ISTITUTO ITALIANO DI TECNOLOGIA
HUMANOIDS AND HUMAN CENTERED MECHATRONICS

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Intuitive Human-Robot Interfaces Leveraging on Autonomy Features for Controlling Highly-Redundant Robots

Human-Robot Interface

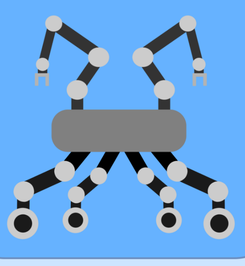
Intuitiveness

Autonomy Features

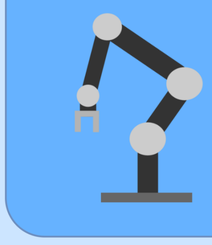
Robot Perception Feedback

Applications

Highly-Redundant Robots



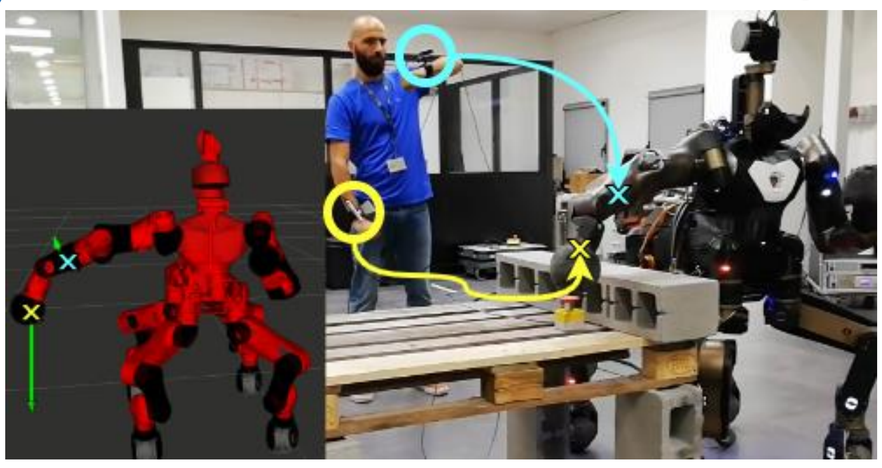
Assistive Manipulators



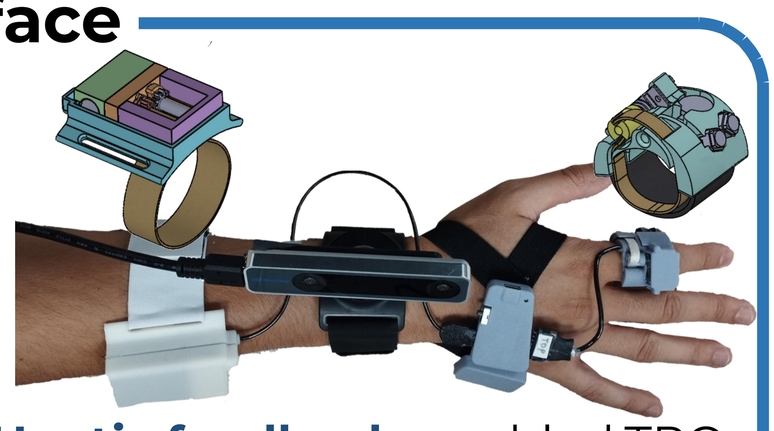
Exploration of **human-robot interfaces:**

- Key objectives of **intuitiveness** and exploitation of **robot autonomy** features
- **Feedback** signals to the operator
- Controlling various kind of robots, like **highly-redundant** systems and **assistive** manipulators

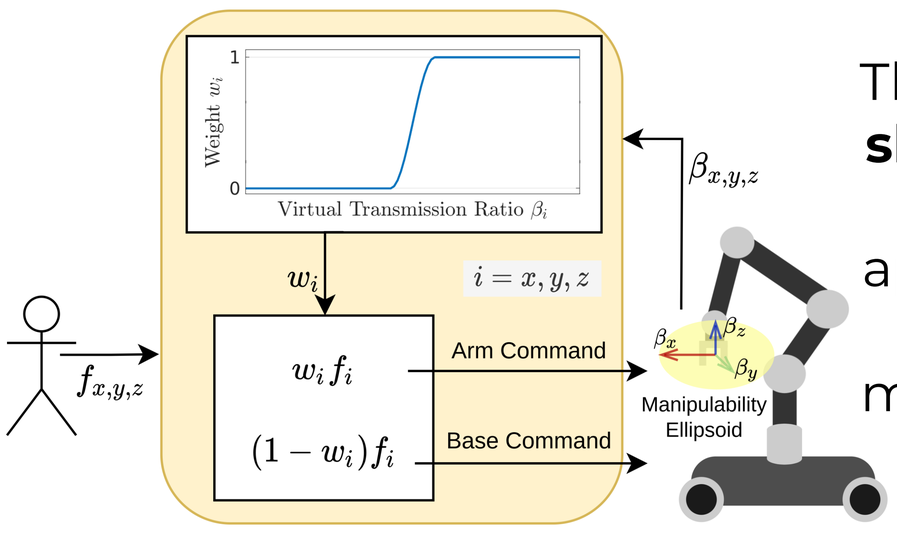
TelePhysicalOperation (TPO) Interface



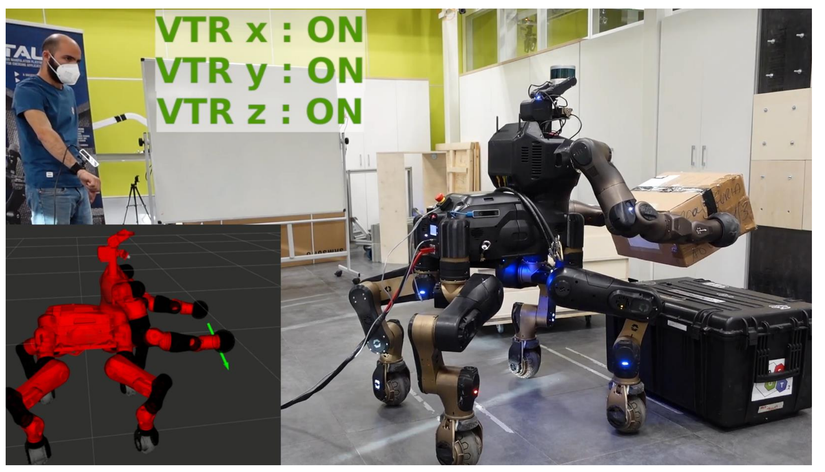
With the "**Marionette**" type interaction interface, a **highly-redundant** robot can be controlled with **virtual forces** by exploiting the **intuitiveness** of a **physical human-robot interaction** in a virtual **remote** manner



Haptic feedback-enabled TPO to feel the virtual forces applied

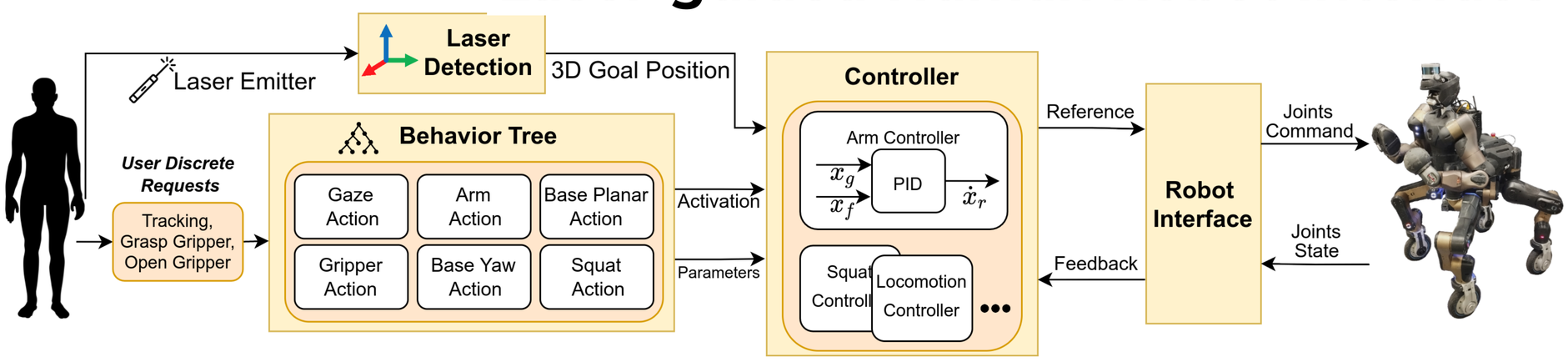


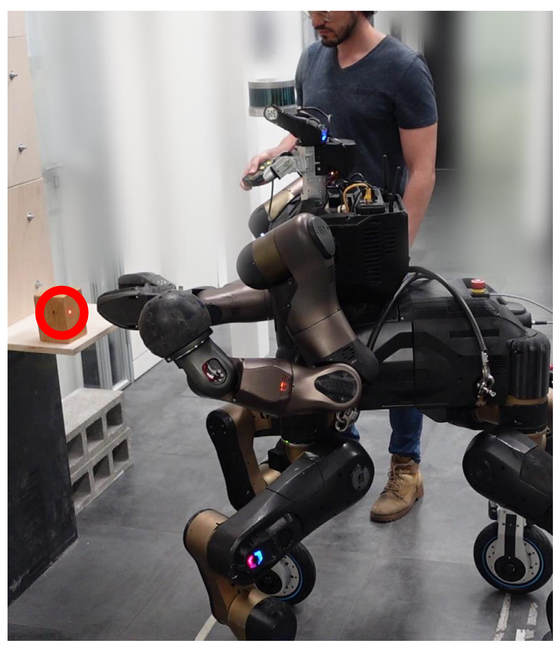
The **manipulability-aware shared locomanipulation autonomy** feature, applied to a **mobile robot**, generates arm and mobile base motions from a single operator input



With the **autonomous regulation of grasping forces**, bimanual object transportation is made effortless

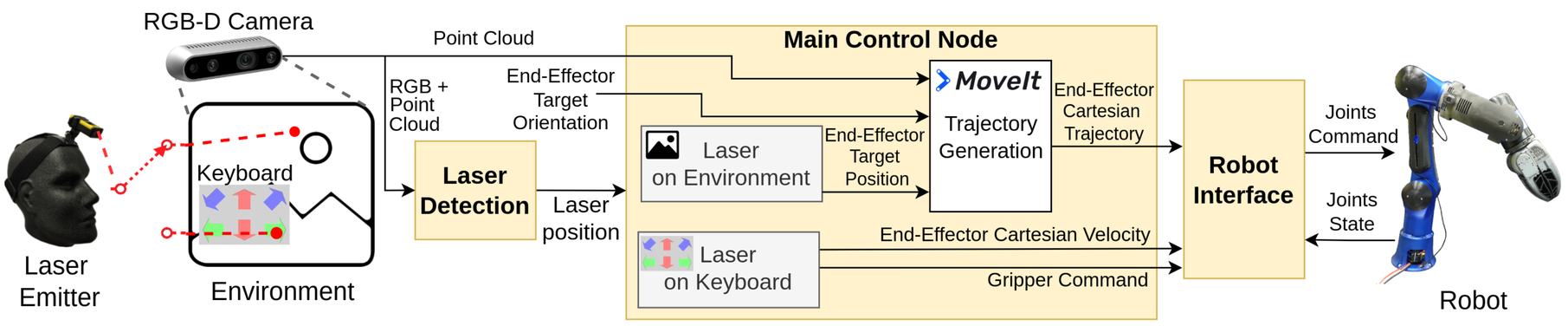
Laser-guided Human Robot Interface

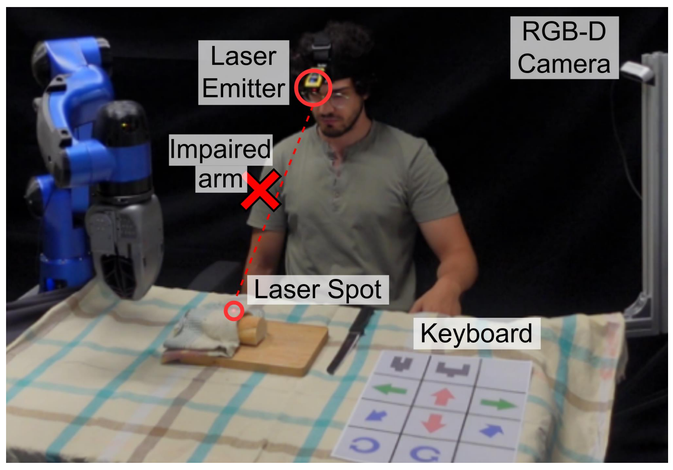




An **intuitive** method for commanding target locations with a laser device

- The laser projection is tracked with a **neural-network** solution
- Motions of the **highly-redundant** robot are generated by an **autonomous** plan based on **behavior trees**





An interface that enables people with upper limb impairements to command the **assistive** manipulator by **intuitively** directing the head, hence the head-worn laser, toward desired locations

RELAX CONCERT SOPHIA HARIA

PhD Days, Genova, Italy
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