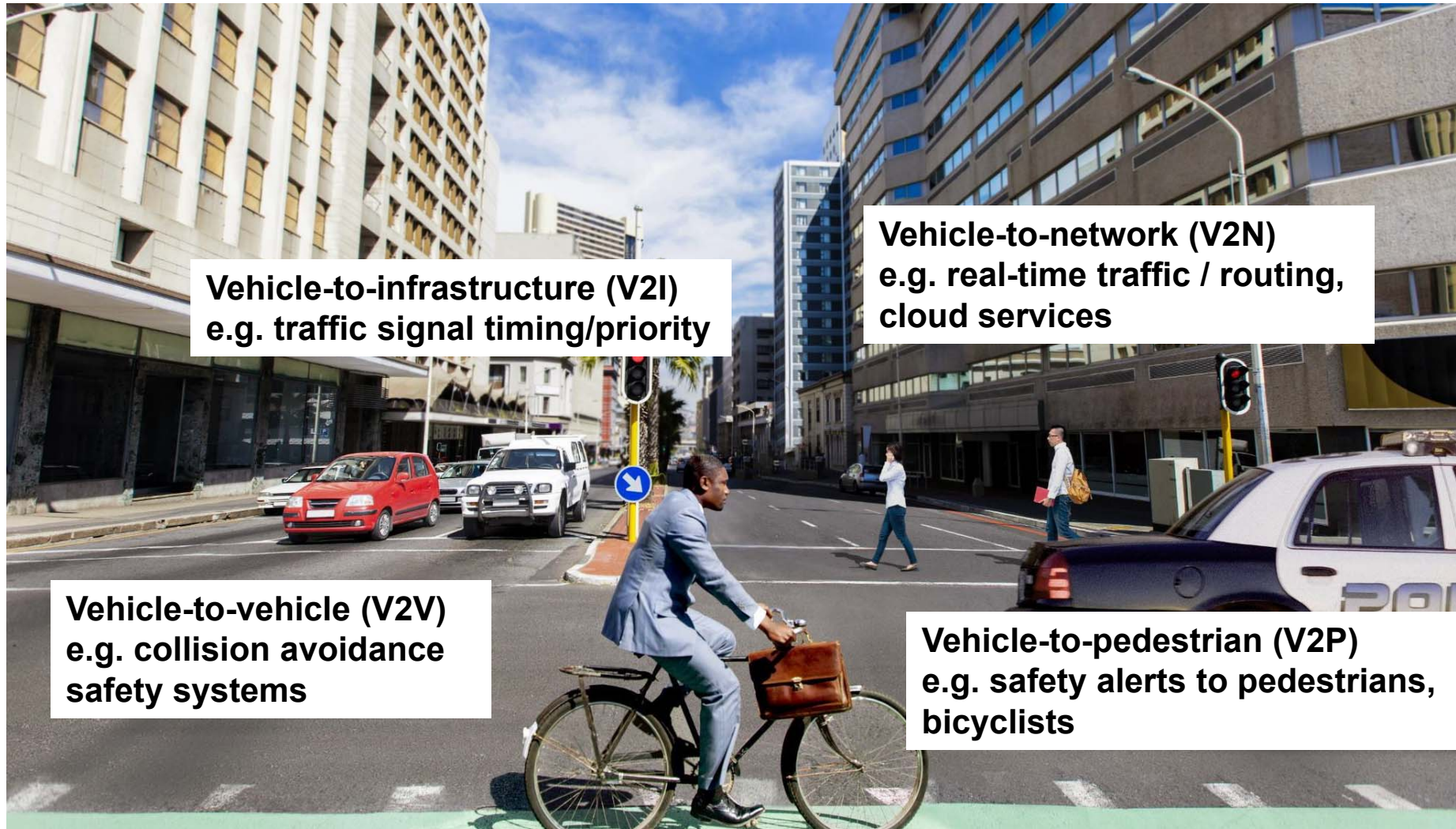


Two-dimensional Motion control (GIMA-TT)

Modeling and Control of a Hybrid Propulsion System for Agricultural Tractors.



V2X Communications



Vehicle-to-infrastructure (V2I)
e.g. traffic signal timing/priority

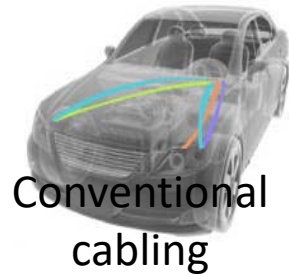
Vehicle-to-network (V2N)
e.g. real-time traffic / routing,
cloud services

Vehicle-to-vehicle (V2V)
e.g. collision avoidance
safety systems

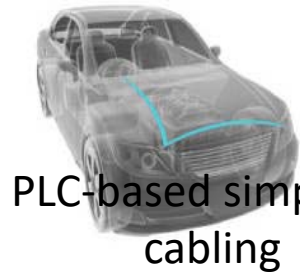
Vehicle-to-pedestrian (V2P)
e.g. safety alerts to pedestrians,
bicyclists

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Conventional cabling



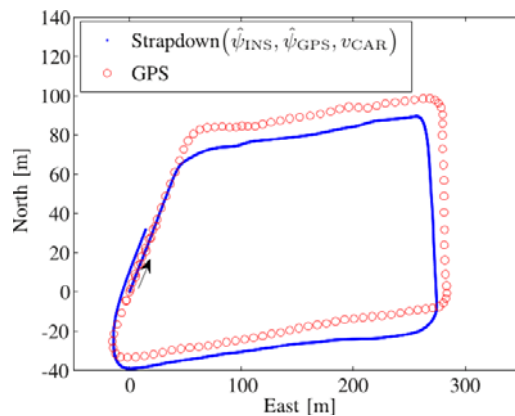
PLC-based simplified cabling

Powerline communications (PLC)

Data communications over vehicular power lines. Part of the cabling for data signals (CAN, LIN) can be removed. Cooperation with Lamborghini.

MIMO radars for imaging

Signal processing algorithms for integrated MIMO radars available on the market. Cooperation with CNH.



Data fusion for reliable vehicular navigation

Data fusion algorithms for improving the accuracy and reliability of vehicular navigation through the use of multiple sensors (GPS modules, inertial measurement units, ...). Cooperation with JRC (Ispra, VA).

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Congestion control in vehicular communications

Exchange of V2V control signals in dense areas of highways.

Cooperation with: Blekinge University, Sweden

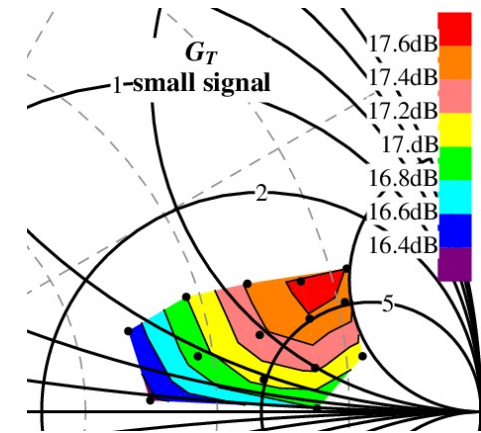
marialuisa.merani@unimore.it

Power Electronics for automotive

- **Semiconductor Power Devices – Topics:**
 - Design, testing and optimization of compound semiconductor (GaN, GaAs, InP) devices for RF and power application
- **Research Activities and Projects:**
 - Electrical Characterization; Simulation (commercial simulator)
 - European Projects: **E²COGaN** – Energy Efficient Converters using GaN Power Devices

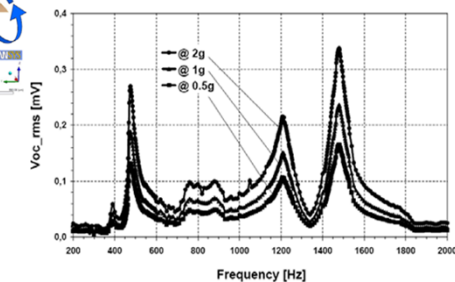
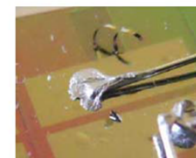
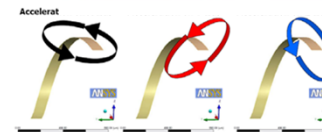
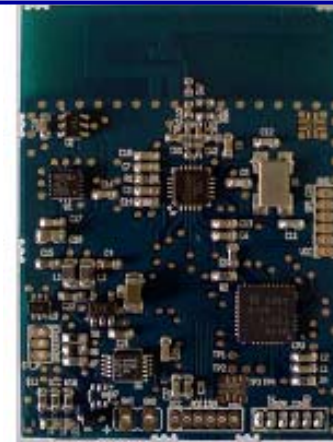
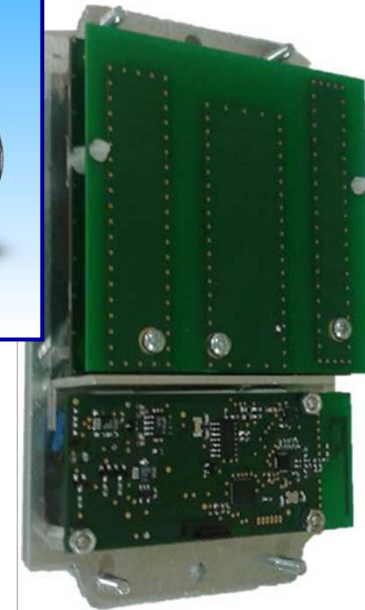
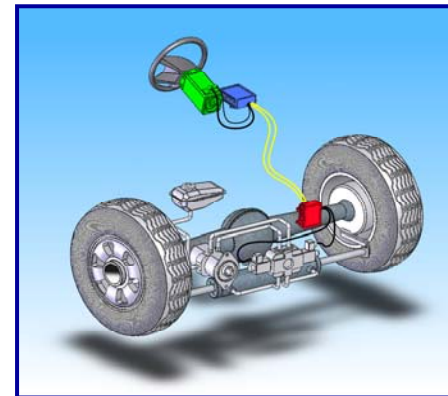


- Collaborations:



Micro and Nano Electronics in automotive

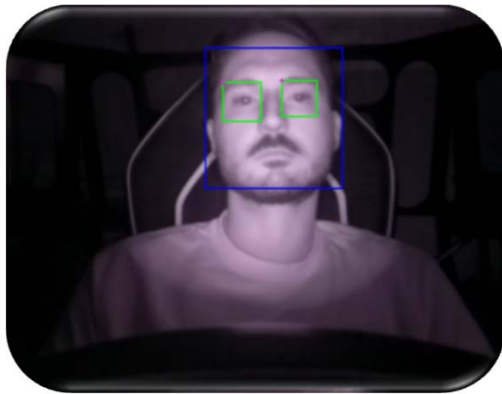
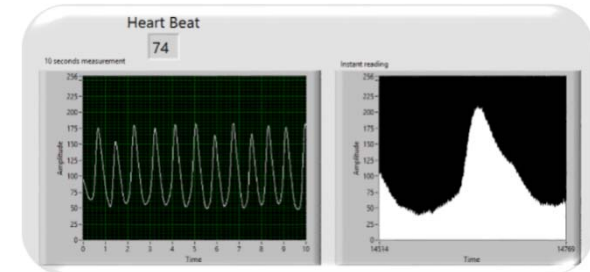
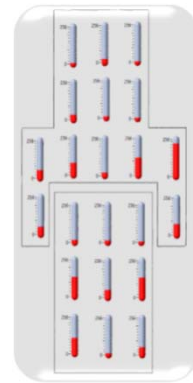
- **Topics: Electronics – Systems**
 - Automotive: Steer By Wire, BMS
 - Embedded Systems
 - Smart sensors for active safety
 - Energy Harvesting
 - Noise shaping and cancelling
- **Main Related Projects:**
 - MECTRON (RER)
 - ISOTRATOR (RER)
«ISOBUS solution for agricultural machineries»
in partnership with ARGO TRACTORS, WALVOIL, COBO GROUP, COMER INDUSTRIES, ARAG, OGNIBENE, Re:LAB
 - STRATOS (EU-ICT EraNet)
Open System for Tractor's autonomous operations» in partnership with Alari (SUI), Univ. of Riga (LAT), Technion (ISR), Univ. Ferrara (ITA)
- **Activity:**
 - Spin-off: embit, XBW



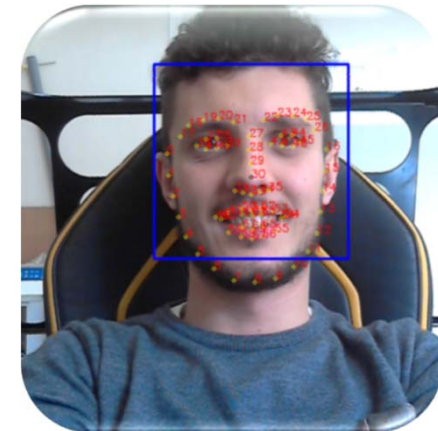


Real time monitoring of the **Driver physiological and emotional status**

Innovative **Sensing**



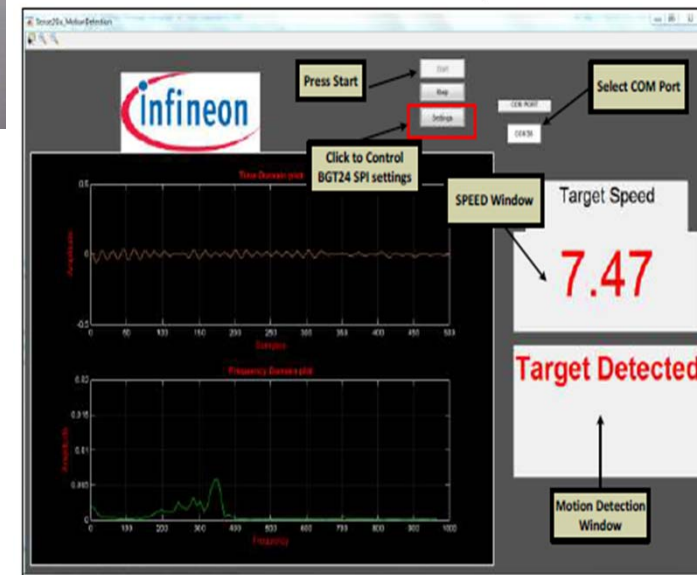
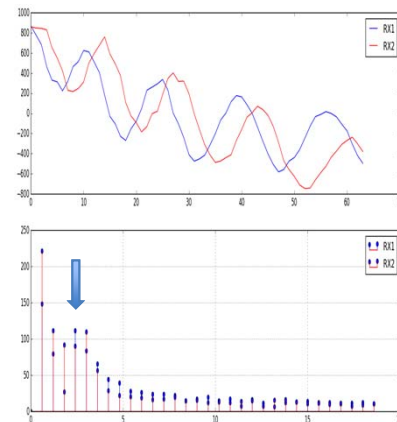
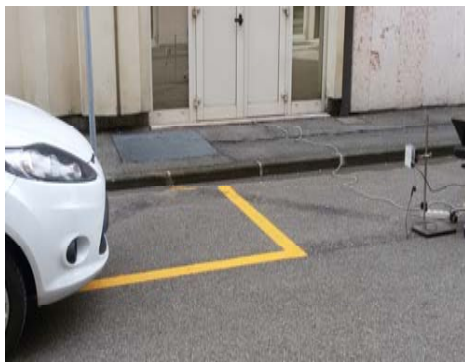
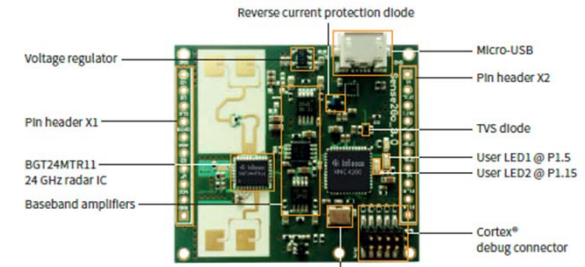
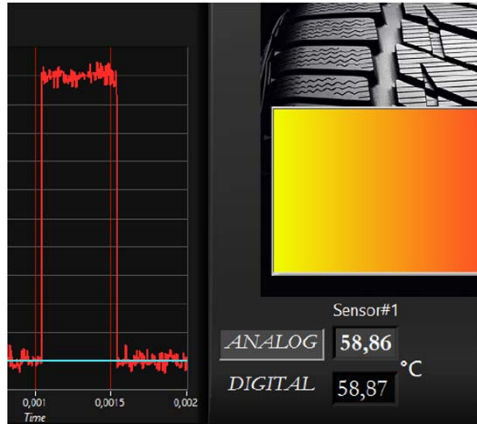
Infrared and visible face
and eye tracking



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Advance Automotive Sensors and Front-end Electronics

Radar and Lidar



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Photonic & Electromagnetic Engineering

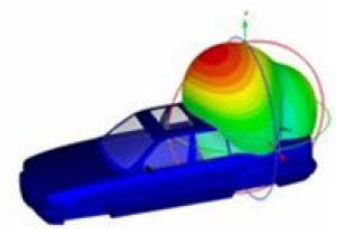
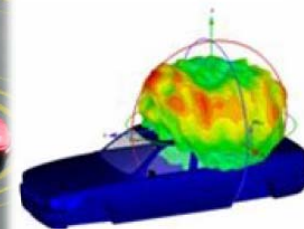
Antennas for automotive



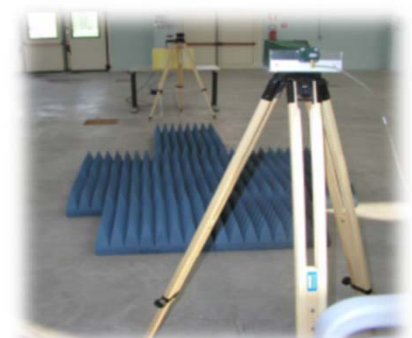
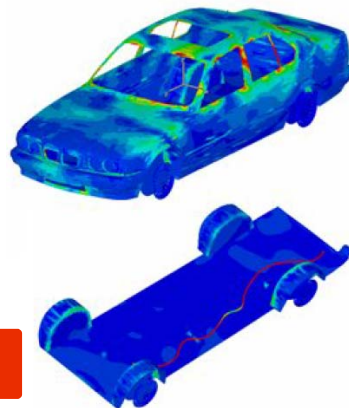
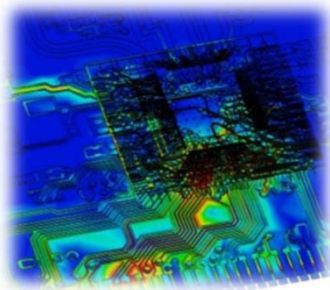
GSM dipole antenna



On glass wire antenna



EMC Electromagnetic Compatibility

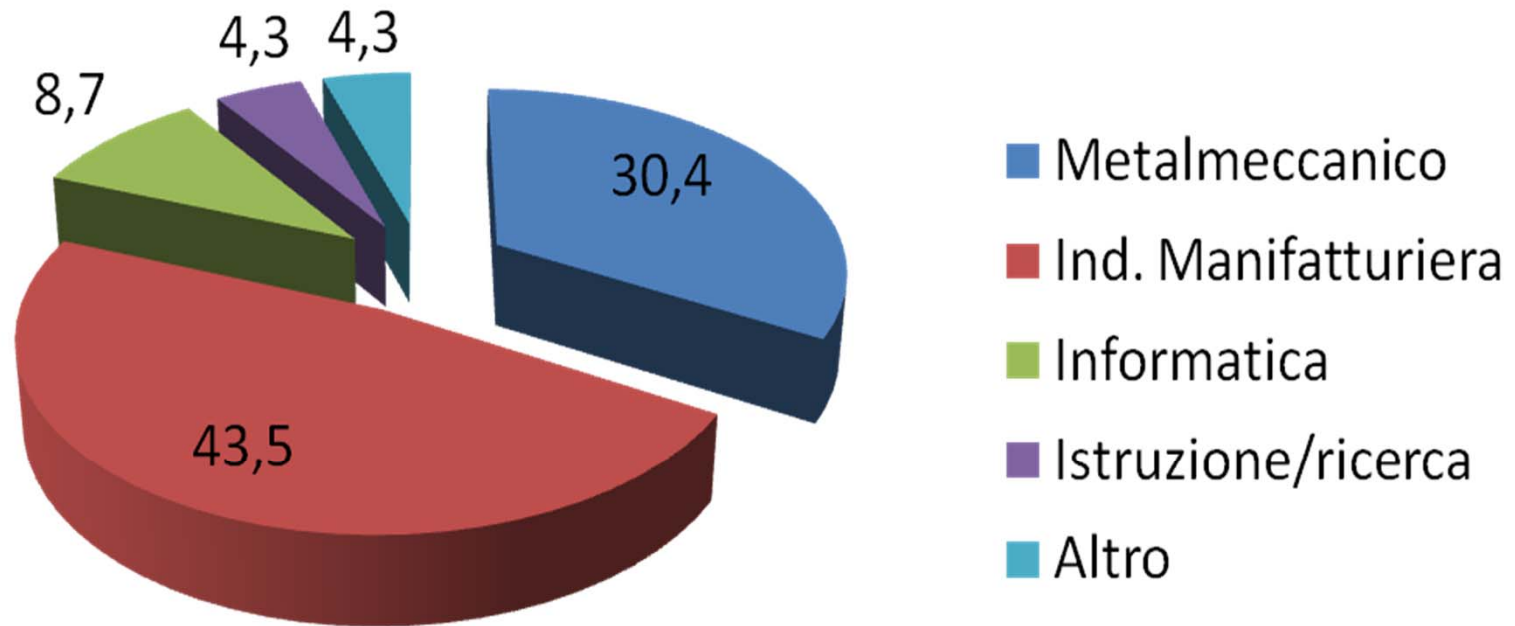


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Prospettive occupazionali

Settore Lavoro

Tipologia



Electronics Engineering: Tasso di occupazione

| 3. Condizione occupazionale | Collettivo selezionato (per anni dalla laurea) | | |
|--|--|---------------------------|---------------------------|
| | Laureati 2016 a 1 anno | Laureati 2014 a 3 anni | Laureati 2012 a 5 anni |
| Condizione occupazionale (%) | | | |
| Lavora | 75,0 | 92,9 | 93,3 |
| Non lavora e non cerca | 18,8 | 7,1 | - |
| Non lavora ma cerca | 6,3 | - | 6,7 |
| Quota che non lavora, non cerca ma è impegnata in un corso universitario/praticantato (%) | 6,3 | 7,1 | - |
| Quota che lavora, per genere (%) | | | |
| Uomini | 69,2 | 91,7 | 92,3 |
| Donne | 100,0 | 100,0 | 100,0 |
| Esperienze di lavoro post-laurea (%) | | | |
| Non lavora ma ha lavorato dopo la laurea | 12,5 | - | - |
| Non ha mai lavorato dopo la laurea | 12,5 | 7,1 | 6,7 |
| Tasso di occupazione (def. Istat - Forze di lavoro) | 93,8 | 100,0 | 100,0 |
| Tasso di disoccupazione (def. Istat - Forze di lavoro) | 6,3 | - | - |

Electronics Engineering: Retribuzione media

fonte www.universitaly.it

| 7. Retribuzione | Collettivo selezionato (per anni dalla laurea) | | |
|--|---|-----------------------------------|-----------------------------------|
| | Laureati 2016 a 1 anno | Laureati 2014 a 3 anni | Laureati 2012 a 5 anni |
| Retribuzione mensile netta (medie, in euro) 📄 | | | |
| Uomini | 1.431 | 1.913 | 1.557 |
| Donne | 1.459 | 1.501 | 1.501 |
| Totale | 1.438 | 1.844 | 1.549 |

Ulteriori informazioni

Maggiori informazioni: www.dief.unimore.it

Home » Didattica » Lauree » Ingegneria Elettronica

<http://www.ingmo.unimore.it/site/home/didattica/lauree/ingegneria-elettronica.html>

