

# Perception active et multimodalité

Keywords: multimodal integration, facial expression, mirror neurons, artificial skin, tool-use, body image, imitation learning, cerebellum, sensorimotor coordination.

## Thèses en cours

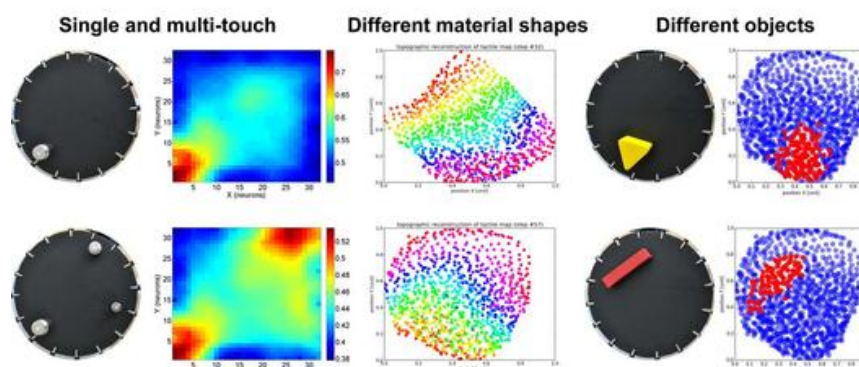
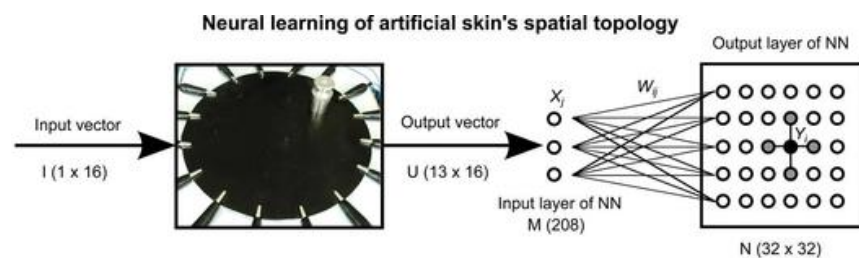
### Incremental Activation of Multiple Learning Systems From Motor Babbling to Tool-Use

Raphaël Braud ([Prof. Philippe Gaussier](#), [Dr. Alexandre Pitti](#))

The main topic of the thesis is to model the neural mechanisms underlying the emergence of tool-use in infants development for robots.

### Artificial Skin for a Humanoid Robot

Anna Pugach ([Prof. Philippe Gaussier](#), [Dr. Alexandre Pitti](#))



The sense of touch is considered as an essential feature for robots in order to improve the quality of their physical and social interactions. For instance, tactile devices have to be fast enough to interact in real time, robust against noise to process rough sensory information as well as adaptive to represent the structure and topography of a tactile sensor itself – i.e. the shape of the sensor surface and its dynamic resolution. In this

paper, we conducted experiments with a self-organizing map neural network that adapts to the structure of a tactile sheet and spatial resolution of the input tactile device; this adaptation is faster and more robust against noise than image reconstruction techniques based on electrical impedance tomography. Other advantages of this bio-inspired reconstruction algorithm are its simple mathematical formulation and the ability to self-calibrate its topographical organization without any a priori information about the input dynamics. Our results show that the spatial patterns of simple and multiple contact points can be acquired and localized with enough speed and precision for pattern recognition tasks during physical contact.

## **Etude des précurseurs de l'intentionnalité avec un nouveau type de robot anthropomorphique. Apprendre à percevoir et à agir dans un cadre interactif**

David Bailly ([Dr. Pierre Andry](#), [Prof. Philippe Gaussier](#))

## **Thèses soutenues**

### **Interactive Learning in Autonomous Robotics: Toward New Kinds of Human Robot Interface. 2014**

Dr. Antoine de Rengervé ([Dr. Pierre Andry](#), [Prof. Philippe Gaussier](#))