Robotics for Companies and Industrial Applications @ the University of Bologna

An overview of past and present experiences

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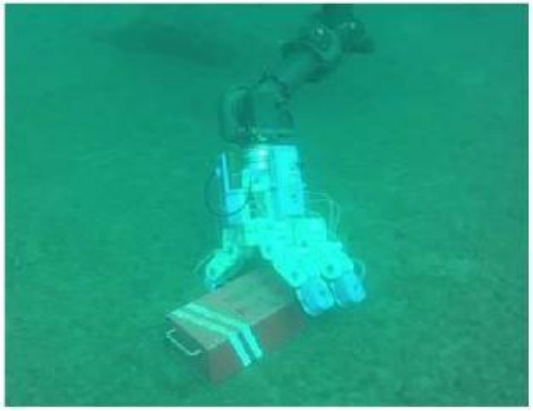
Underwater Robotics

Underwater robotics for assembly and maintenance tasks

- ✓ Autonomous systems
- ✓ Cooperating robots
- ✓ Manipulation platforms

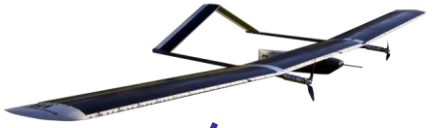


In collaboration with

GRAALtech

The SHERPA Project

- The SHERPA answer
  - Robotic platforms for autonomous patrol and avalance victim search



Automatic Delegation system

Semantic interpretation

In collaboration with

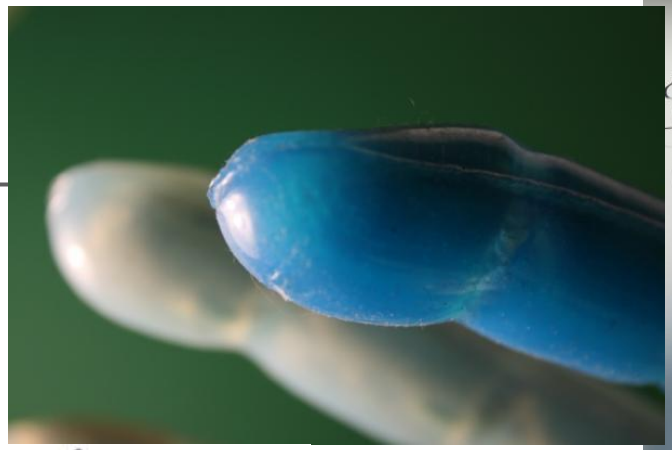
BLUEBOTICS
Mobile Robots at Your Service

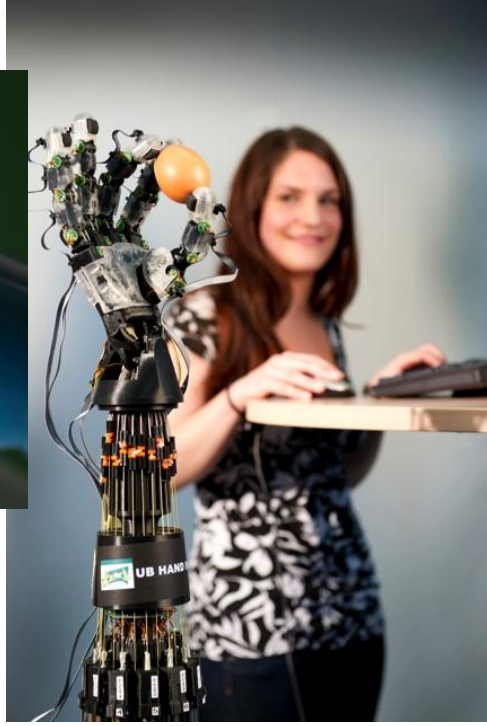
ASLA TECH

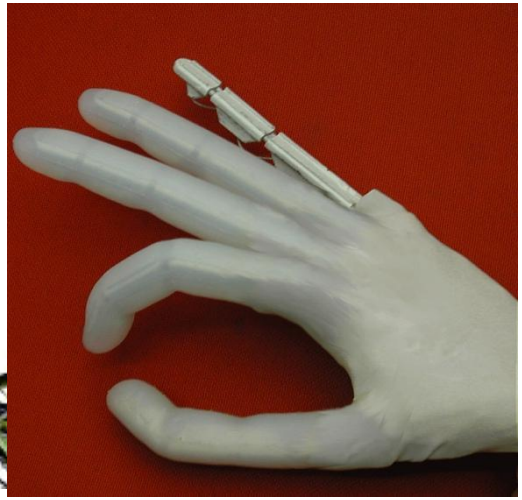
Robot Hands

Robotic Hands/Grippers:

- Designed for industrial applications
- With integrated control, tactile sensing and vision system







In collaboration with

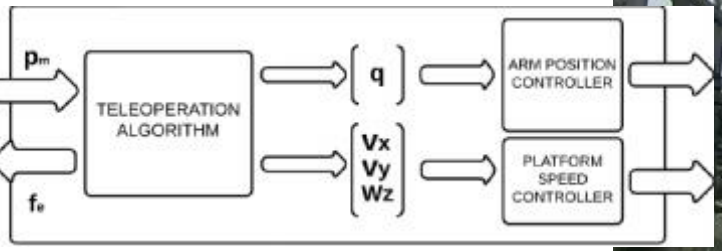
BONMET 深圳博美德机器人有限公司

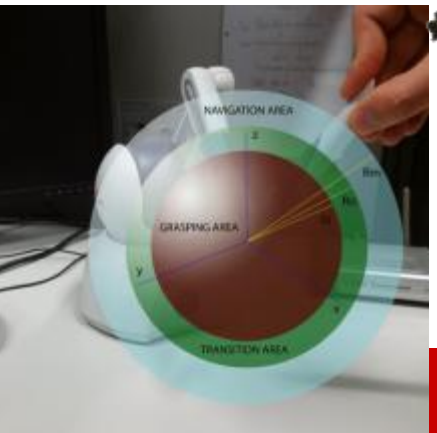
ARCA Arca Tecnologie srl

Scramp Robotics GmbH

Smart Autonomous Intervention

- Move the operator away from the plant
- Introduction of robotic technology and teleoperation to reduce costs and risks
- Development of simplified interface for teleoperation and training
- Partial local autonomy for common tasks executed transparently to the user





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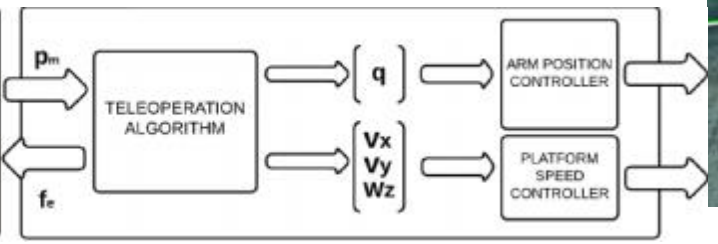
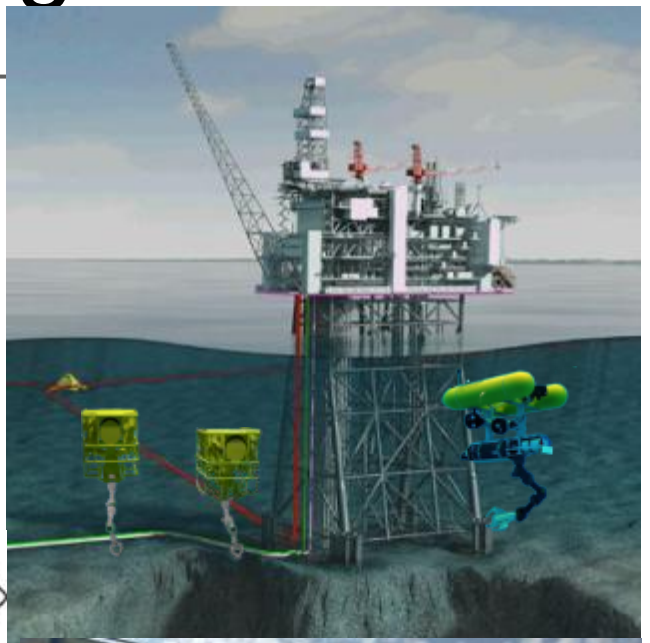
Teleoperation of Heterogeneous Teams

- Introduce teams of heterogeneous robots to execute complex monitoring and intervention tasks
- Operated from remote through transparent teleoperation channels (independent from the robotic team)





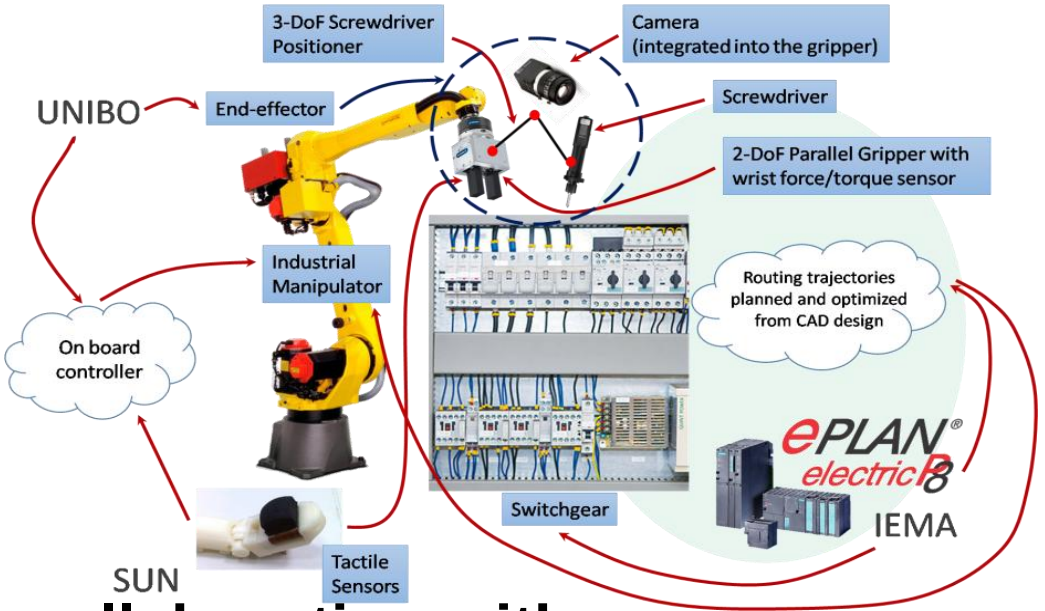
- The user can operate on different plants from the same location

In collaboration with

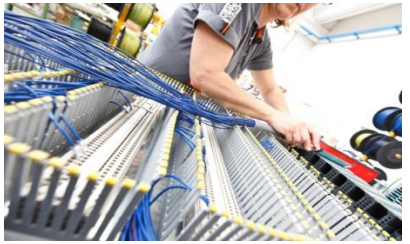
The WIRES project

Switchgear wiring: A manufacturing field strongly based on human adaptability, interpretation and manipulation abilities

TOMORROW



TODAY



Advanced manipulation capabilities enable new application scenarios including deformable object handling

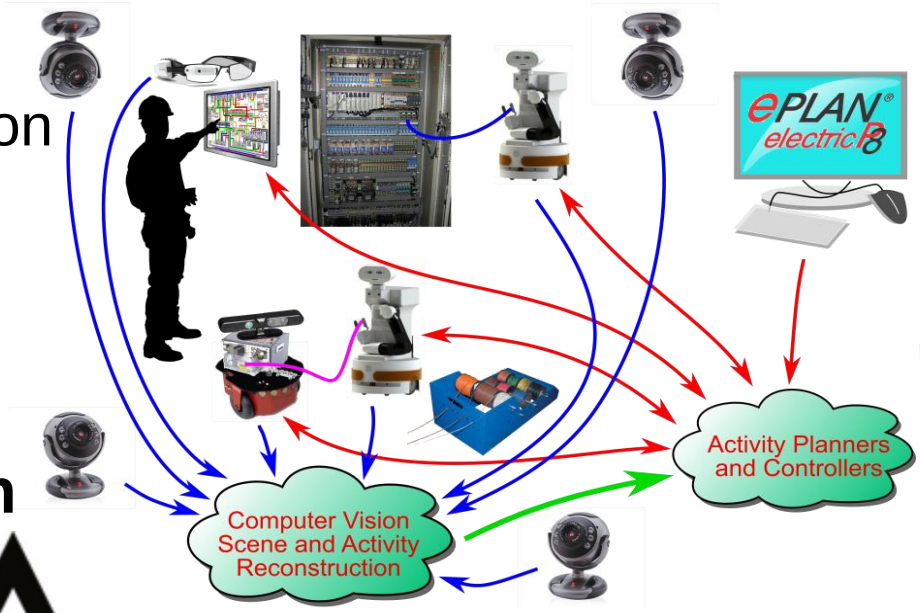
- ✓ Tactile sensing
- ✓ Vision systems
- ✓ Multi-fingered and multi-function grippers

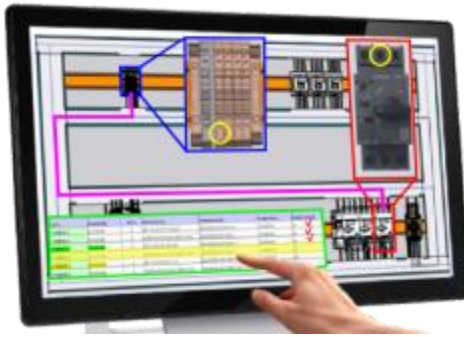
In collaboration with

IEMA
Impianti Elettrici Macchine Automatiche

Future Scenario

- ✓ **Specialized abilities**
- ✓ **Communication and cooperation skills**
- ✓ Distributed vision system
- ✓ Mobile manipulators
- ✓ Specialized platforms
- ✓ Human-robot cooperation
- ✓ Natural human-robot dialogue





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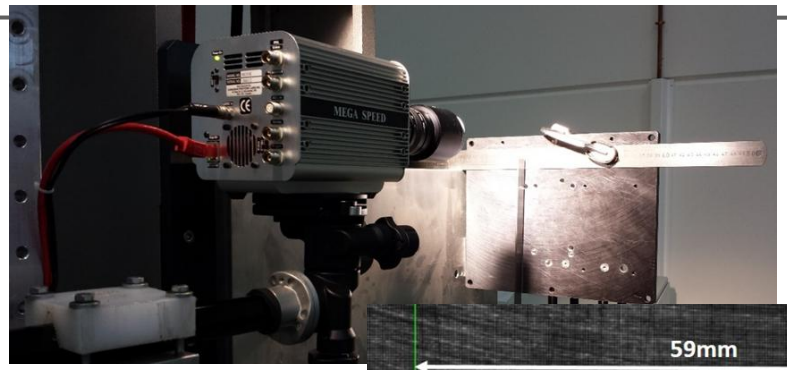
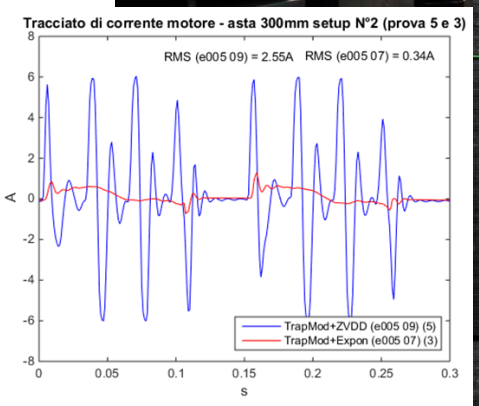
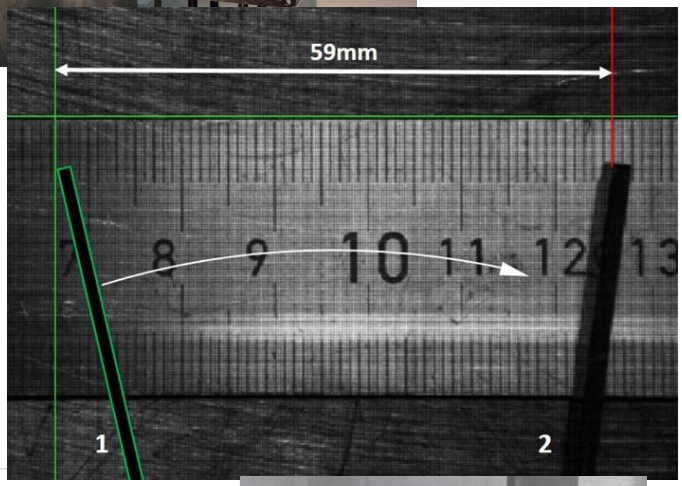
Trajectory Optimization

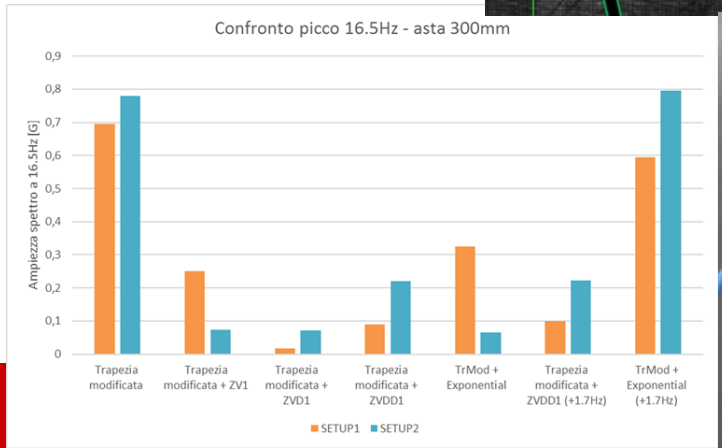
Realtime trajectory design and filtering through exponential filters, ZVD and ZVDD filters for:

- Vibration reduction
- Mechanism optimization
- Cycle time reduction
- From mechanical to electric cams









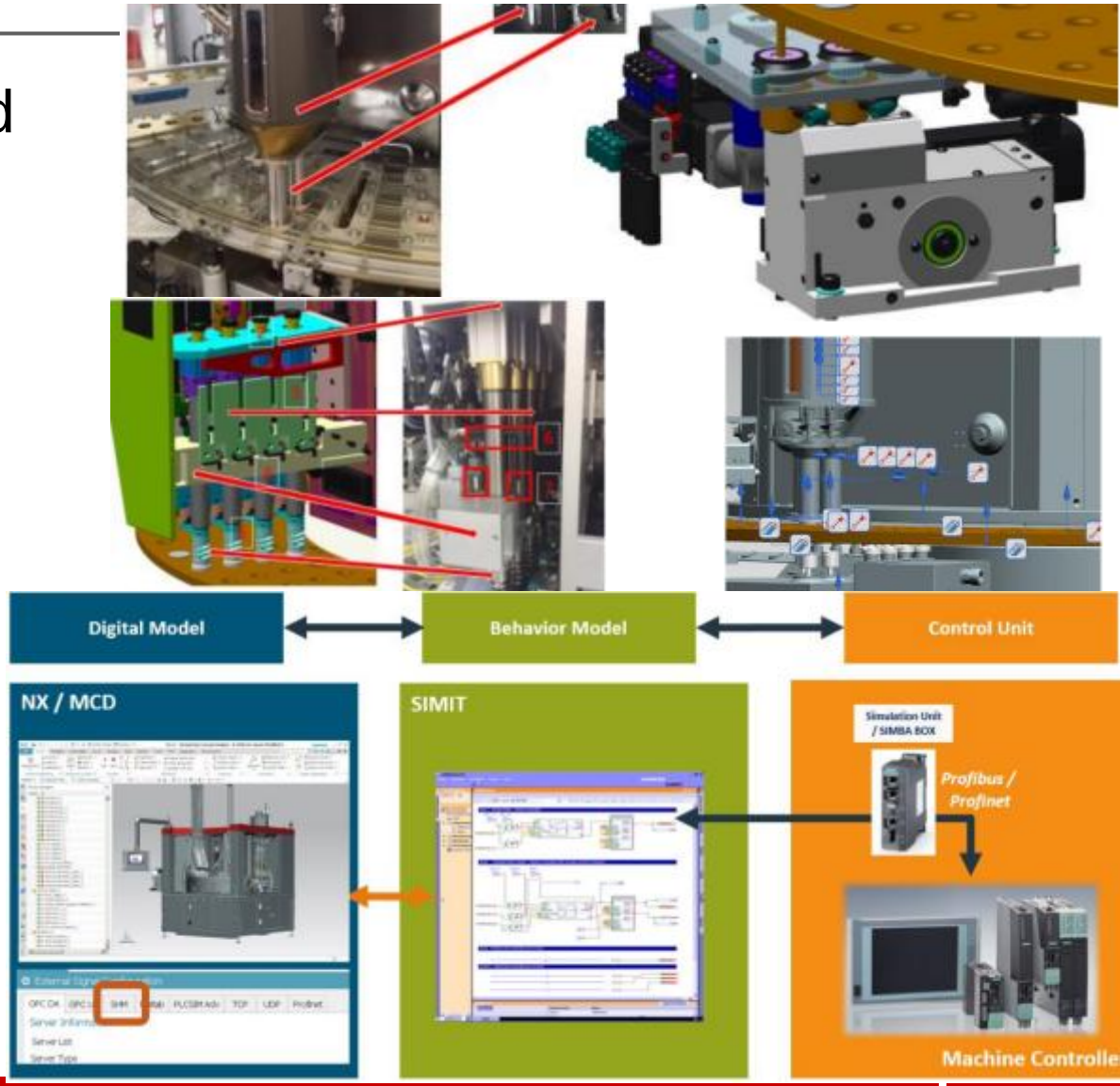
In collaboration with

IMA SPA

Virtual and smart commissioning

Virtual commissioning applied to automatic machines

- Time to market reduction
- Control logic design optimization
- Anticipate commissioning through functionally-consistent virtual models



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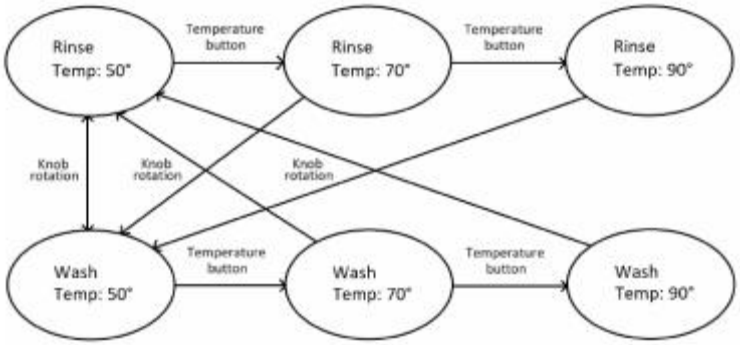
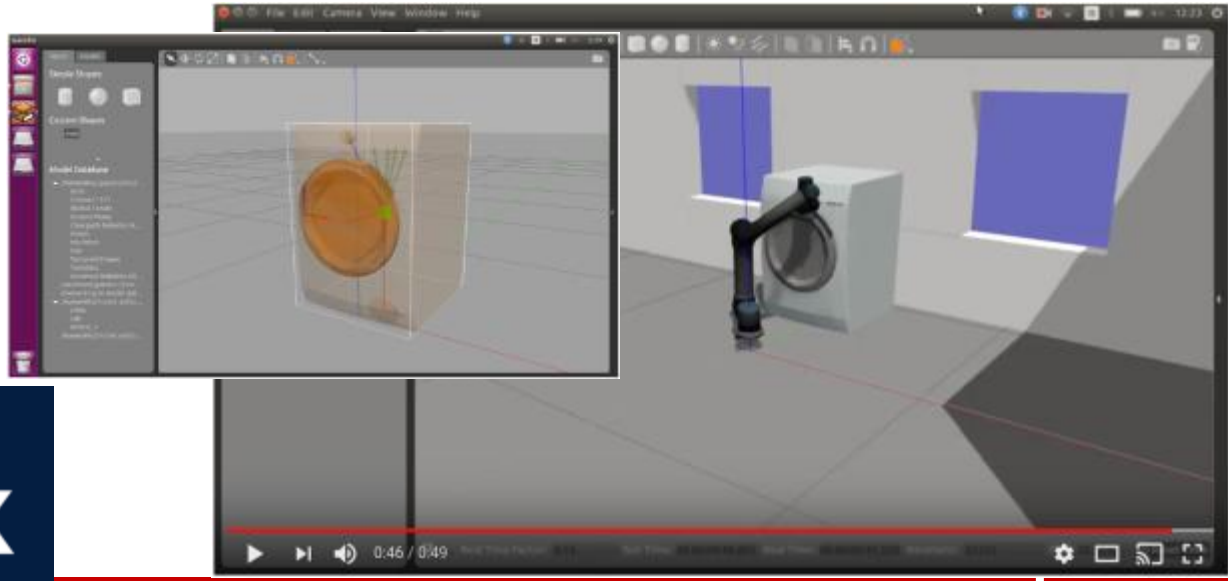
GIMATT

Automatic test and quality assessment

Extensive test procedures executed by robots

- Enlarge the number of tests
- Applicable to each single product
- Collaborative and Design-oriented robot training





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Electrolux