Scientific axes

DEMAR research interests are centered on the human sensory motor system, including muscles, sensory feedbacks, and neural motor networks.

The main scientific axes of DEMAR are then:

- **Modelling the sensory motor system**, since designing efficient control schemes and performing realistic simulations need for modelling. The scientific approach is to develop multi scale models based on the physiological microscopic reality up to a macroscopic behavior of the main parts of the sensory motor system: muscles, natural sensors and neural structures.

*Read more in the corresponding item...*
- **Controlling the sensory motor system.** Controlling the sensory motor system through the FES technique is complex due to the muscle’s dynamics, the biomechanical structure, but also the available measurements for feedbacks. Advanced control strategy such as high order sliding modes, nonlinear model predictive control, high level hybrid approaches based on continuous control and event triggered commutation of strategies, movement trajectory generation, etc. are studied.

*Read more in the corresponding item...*

- **Interfacing artificial and natural parts through neuroprosthetic devices.** To overcome the limitations of the actual FES centralized architecture, a new FES architecture was proposed according to the SENIS (Stimulation Electrique Neurale dIStribuée) concept: the distribution of i) the stimulation unit with its control near its activator, i.e. its associated neural electrode ii) the implanted sensor with its embedded signal processing.

*Read more in the corresponding item...*