

# Workshop on Actuation & Sensing in Robotics

## Session B - Sensing

### B1

## Natural and intuitive exchanges of objects between humans and robots

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As robotic evolution brings robots closer and closer to humans, one important objective is to realize interactive tasks intuitively and safely. The exchange of objects is one of the canonical tasks that can be carried out by a number of means. For example, the human can manage the operation and control the opening or the closing of the robotic fingers by all types of systems. But the best solution is to endow robots with the ability to exchange objects naturally as humans do.

We present an “intelligent” sensorized device named Bidule (Fig. a) to study the force exchanged during human/human object exchanges (Fig. b). It is built around a Gumstix microcomputer, a 6D force sensor and an accelerometer. From the data obtained with this device and using wavelet analysis, we show that, during exchange, the force signal carries information. This information can be used to choose the instant when the robot can close or open its fingers.

To validate this approach, we implemented a new grasp detector based on these results on our Jido robot. The first exchanges of objects realized show the robustness of this approach based on an intuitive interaction between humans and robots (Fig. c).

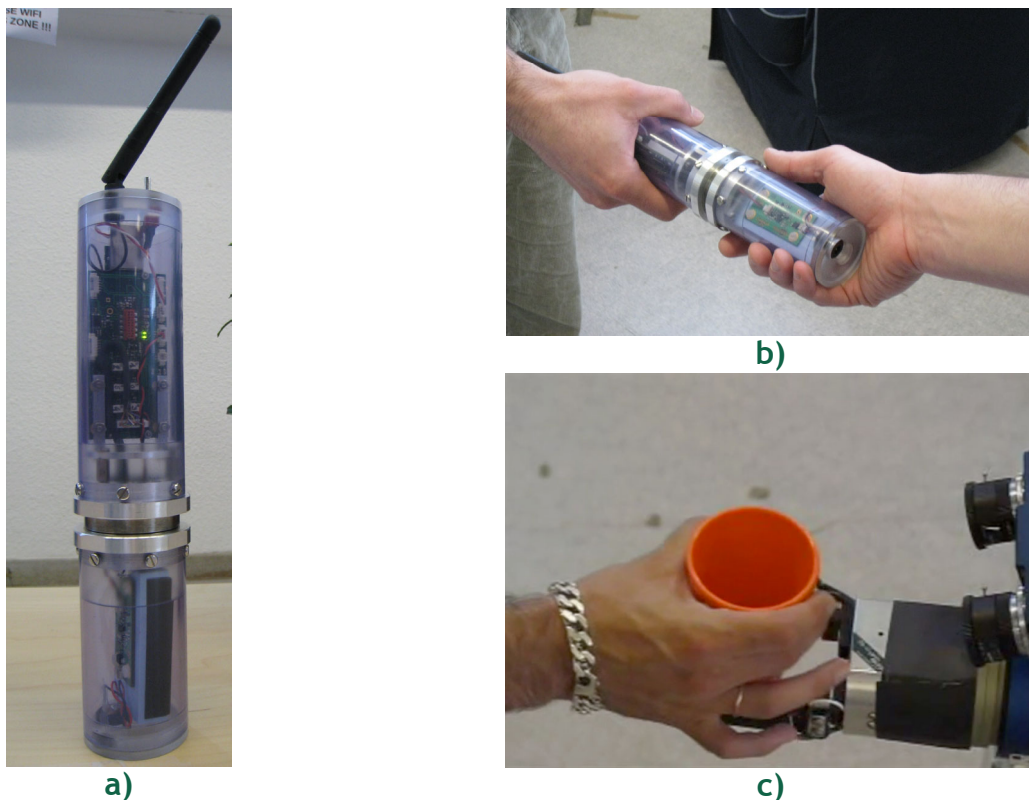


Figure - a) bidule object, b) exchange of the bidule by two humans, c) a human grasps an object from the robot.