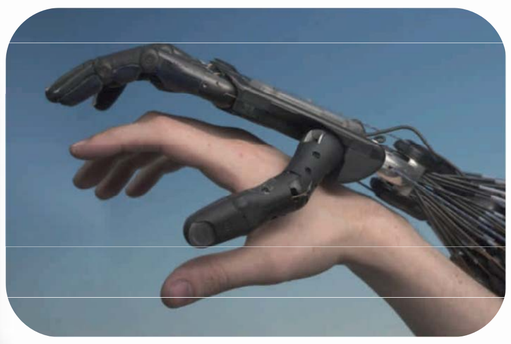

Multi-modal control of an anthropomorphic hand in the context of grasping and in-hand manipulation

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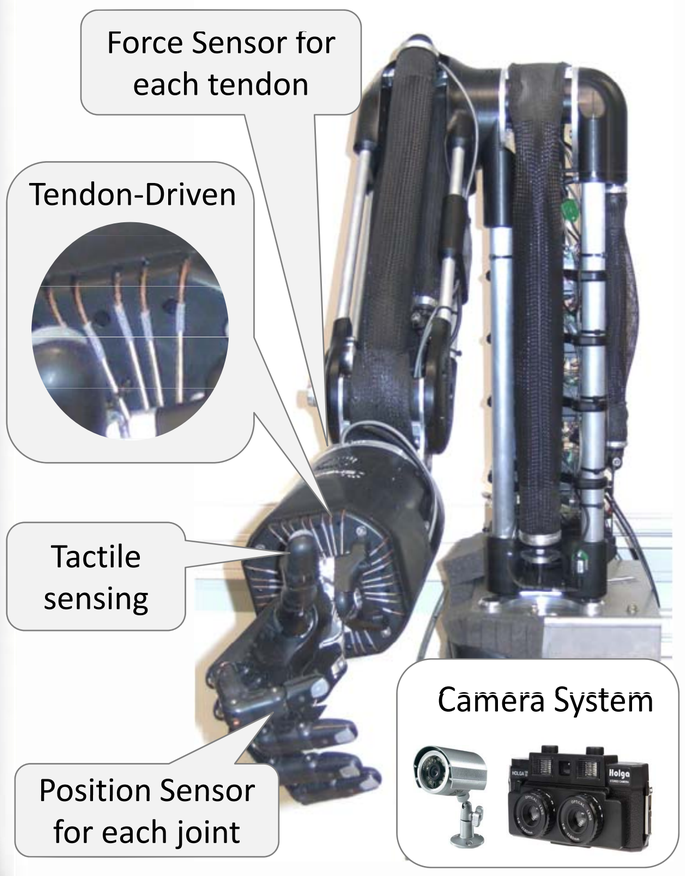
Main Objective

Control of an anthropomorphic hand based on a multi-sensorial system for the tasks of grasping and in-hand manipulation. The work will be driven by quality criteria such as dexterity, stability, compliance and manipulability.

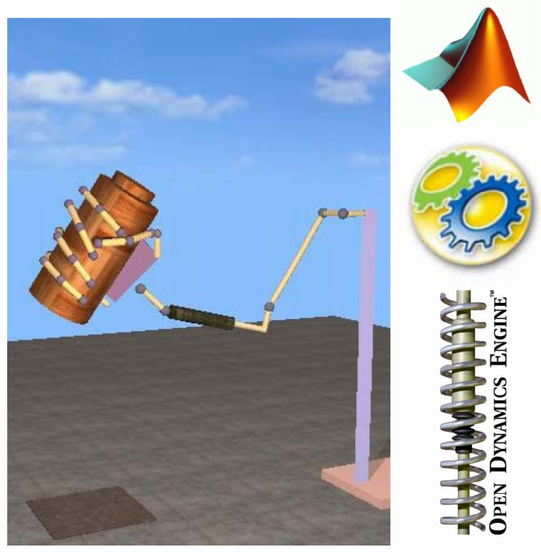
Experimental Platform

Shadow hand with diverse types of sensors: position, force, visual and tactile sensing



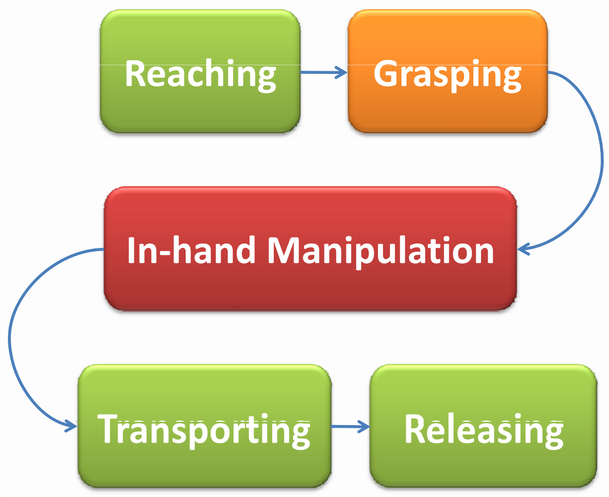
Simulation Tools

Matlab, Marilou Simulation Environment and ODE – Open Dynamics Engine



Action Decomposition

The whole action that the control system is involved in can be decomposed into 5 basic tasks:



Each basic task need a specific control strategy.

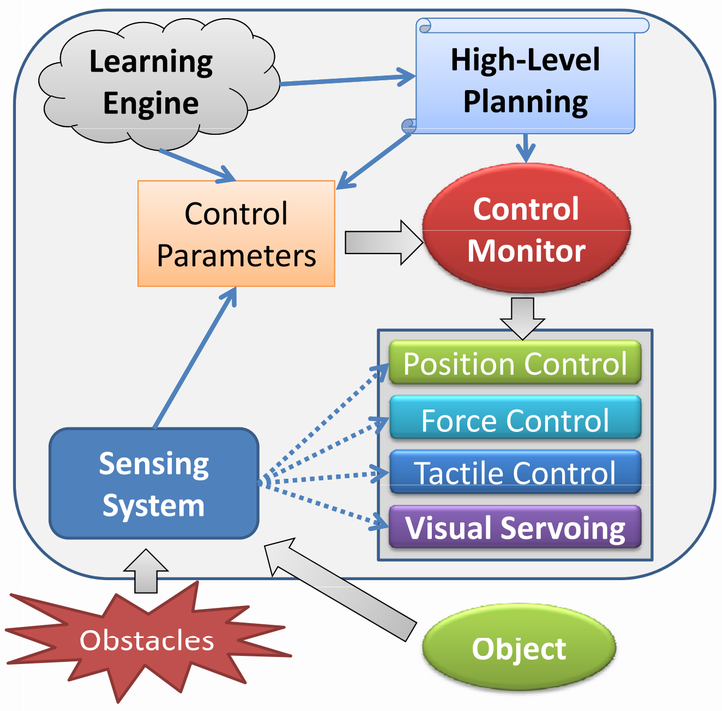
Control Architecture

Basic Bricks:

- Position control
- Force – Torque control
- Tactile Sensing control
- Visual Servoing
- Multi-Finger Coordination

Control Parameters:

They are essentially the gains or parameters that are specified based on robot–object characteristics, control strategy and some specific needs.



Interaction with Learning & High-level Planning:

Online Learning & High-level planning will monitor the execution of the tasks by determining the type of control and the corresponding parameters.

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HANDLE: Developmental pathway towards autonomy and dexterity in robot in-hand manipulation, is a Large Scale Integrated Project coordinated by the University Pierre and Marie Curie of Paris and includes a consortium formed by nine partners from six EU countries: France, UK, Spain, Portugal, Sweden and Germany.