

Body, Interaction & Self robotics WS:
The utility of body, interaction and self learning
in robotics

M A D R I D 2 0 1 8

IROS



1 October 2018

Madrid, Spain



The utility of body, interaction and self learning in robotics

Full-day workshop at IEEE/RSJ IROS 2018

(International Conference on Intelligent Robots and Systems)

October 1, 2018. Madrid, Spain.

www.selfception.eu/bodis-iros2018

***** Call for contributions *****

We cordially invite you to submit your contribution to the workshop entitled "**BODIS: The utility of body, interaction and self learning in robotics**", a full-day workshop at IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2018), to be held in Madrid, Spain, on October 1st, 2018.

Send your contribution (max 4 pages) through easychair [here](#) before **July 6**.

You can find more details here:

<http://www.ics.ei.tum.de/en/selfception/bodis-iros2018/call-for-contributions/>

***** Important Info *****

Paper submission deadline: 6th July 2018

Notification of acceptance: 10th August 2018

Workshop day: 1st October 2018

Website: www.selfception.eu/bodis-iros2018/

Contact email: selfception.workshop@gmail.com

Submissions: <https://easychair.org/conferences/?conf=bodis2018>

***** Invited Speakers *****

- **Yasuo Kuniyoshi**. University of Tokyo. Japan
- **Yukie Nagai**. Nat. Inst. of Information and Communication Technology. Japan
- **Tony Prescott**. University of sheffield . UK
- **Jeannette Bohg**. Stanford/Max Plank. USA
- **Yiannis Demiris**. Imperial College. UK
- **Alessandra Sciutti**. Italian Institute of Technology. Italy

***** Organizers *****

Pablo Lanillos, Technical University of Munich, (TUM), Germany

Matej Hoffmann, Czech Technical University in Prague, Czech Republic

Jun Tani, Okinawa Inst. of Science and Technology (OIST), Japan.

Giulio Sandini, Italian Institute of Technology (IIT), Italy.

Gordon Cheng, Technical University of Munich (TUM), Germany.

*** Description ***

Humans learn and later continuously update models of their bodies and the world by means of interaction during their whole life and are able to discern between their own body and self-produced actions and other entities in their surroundings. Thereby, humans can seemingly effortlessly cope with complex unstructured environments using predictors and interact with other entities and humans inferring their physical (location and dynamics), emotional, and mental state. Although we are still far from this scenario in robotics, promising models and methods appear every year with great potential for real world applications. However, there are still barriers that should be overcome, such as the lack of proper experimental evaluation, oversimplification of the models, scalability or generalization. Usually, the complexity of the learning and modelling schemes makes difficult to envisage its utility for end-user fields like robot companions, human-robot interaction or industrial applications. Hence, this workshop discusses the utility and applicability of current computational models that allow robots to learn their body and interaction models to deploy robust adaptive physical interaction by exploiting the learnt prediction capabilities. Drawing on recent developments in embodied artificial intelligence and robotic sensing technology, engineering and bio-inspired solutions will be presented to solve challenging problems, such as automatic multimodal self-calibration (e.g. soft robots), interactive perception and learning (e.g. causal inference), safe human-robot interaction (e.g. peripersonal space learning) and safe interaction in complex human environments (e.g. self/other distinction).

The main objectives of the workshop are:

1. To present the utility and advantages of autonomous learning of body, interaction, and self models in robotics, and its underlying mechanisms as critical processes for human-robot interplay, interaction in unstructured environments and tool use.
2. To bring together roboticists that started theorizing about this approach with novel researchers in the field of embodied AI and robotics, in order to present and discuss the main developments, benefits and current challenges for deploying new generation of multisensory robots that learn from interaction.

Particularly, four important pillars will be addressed in detail. (I) Body: sensors and actuators to provide successful body learning capabilities. (II) Exploration: methods to efficiently sample information from the body and the environment. Different complementary methods have been proposed, such as neural oscillators, intrinsic motivation, goal directed movements, social and imitation driven exploration. (III) Learning: sensorimotor integration algorithms to encode body patterns and enable prediction. Promising connectionist approaches are multiple timescales recurrent neural networks, Hebbian-based and deep learning like restricted Boltzmann machines; Bayesian inference solutions, such as variational Bayes and predictive processing; and high-dimensionality regressors like Gaussian process, locally weighted projection regression or infinite experts. (IV) Memory: the model, the parameters or the priors are stored during interaction for future predictions. The memory highly depends on the learning algorithm. Some potential approaches are parameterization, Gaussian factorizations, RNN layers with different temporal dynamics, episodic memories and associative networks.

*** Topics of interest ***

- Body-model learning
 - Self-exploration
 - Self-calibration
 - Self-modeling
- Self/other distinction
- Sensorimotor, intermodal and crossmodal patterns learning algorithms
- Interactive perception
- Peripersonal space learning and protective safety zones
- Embodied active perception, learning and interaction
 - Active inference
 - Predictive processing in robots
 - Embodied causality
 - Interaction using body predictors
- Self computational models
 - Agency
 - Body-ownership
- Self-aware robots

*** Call for contributions (detailed) ***

We invite participants to submit extended abstracts, short papers (max 4 pages) or 5 minutes videos of relevant work. Publications to be presented at the main conference are also welcome. The accepted contributions will be posted on the workshop website but they will not appear in the official IEEE proceedings. The reviewing is single blind and will be edited by the workshop organizers.

Please submit your abstract through [easychair here](#) before **6th July**, 2018. Any questions please send an email to selfception.workshop@gmail.com.

The template for the contributions is IEEE RAS workshop ([Latex](#)). The following paper categories are welcome:

- Extended abstracts
- Short papers (max 4 pages)
- Video contribution. Submit a pdf explaining the video and embed the link on the text

Accepted contributions will have the opportunity to present their work/ideas to the audience in a poster highlights slot. Moreover, up to 4 excellent submissions will give a 20 min talk at the workshop. *Please indicate in your email if you want to present as a poster/video or if you want to apply for the oral presentation slot.*

Furthermore, a selective number of papers from the poster sessions will be invited to submit their extended novel work to the special issue we are proposing for journal to be defined. This special issue will cover the main topics of interest of this workshop.

*** Supported by ***

IEEE/RSJ IROS, IEEE Cognitive Robotics Technical committee, and SELFCEPTION MSCA H2020 project.

