DIPARTIMENTO DI INGEGNERIA DELL'INFORMAZIONE

http://www.dei.unipd.it

# THE FRONTIERS OF ROBOTICS

## From Autonomous Robots to Brain Control

Intelligent Autonomous Systems Laboratory (IAS-Lab)

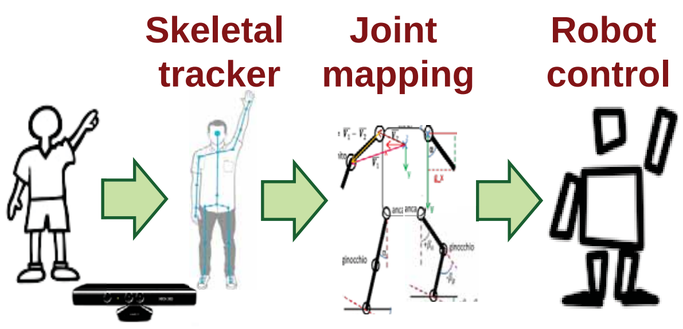
http://robotics.dei.unipd.it/

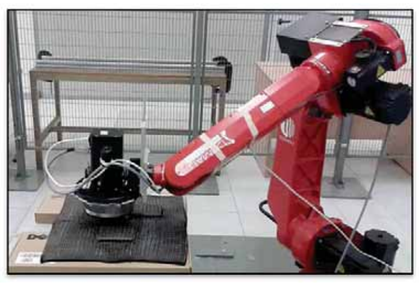
https://www.youtube.com/user/IASLABResearch

# Research

## *Robot Vision*

- **People Detection** and **Tracking**
- Omnidirectional Image Processing
- Image-based Localization and 3D Reconstruction
- Motion Tracking and Classification



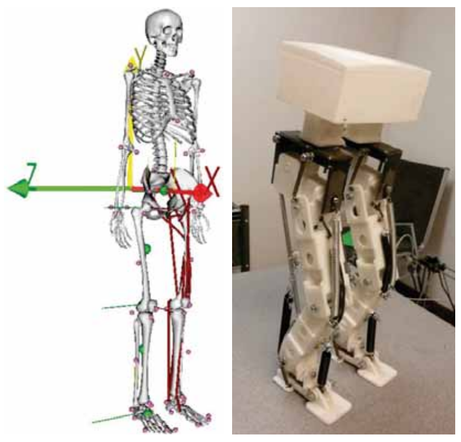
## *Industrial Robotics*

- **Assembly** and **Task Planning**
- Grasp Planning
- Obstacle and Collision Avoidance
- Multi-robot Motion Planning

## *Social Robotics*

- **Educational Robotics**
- Improve interactions with children and autistic people
- **Elder care** and **falls detection**
- Teleoperation

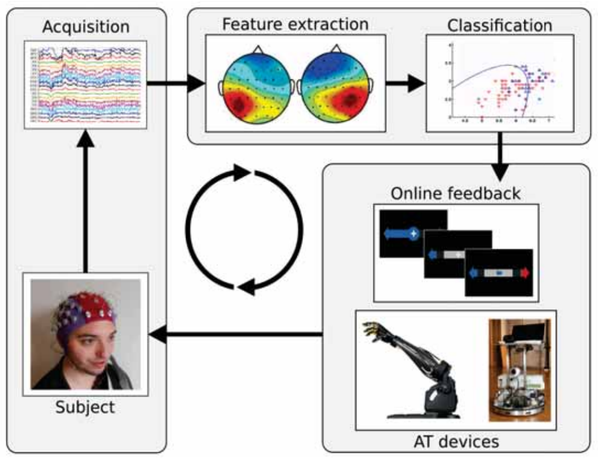
## *Neurorobotics*



- From the understanding of human movement to the development of **bio-inspired humanoid robots**
- Neuromusculoskeletal models
- Biomechanics of movement
- Electromyography
- **Human-Robot Interfaces**
- Soft Robotics

## *Brain-Computer Interface*

- Control applications, robots and exoskeletons by using thoughts
- **Motor Imagery**
- Electroencephalogram
- **Recording and Processing Brain Signals**




# European Projects

FOCUS
www.focusonfof.eu

- 11 partners from 7 countries in Europe
- *European Union Horizon 2020 Program (H2020), grant agreement n. 637090*
- Support methods for improved exploitation of FoF project results
- **Creating clusters** of FoF project activities
- **Share experiences** and **best-practices** to stimulate the take-up of project results
- Investigate how to best **exploit synergies**


- 5 partners from Italy
- Project co-financed by *European Agricultural Fund for Rural Development (EAFRD)* and *Misura 124: Cooperazione per lo sviluppo di nuovi prodotti, processi e tecnologie nel settore agricolo, agroalimentare e forestale*
- Developing of a cost effective and small sized **autonomous machine** capable to perform simple operations in vineyards with the possibility to be powered by **renewable energy sources**


- 7 partners from 5 countries in Europe
- Project funded by the *European Commission in FP7 ICT under grant n. 608768*
- Development of an **automatic quality control and feedback mech**anism to improve draping of carbon fibres on complex parts
- Engineering a new sensor system for robust **detection of fibre orientation** combined with a robotic system
- Adoption of a new technology that uses **reflection models of carbon fibre** to solve the problems encountered with earlier vision-based approaches


- 7 partners from 5 countries in Europe
- Project funded by the *European Commission in FP7 FoF under grant n. 284607*
- Combining **robotics** and **thermography** to replace manually magnetic particle inspection methods for **crack detection** in parts with complex geometry

# Active Collaborations and Partnership

Delcam · NTNU Norwegian University of Science and Technology · The University Of Sheffield. · IK4 IDEKO Research Alliance · tecnalia · CRF Centro Ricerche Fiat · PHILIPS · Katholieke Universiteit Leuven · Fraunhofer · Politecnico di Milano · ethics consorzio · IT+Robotics · Marco Sambin · Azienda Agricola Giorgio Pantano · PROFACTOR · BAM · BRP · INSA Lyon · InfraTec · Advance Composite Fibers · TRIMEK Metrological Engineering · Marcus · Benteler-SGL Automotive Composites · esi get it right®