

Contact Information

Position Head of Department
Affiliation Department of Cognitive Robotics
Institute of Robotics and Mechatronics
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Research Interests

Robotics, Artificial Intelligence, Cognitive Science
Movement Primitives, Reinforcement Learning, Stochastic Optimization, Cognitive Robotics, Developmental Robotics, Mobile Manipulation, Symbolic Planning, Imitation Learning, Variable Impedance Control, Analysis and Modeling of Human Motion Data

Education

- 10/2007** **Doctorate in Computer Science**
Technische Universität München, Munich, Germany
Degree: Dr.rer.nat., Magna Cum Laude
Thesis: Tailoring robot actions to task contexts using action models
Supervisor: Prof. Michael Beetz
- 08/2001** **Doctorandus in Cognitive Science and Engineering**
University of Groningen, Groningen, Netherlands
Degree: Doctorandus, Cum Laude (best of year)
Thesis: Completion of occluded surfaces
Supervisors: Dr. Henk Mastebroek, Prof. John Hallam, Prof. Bob Fisher
Award: 'Best Master's Thesis Prize 2001' from Artificial Intelligence Education in the Netherlands
- 01/1996** **Propedeuse in Biology**
University of Groningen, Groningen, Netherlands
Degree: 'Propedeuse', as a prerequisite for Cognitive Science and Engineering.

Professional Experience

- 03/2016** **Institute of Robotics and Mechatronics**
- *Head of Department*
- current** Department of Cognitive Robotics, Institute of Robotics and Mechatronics
German Aerospace Center (DLR), Oberpfaffenhofen, Germany
Managing 24 researchers, acquiring national and European funding, leading (European) projects, initiating and managing industrial cooperations, determining and coordinating research strategies, ensuring scientific and publication quality.
- 11/2011** **École Nationale Supérieure Techniques Avancées**
- *Assistant Professor*
- 01/2016** Cognitive Robotics, ENSTA-ParisTech
École Nationale Supérieure Techniques Avancées, Paris, France
Supervision of three PhD students, acquiring national and European funding, responsible for coordinating the first year computer science courses (150 students), organizing and managing two of these courses.

- 07/2011** **Technische Universität Berlin**
 - *Postdoctoral Research Fellow*
- 10/2011** Robotics and Biology Laboratory, Department of Electrical Engineering and Computer Science
 Technische Universität Berlin, Berlin, Germany
Topic: Adaptive exploration for reinforcement learning.
Funding: Return Grant from the German Research Foundation (Deutsche Forschungsgemeinschaft)
- 08/2009** **University of Southern California**
 - *Postdoctoral Research Fellow*
- 06/2011** Computational Learning and Motor Control Lab, Viterbi School of Engineering
 University of Southern California, Los Angeles, USA
Topic: Learning task-relevant parameters for human and robot motion primitives to acquire complex manipulation skills on a humanoid robot.
Funding: Post-doctoral Research Fellowship from the German Research Foundation (Deutsche Forschungsgemeinschaft - DFG)
- 01/2009** **Advanced Telecommunications Research Institute International**
 - *Postdoctoral Research Fellow*
- 03/2009** Computational Neuroscience Laboratories
 Advanced Telecommunications Research Institute International, Kyoto, Japan
Topic: Modeling tracked human reaching data, and implementing these models on the CB-i humanoid robot using Dynamic Movement Primitives.
Funding: Japan Society for the Promotion of Science (JSPS) Postdoctoral Fellowship
- 05/2008** **Technische Universität München**
 - *Postdoctoral Research Associate*
- 07/2009** Intelligent Autonomous Systems Group, Department of Computer Science
 Technische Universität München, Munich, Germany
Topic: Developing computational and control models of pick-and-place tasks in the context of everyday manipulation activities in human environments, and implementing these models on mobile manipulation platforms.
Funding: Post-doctoral research assistant, funded by the project “*CogMan – Cognitive Models of Everyday Manipulation Tasks*”, in the DFG Cluster of Excellence “*CoTeSys – Cognition for Technical Systems*”.
- 01/2007** **University of Bremen**
 - *Postdoctoral Research Associate*
- 04/2008** Cognitive Neuroinformatics Group, Faculty of Computer Science
 University of Bremen, Bremen, Germany
Topic: Developing hierarchical sensori-motor representations for autonomous agent control in a virtual reality environment. Also leader of the largest workpackage (¿ 14 person-years) in the EU-project “SHARE-it”.
Funding: As a post-doctoral research assistant, funded by the project “*ActionSpace: Spatial Exploration Based on an Integrated Representation of Sensory Features and Motor Actions*”, as part of the DFG Transregional Collaborative Research Center “*Spatial Cognition: Reasoning, Action, Interaction*”. Also funded by the EU-project “*SHARE-it: Supported Human Autonomy for Recovery and Enhancement of cognitive and motor abilities using Information Technologies*”.
- 05/2002** **Technische Universität München**
 - *Research Assistant (PhD student)*
- 09/2006** Intelligent Autonomous Systems Group, Department of Computer Science
 Technische Universität München, Munich, Germany
Topic: Learning compact action models for robot using experience-based learning. Applying these models in the context of plan optimization, transformation and coordination. The application domains are robotic soccer, arm control and mobile manipulation.

Funding: As a Ph.D. student/research assistant, funded by the project “AGILO: Semi-Automatic Acquisition of Visuomotoric Plans”, as part of the DFG priority program “Cooperating Teams of Mobile Robots in Dynamic Environments”, which focussed on RoboCup.

- 06/2001** **Instituto Superior Técnico**
- *Visiting Researcher*
- 12/2001** VisLab, Instituto de Sistemas e Robotica
Instituto Superior Técnico, Lisbon, Portugal
Topic: 2.5D range image segmentation and modeling with shape primitives. Detection and completion of occlusions in range images of building interiors.
Funding: As a visiting researcher, funded by the EU project “CAMERA: CAAd Modelling of Built Environments from Range Analysis”.
- 09/2000** **University of Edinburgh**
- *Research Assistant*
- 05/2001** Machine Vision Unit, Department of Artificial Intelligence
University of Edinburgh, Edinburgh, United Kingdom
Topic: 2.5D range image segmentation and modeling with shape primitives. Detection and completion of occlusions in range images of building interiors.
Funding: As a research assistant, funded by the EU project “CAMERA: CAAd Modelling of Built Environments from Range Analysis”.
- 1991** **Miscellaneous jobs**
- paper delivery, bookbinder, pastry baker, butcher’s assistant, Christmas decorator, shop assistant,
1999 petrol station supervisor, dairy factory worker, construction site cleaner, removal assistant, metal factory worker, to name a few.

Awards

- 2013** ‘King-Sun Fu Best Paper Award of the IEEE Transactions on Robotics for the year 2012’ for the article ‘Reinforcement Learning with Sequences of Motion Primitives for Robust Manipulation’ - Freek Stulp, Evangelos Theodorou, and Stefan Schaal.
- 2012** ‘Paper of Excellence Award’ at the International Conference on Development and Learning (ICDL), for the paper “Emergent proximo-distal maturation through adaptive exploration” – Freek Stulp and Pierre-Yves Oudeyer
- 2011** ‘Best poster for technical strength’ at a research review of the Computer Science department at the University of Southern California, for the poster ‘Movement Segmentation using a Primitive Library’ - Franziska Meier, Evangelos Theodorou, Freek Stulp, Stefan Schaal.
- 2010** Best paper finalist at the 10th IEEE-RAS International Conference on Humanoid Robots, for the paper: Freek Stulp, Jonas Buchli, Evangelos Theodorou, and Stefan Schaal – Reinforcement learning of full-body humanoid motor skills.
- 2001** Best Master’s Thesis Prize, academic year 2000/2001, by Artificial Intelligence Education in the Netherlands (KION).

Grants and Fellowships

- 2016** EU RIA Project “AnDy” (700k EUR for affiliated institute)
- 2014** EU FET Project “DREAM” (500k EUR for affiliated institute)
- 2013** “Allocation doctorale” (funding for a PhD student) from Digiteo (100k EUR)
- 2011** Return Grant from the German Research Foundation (DFG), 3 months
- 2009** Research Fellowship from the German Research Foundation (DFG), 2 years
- 2009** Postdoctoral Fellowship from the Japan Society for the Promotion of Science (JSPS), 2 months
- 2008** Grant from the Bavaria California Technology Center (BaCaTec) to visit the Computational Learning and Motor Control Lab at the University of Southern California.

Selected Publications

h-index of 24.

A complete list is here: <https://scholar.google.de/citations?user=aHPX6PsAAAAJ>

- 2018 G. Raiola, S. Restrepo, P. Chevalier, P. Rodriguez-Ayerbe, X. Lamy, S. Tliba, F. Stulp. Co-manipulation with a library of virtual guiding fixtures. *Autonomous Robots*, 2018
- 2018 F. Stulp and P.-Y. Oudeyer. Proximodistal exploration in motor learning as an emergent property of optimization. *Developmental Science*, 2018
- 2018 S. Brunner, P. Lehner, Martin. Schuster, S. Riedel, R. Belder, D. Leidner, A. Wedler, M. Beetz, F. Stulp. Design, Execution, and Postmortem Analysis of Prolonged Autonomous Robot Operations. *IEEE Robotics and Automation Letters*, 2018
- 2017 B. Busch, J. Grizou, M. Lopes, F. Stulp. Learning legible motion from human–robot interactions. *International Journal of Social Robotics*, 2017
- 2015 F. Stulp and O. Sigaud. Many regression algorithms, one unified model - A review. *Neural Networks*, 2015.
- 2013 F. Stulp and O. Sigaud. Robot Skill Learning: From Reinforcement Learning to Evolution Strategies. *Paladyn. Journal of Behavioral Robotics*, 2013
- 2012 Stulp, F., Theodorou, E., Schaal, S. Hierarchical reinforcement learning for robust manipulation. *IEEE Transactions on Robotics*, 28(6):1360–1370, 2012. **King-Sun Fu Best Paper Award of the IEEE Transactions on Robotics for the year 2012**
- 2012 Freek Stulp and Olivier Sigaud. Path integral policy improvement with covariance matrix adaptation. In *Proceedings of the 29th International Conference on Machine Learning (ICML)*, 2012.
- 2012 Stulp, F., Fedrizzi, A., Mösenlechner, L., Beetz, M. Learning and reasoning with action-related places for robust mobile manipulation. *Journal of Artificial Intelligence Research (JAIR)*, 43:1–42, January 2012.
- 2011 Buchli, J., Stulp, F., Theodorou, E., and Stefan Schaal. Learning variable impedance control. *International Journal of Robotics Research*, 2011.

Teaching

Undergraduate student project supervision

A '*' indicates that at least one conference publication arose from the project.

- 2014* Nicolas Torres Alberto – Computed Torque Control with Variable Gains
- 2013* Laura Vogelaar – On-line Option Discovery and De-Aliasing for Direct Policy Search
- 2013* Gennaro Raiola – Learning Parameterized Skills through Models with Expanded Kernels (MSc.)
- 2008 Fadoua Fakhfakh – Evaluation methodologies in assistance systems (Dipl.)
- 2008 Etienne Bousquié (ENSTA) – Analyse de trajectoires de préhension lors de l'évitement d'un objet
- 2007 Interact (Collaborative student project with 20 students)
- 2006* Wolfram Koska – Optimizing service robot plans by tuning unbound action parameters (Dipl.)
- 2006* Mark Pflüger – Feature space transformation using directed equation discovery (Dipl.)
- 2006* Michael Isik – Implicit coordination in heterogeneous robot teams with action models (Dipl.)
- 2005 Max Rietmann (Cornell) – Implementation of a C++ interface for the Roboteq AX2550 Controller
- 2005* Michael Isik – Installing a CORBA based framework on the AGILO RoboCup robots (SEP)
- 2004 Nadine Perera, Tobias Gradl – A tool for exploratory data analysis for RoboCup logfiles (SEP)
- 2004 Markus Rieger - Resolving problems in a USB interface by actively scheduling threads (SEP)

Seminars and Courses

- 02/2013-
current Coordinator of the first year computer science courses (IN101, IN102, IN103, IN104)
ENSTA-ParisTech, Paris, France.

- 09/2014-** Course “IN101 Algorithmique et Programmation (en Python)”: organizer/lecturer (140 students), and tutor (20 students)
current ENSTA-ParisTech, Paris, France.
- 11/2014-** Course “IN102 Système et Programmation (en C)”: tutor (20 students)
current ENSTA-ParisTech, Paris, France.
- 04/2013-** Course “IN104 Projet informatique”: organizer/lecturer (140 students), and tutor (16 students)
current ENSTA-ParisTech, Paris, France.
- 09/2012-** Course “IN101 Algorithmique et Programmation”: tutor (16 students)
07/2014 ENSTA-ParisTech, Paris, France.
- 10/2002-** Intelligent Autonomous Systems seminar (organizer, 7 editions with a total of 50 students)
05/2006 Technische Universität München, Munich, Germany.
- 09/2005-** Discrete Structures course (tutor for 40 students)
05/2006 Technische Universität München, Munich, Germany.
- 09/2000-** Introduction to Informatics and Java courses (tutor for 30 students)
05/2001 Department of Informatics, University of Edinburgh, Edinburgh, United Kingdom.
- 03/1999-** Introduction to Artificial Intelligence course (tutor for 30 students)
- 12/2000** Cognitive Science and Engineering, University of Groningen, The Netherlands. Together with a fellow student a large-scale didactic tool was implemented (in Java) to introduce students to the concepts of second order logic.

Other Professional Activities

Workshop/Tutorial Organization

- 2018** Tutorial “From Least Squares Regression to High-dimensional Motion Primitives”, held in conjunction with International Conference on Intelligent Robots and Systems, with Sylvain Calinon and Gerhard Neumann
- 2017** Workshop on “Micro-data: the next frontier in robot learning?”, held in conjunction with International Conference on Intelligent Robots and Systems, with Jean-Baptiste Mouret and Sylvain Calinon
- 2015** Workshop on “Physical Human-Robot Collaboration: Safety, Control, Learning and Applications”, held in conjunction with the IEEE/RSJ International Conference on Intelligent Robots and Systems, with Andrej Gams and Sylvain Calinon
- 2013** Workshop on “Hierarchical and Structured Learning for Robotics”, held in conjunction with Robotics: Science and Systems Conference (RSS), with Gerhard Neumann, George Konidaris, and Jan Peters. (#participants>25)
- 2011** Workshop on “A Comparison of Reinforcement Learning and Optimal Control Methods for Real-World Robotic Tasks”, held in conjunction with Robotics: Science and Systems Conference (RSS), with Evangelos Theodorou and Stefan Schaal. (#participants>30)
- 2009** Workshop on “Robust and Legible Manipulation in Human Environments”, held in conjunction with the International Conference on Advanced Robotics (ICAR2009), with Michael Beetz and Jan Paulus. (#participants>25)
- 2004** Workshop on “Methods and Technology for Empirical Evaluation of Multi-agent Systems and Multi-robot Teams (MTEE)”, held in conjunction with the 27th German Conference on Artificial Intelligence (KI2004), with Hans Utz and Bernhard Nebel. (#participants>35)
- 2004** Chair of the mid-size league at the German Open robot soccer competitions.
- 2004** Workshop on “Verhaltensbeschreibung und Programmierung”, held in context of the the DFG priority program “Cooperating Teams of Mobile Robots in Dynamic Environments” (SPP1125), with Dr. Jan Hoffmann (#participants>15).

Reviewing

Robotics

Journals: • IEEE Transactions on Robotics • IEEE Robotics and Automation Letters • Robotics and Autonomous Systems • Autonomous Robots • Journal of Intelligent and Robotic Systems • IEEE Transactions on Mechatronics • IEEE Transactions on Control Systems Technology.

Conferences: • Robotics: Science and Systems (RSS) – 2014-2015 (AE). • Int'l Conf. on Robotics and Automation (ICRA) – 2008-2018 (reviewer), 2014-2017 (Associate Editor). • Int'l Conf. on Intelligent Robots and Systems (IROS) – 2009-2013 (reviewer), 2016-2017 (AE), 2018 (Editor) • Int'l Conf. on Development and Learning (ICDL) – 2010-2012 (PC). • Int'l Conf. on Humanoids Robots (Humanoids) – 2011-2014. • Conference on Robot Learning – 2017-2018

Artificial Intelligence

Journals: • Artificial Intelligence Magazine. • Transactions on Autonomous Mental Development.

Conferences: • AAAI Conference on Artificial Intelligence (AAAI) – 2008 (PC) • Künstliche Intelligenz (2004-2006) • SOFSEM – 2007 (PC)

Computer Vision

Conferences: • International Conference on Pattern Recognition (ICPR) – 2006 • German Association for Pattern Recognition (DAGM) – 2003

Outreach

- Print** My RoboCup-related research has been published in several print media, e.g. Süddeutsche Zeitung, Aud!max, and Siemens Magazine.
- TV** I have been interviewed for the German ARD television show "Willi Will's Wissen" on our robot soccer team, the "Agilo RoboCuppers".
- Demos** One of the Munich soccer robots was exhibited at the Deutsche Museum for two months, as part of the exposition "Innovationen im Fussball". We also presented our robot soccer team to the public at demonstration games at the SiemensForum in Munich, and Wissenschaftstag at the Technische Universität München.

Language Skills

Fluent: Dutch, English, German

Advanced knowledge: French, Spanish

Programming: C++, C, Python, Matlab, Perl, Java, Prolog, Linux shell scripting