

Erwan Renaudo | PhD

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Research Interests

- Cognitive architectures for fully autonomous robots.
- Machine learning applied to robotics.
- Developmental robotics.

Academic positions

Post-doctoral researcher – IMAGINE project

University of Innsbruck (UIBK), group head: Justus Piater
Responsible for Work Package 2: Action Representation for Robotics;
Project-wide technical coordination

Innsbruck, Austria

Jan. 2017 – Apr. 2021

Post-Doctoral researcher

University Pierre and Marie Curie (UPMC)
Supervision: Raja Chatila and Mohamed Chetouani
Application of my PhD work to Human-Robot Interaction

Paris, France

Jul. 2016 – Dec. 2016

PhD Candidate

UPMC, supervised by Raja Chatila and Mehdi Khamassi

Paris, France

Nov. 2012 – Jun. 2016

“From flexible to habitual behaviors : neuro-inspired meta-learning for autonomous robots.”

Jury : David Filliat, Jacques Malenfant, Nicolas Rougier, Costas Tzafestas, Véronique Serfaty (invited).

Education

Institut des Systèmes Intelligents et de Robotique (ISIR)

Ph.D., supervised by Raja Chatila and Mehdi Khamassi.

Paris, France

2012 – 2016

“From flexible to habitual behaviors : neuroinspired meta-learning for autonomous robots” – RoboErgoSum Project

University of Cergy-Pontoise

M. Sc. in Intelligent and Communicating Systems

Cergy, France

2011–2012

Majors : Artificial Intelligence, Machine Learning, Bio-inspired Robotics, Modelling

École Nationale supérieure de l'Électronique et de ses Applications (ENSEA)

Engineer degree (M.Sc.) in Electronics, Informatics and Telecommunications

Cergy, France

2008–2011

Majors : Informatics, Software architecture, Signal processing

Publications

[1] Rémi Dromnelle, Benoît Girard, **Erwan Renaudo**, Raja Chatila, and Mehdi Khamassi. Coping with the variability in humans' reward during simulated human-robot interactions through the coordination of multiple learning strategies. In *Proceedings of the 29th IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*, pages 612–617, 2020.

[2] Rémi Dromnelle, **Erwan Renaudo**, Guillaume Pourcel, Raja Chatila, Benoît Girard, and Mehdi Khamassi. How to reduce computation time while sparing performance during robot navigation? a neuro-inspired architecture for autonomous shifting between model-based and model-free learning. In *Biomimetic and Biohybrid Systems*, pages 68–79, Cham, 2020. Springer International Publishing.

[3] Simon Haller-Seeber, **Erwan Renaudo**, Philipp Zech, Florian Westreicher, Markus Walzthöni,

Stefan Strappler, Cornelia Vidovic, and Justus Piater. Rossini: Robot kids design thinking. In *Robotics in Education 2020*, pages 0–0, 2020.

[4] Jakob J. Hollenstein, Sayantan Auddy, Matteo Saveriano, **Erwan Renaudo**, and Justus Piater. How do offline measures for exploration in reinforcement learning behave? In *Workshop on Knowledge Based Reinforcement Learning 2020*, Yokohama, Japan / Virtual, 2020.

[5] Jakob J. Hollenstein, **Erwan Renaudo**, Matteo Saveriano, and Justus Piater. How does explicit exploration influence deep reinforcement learning ? In *Austrian Robotics Workshop 2020*, Graz, Austria, 2020.

[6] Erenus Yildiz, Tobias Brinker, **Erwan Renaudo**, Jakob J. Hollenstein, Simon Haller, Justus Piater, and Florentin Wörgötter. A visual intelligence scheme for hard drive disassembly in automated recycling routines. In *Proceedings of the International Conference on Robotics, Computer Vision and Intelligent Systems - ROBOVIS*, pages 17–27, 2020.

[7] Philipp Zech, **Erwan Renaudo**, Simon Haller, Xiang Zhang, and Justus Piater. Action representations in robotics: A taxonomy and systematic classification. *The International Journal of Robotics Research*, 38(5):518–562, 2019.

[8] Raja Chatila, **Erwan Renaudo**, Mihai Andries, Ricardo-Omar Chavez-Garcia, Pierre Luce-Vayrac, Raphaël Gottstein, Rachid Alami, Aurélie Clodic, Sandra Devin, Benoît Girard, and Mehdi Khamassi. Toward self-aware robots. *Frontiers in Robotics and AI*, 5:88, 2017.

[9] Mehdi Khamassi, Benoît Girard, Aurélie Clodic, Sandra Devin, **Erwan Renaudo**, Elisabeth Pacherie, Rachid Alami, and Raja Chatila. Integration of action, joint action and learning in robot cognitive architectures. *Intellectica*, 2016.

[10] **Erwan Renaudo**, Sandra Devin, Benoît Girard, Raja Chatila, Rachid Alami, Mehdi Khamassi, and Aurélie Clodic. Learning to interact with humans using goal-directed and habitual behaviors. In *Workshop on Learning for Human-Robot Collaboration at RO-MAN 2015 Conference*, Kobe, Japan, 2015.

[11] **Erwan Renaudo**, Benoît Girard, Raja Chatila, and Mehdi Khamassi. Respective advantages and disadvantages of model-based and model-free reinforcement learning in a robotics neuro-inspired cognitive architecture. In *Biologically Inspired Cognitive Architectures (BICA) 2015*, Lyon, France, 2015.

[12] **Erwan Renaudo**, Benoît Girard, Raja Chatila, and Mehdi Khamassi. Which criteria for autonomously shifting between goal-directed and habitual behaviors in robots? In *5th International Conference on Development and Learning and on Epigenetic Robotics (ICDL-EPIROB)*, pages 254–260, Providence, RI, USA, 2015.

[13] **Erwan Renaudo**, Benoît Girard, Raja Chatila, and Mehdi Khamassi. Design of a control architecture for habit learning in robots. In *Biomimetic and Biohybrid Systems - Third International Conference, Living Machines 2014, Milan, Italy, July 30 - August 1, 2014. Proceedings*, pages 249–260, 2014.

Student (co)supervision

Innsbruck	}	2021–present: Cristof Rojas (3 rd year B.Sc.), co-supervised with Antonio Rodriguez–Sanchez
		2019–present: Christoph Kirchner (2 nd year M.Sc.), co-supervised with Matteo Saveriano
		2019–2021: Oliver Lintner (3 rd year B.Sc.), co-supervised with Sayantan Auddy
		2019–2021: Martin Kofler (3 rd year B.Sc.), co-supervised with Bart Keulen
		Summer 2019: FFG internship: 4 high-school students
		2017–present: Jakob Hollenstein (PhD Student), co-supervised with Justus Piater

- Paris {
- 2016: Avel Guénin–Carlut (1st year M.Sc.), co-supervised with Mehdi Khamassi
 - 2015: Rémi Dromnelle (1st year M.Sc.), co-supervised with Guillaume Viejo and Mehdi Khamassi
 - 2014: Scarlett Fres (2nd year M.Sc.), co-supervised with Benoît Girard
 - 2013: Omar Islas (2nd year M.Sc.), co-supervised with Benoît Girard and Mehdi Khamassi
 - 2013: Sana Bahri (engineering student), co-supervised with Benoît Girard and Mehdi Khamassi
 - 2012: Sélim Khamassi (engineering student), co-supervised with Benoît Girard and Mehdi Khamassi
 - 2012: Valère Pique (1st year B.Sc.), co-supervised with Benoît Girard and Mehdi Khamassi

Teaching duties

Uni. Innsbruck:

M. Sc. Computer Science, Summer 2019:

Master Seminar 2: Advanced topics in Robotics and Machine Learning

B. Sc. Computer Science, Summer 2018:

- Introduction to Intelligent and Autonomous Systems: Proseminar

- Introduction to Intelligent and Autonomous Systems: Lecture on Control

B. Sc. Computer Science, Summer 2017:

Introduction to Machine Learning: Lecture on Reinforcement Learning

Master ITI, ENS Ulm, 2016: Lecture on “Modelling Action”

Technical skills

Machine learning: Reinforcement learning, Clustering, Neural networks, SLAM

Robotics: Kuka LWR, Kuka IIWA, Willow Garage’s PR2 (robot technical management 2013–2016), Clearpath Robotics’ TurtleBot, Softbank robotics’ Nao

Tools: ROS, Gazebo, VRep, Git

Various: Signal processing (speech processing, vision processing)

Languages: Python, C++, Matlab, Arduino, LaTeX

Other robot related activities

Wissenschaft Festival Innsbruck, 2019: Demonstration and presentation to general audience

InDay Students 2017-2019, Campus Tage 2019: Lab presentation & demos to University students

RoSsini 2018: Co-organization and animation of a workshop on introduction to robotics for kids (in collaboration with Spielraum Fablab Innsbruck)

PopMärchen 2017, Wattens: Participation of the IIS Robotino to a theater play

Science Fair 2014–2016: PR2 and Turtlebot demonstrations

Planète Robots (FR): Popularization in n°34, p94, “Robotique et Neurosciences”

Dossier Pour la Science (FR): Popularization in n°87, “La conscience d’une machine”

Scientific collaborations

IIS: Matteo Saveriano, Simon Haller

ISIR: Benoît Girard, Mehdi Khamassi, Raja Chatila, Rémi Dromnelle

LAAS: Aurélie Clodic, Rachid Alami (RoboErgoSum ANR Project)

Event organization

Journal: Guest Editor Special Issue on Human-Friendly Robotics (Springer) 2020

Workshop: Co-chair Human-Friendly Robotics 2020

Journal: Guest Editor Special Issue on Computational Models of Affordance in Robotics in *Frontiers in NeuroRobotics* 2019–2020

Workshop: Co-chair International Workshop on Computational Models of Affordance in Robotics 2019

Reviews

Journal: *Robotics and Automation Letters* (2020)

Conference: International Conference on Learning Representations (2020)

Workshop: Human-Friendly Robotics Workshop (2020)

Conference: International Conference on Ubiquitous Robots (2020)

Journal: *International Journal of Social Robotics* (2019)

Conference: International Workshop on Computational Models of Affordance in Robotics 2019

Conference: IROS 2018

Conference: ICLR 2018

Conference: Austrian Robotics Workshop 2018

Conference: IEEE RAS Humanoids 2015

Grant

2012: DGA Ph.D. fellowship.

Languages

French: *Mother tongue*

English: *Fluent*

Italian: *B1*

German: *A2*

Summer school

Veni Vedi Vici 2013: Attended iCub Robot Summer School, Sestri Levante, Italy

References

1. Raja Chatila, Director of research at French National Center of Scientific Research (CNRS)

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4 place Jussieu, CC 173, 75252 Paris cedex 05

2. Justus Piater, Professor at the University of Innsbruck

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