

In face of the advances in brain-inspired robotics: Do we need to develop *neuroethics of neurorobotics*?

Towards an ethics of neurorobotics

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THE CHALLENGE

Given the specificity of Neurorobotics, as an emerging field of research and innovation that intersects neuroscience, robotics and information technologies: are there ethical issues specific to this interdisciplinary field of practice that distinguish it from other topics, conflicts and ethical dilemmas already identified by robot ethics and ethics in information technologies? **Due to its specificity, does the emergence and development of neurorobotics merit the development of a "neuroethics of neurorobotics"?**

WHAT IS NEUROROBOTICS?

- Focuses on the results from the alliance between neuroscience & robotics
- That helps the scientific community to understand the brain better
- As design robotic devices & algorithms for interfacing human and robotics
- Connect simulated brain model to virtual or even real body
- Explore how the brain controls movement, react to stimulus & learns in a virtual environment

NATURE AS SOURCE OF INSPIRATION

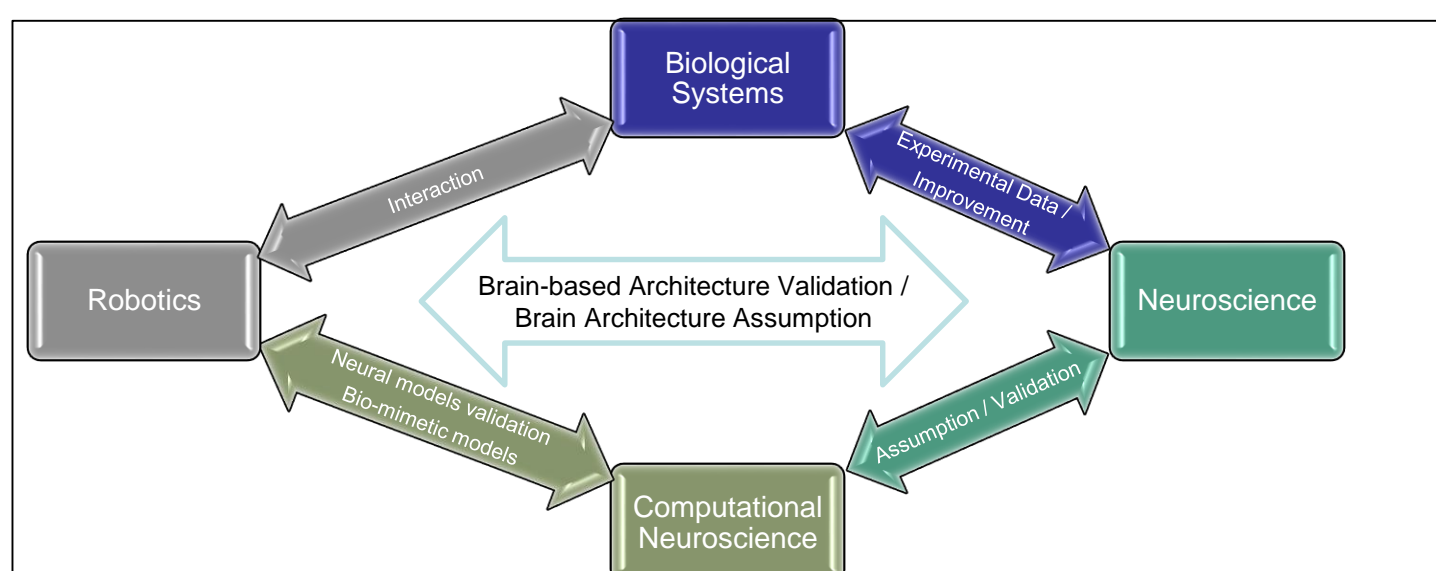
- The biological systems are the result of an evolutionary process
- Is it possible to emulate nature in order to design and develop sophisticated, robust & adaptable artificial systems?

USING THE BRAIN AS INSPIRATION

- The human brain is one of the most astonishing, complex & powerful creations of nature.
- It is lightning fast communication system that controls every aspect of your sensation and movement

BUT

- The central nervous system is not alone
- The adaptive behavior in biological organisms results from *interaction* between brains, bodies & environment



ADVANTAGES

For Neuroscience

- Reduce the need of animal experiments
- Study diseases in unprecedented in-silico experiments
- Improve validation of data & experiments with computational & practical validation

For Artificial Systems

- Faster, more flexible & capable real-time learning & control
- Boosted interaction capabilities
- Improvement of the design

Possible applications of Neurorobotics

- Industrial robots; Medical Research; Education

WHICH DISTINCTIVE ETHICAL ISSUES MAY NEUROROBOTICS RAISE?

- Ontological
- Epistemological
- Ethical
- Normative and political

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