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Laboratoire d'ingé
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INTERACTIVE ROBOTICS

The video team

The Interactive Robotics (IR) team is doing research on Interactive Robotics for Assistance and Service. The different scientific problems and challenges approached apply to the modeling, simulation, design and the control of this type of systems.

The realisation of experimental platforms in the form of laboratory prototypes is one of the originality, at the national scale, of the IR team. Experimental validation on these prototypes or on trading platforms is the last step for the IR team keen to carry out theoretical and experimental works which is characterized by the applied and multidisciplinary approach of robotics.

The application fields are health and handicap on one side, and the personal assistant on the other side. The objective is to improve our understanding of the interaction (physical or virtual) of the Human and of Interactive Robotics for Assistance and Service in order to offer new mechatronic solutions and software capable of improving the efficiency and the security of this interaction as well as the global autonomy of the interactive system.

The adopted approach is therefore to consider the various components of the interactive robotic system and to bring new contributions in terms of design, power transmission, control and evaluation.

The team's reserach activities are developed in two complementary themes:

Theme 1: Biomimetic design, control and machine learning
Theme 2: Assistance and interaction

The major contributions concern:
a) The development of an integrated actuator with hydrostatic transmission, active compliance and energy efficient.
b) The innovative design of new kinematic and mechatronic structures capable of reproducing a bio-faithful behavior of the interactive system.
c) Prediction using the average energy of the length of the next step as a function of a desired average speed of a bipedal robot moving on level ground or over obstacles.
d) The generation of coordinated behaviours for walking systems based on explicit geometric, dynamic and energetic formulations.
e) Neural dynamic control by introducing H variables of redundant systems.
f) The reconstruction and real-time control of the spatial configuration thanks to a multi-modal fusion integrating vision, an inertial sensor and magnetometers.

g) Behavioral autonomy for humanoid robots with multisensory perception.
A strong industrial partnership is established with societies like Aldebaran Robotics and BIA.