Title (tentative): Development and testing of a new 6 dof force sensor

Thesis advisor(s): Casadio Maura, Gabriel Baud-Bovy Researcher (IIT, E-mail: gabriel.baud-bovy@iit.it) Jacopo Zenzeri (IIT, jacopo.zenzeri@iit.it)

E-mail: Maura.Casadio@unige.it

Address: Via Opera Pia 13, 16145 Genova (ITALY)

Phone: (+39) 010353 - 2749

Description

Motivation and application domain

Force sensing technologies is an important element of robotics. Accurate force sensors are needed to implement many control laws in robotics and to monitor physical interaction between humans and machines. At IIT, force sensors are used in humanoid robots like iCub to implement muscle-like properties (impedance control) and in robot-assisted rehabilitation setups for example.

General objectives and main activities

The general objective is to develop 6 dofs force sensor that is adapted to monitor human upper limb function and fine manipulation actions. The students will work in collaboration with mechanical designer and electronicians. The activities include:

1. Testing and fully characterizing the force sensor (mechanical response, temperature sensibility, signal-to-noise ratio).
2. Develop an automated calibration procedures
3. Compare performance with commercial force sensors
4. Developing software to communicate with force sensor electronics
5. Integrate the force sensor in experimental setup

Training Objectives (technical/analytical tools, experimental methodologies)

The things that I will learn:

1. Principles of force sensor design (CAD modeling, strain gage, …)
2. Testing and calibration procedures
3. Mixed software skills (C/C++ on PC and embedded systems, matlab)
4. Force sensing applications in haptics and robotics

Place(s) where the thesis work will be carried out: RBCS Dept, Istituto Italiano di Tecnologia

Additional information

Pre-requisite abilities/skills: Knowledge of C/C++. Matlab or R. Some EE and/or ME background

Maximum number of students: 2