

Simon Stepputtis

POSTDOCTORAL FELLOW · CARNEGIE MELLON UNIVERSITY

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Education

PhD Student in Computer Science

Arizona State University

JANUARY 2017 - DECEMBER 2021

Tempe, AZ, USA

- **Thesis** — *Multimodal Robot Learning for Grasping and Manipulation*
- My research focuses on the synergies between Human-Robot Interaction and Natural Language Processing for common manipulation tasks
- Selected publication: **NeurIPS 2020 Spotlight: Language-Conditioned Imitation Learning for Robot Manipulation Tasks**

Master of Science in Engineering & Computing

TU Bergakademie Freiberg

APRIL 2015 - NOVEMBER 2016

Freiberg, SA, Germany

- **Thesis** — *A data driven approach for triadic interactions in human robot interaction*
- This thesis deals with the question of how to reason about an additional object in classic Human-Robot Interaction
- Specifically, I designed a system for natural handover tasks between robots and humans

Bachelor of Science in Engineering & Computing

TU Bergakademie Freiberg

OCTOBER 2011 - MARCH 2015

Freiberg, SA, Germany

- **Thesis** — *Upper body tracking for avatar visualization in HMD-based virtual reality*
- In this thesis I designed a approach that allows users to have a realistic virtual body while being immersed in HMD-based virtual reality
- A core component of this work is to bridge the reality gap between the users movement in the real and virtual world

Experience

Postdoctoral Fellow

Carnegie Mellon University

JANUARY 2022 - PRESENT

Pittsburgh, PA, USA

In my role as a postdoctoral fellow in the Robotics Institute at Carnegie Mellon University, my main duties include:

- Designing and developing algorithms for multi-agent and multi-robot coordination
- My research focuses on understanding and inferring the intention of participants in a team composed of humans and agents
- Support and mentor junior members of the group in various stages of their academic career
- Lead writing scientific papers and proposals

Resident @ X

X, The Moonshot Factory

MAY 2021 - OCTOBER 2021

Mountain View, CA, USA

As a resident at X, the moonshot factory, I am working on industrial manipulation tasks for Intrinsic, a robotics software and AI project at X.

- Developed a novel approach for contact-rich bimanual insertion tasks that can be trained by human imitation (Python, C, C++) [Paper: IROS 2022]
- Application of software development standards in a large-scale project and code base (Git, Mercurial)

Graduate Service Assistant

Arizona State University

JANUARY 2017 - MAY 2018 AND AUGUST 2018 - MAY 2021

Tempe, AZ, USA

I have worked on various projects in the field of Human Robot Interaction, Natural Language Processing, Machine Learning and Artificial Intelligence:

- Designed and developed an end-to-end approach to synthesize robot controllers from language and visual perception, allowing robots to engage in natural Human-Robot Collaboration (Python, TensorFlow, ROS) [Paper: NeurIPS 2020]
- Developed a deep learning approach to allow robots to perform in-hand object manipulation based on tactile sensor data by utilizing slip (Python, Keras, ROS) [Paper: ICRA 2018]

Additionally, my passion for teaching has led me to work as a teaching Assistant at Arizona State University on multiple occasions.: *Introduction to Theoretical Computer Science* (Spring 2018, 2019, 2020); *Artificial Intelligence* (Fall 2017) (Python); *Advances in Robot Learning* (Spring 2017, Spring 2021) (Python, C, C++); *Object Orientated Programming and Data Structures* (Spring 2017) (Java)

Graduate Services Assistant

MAY 2020 - JULY 2020

Arizona State University

Tempe, AZ, USA

I taught the undergraduate class "Introduction to Theoretical Computer Science" in the School of Computing and Augmented Intelligence as the main instructor. My duties included managing the entire course of 80 students, curriculum, homework, and exam design, and facilitating the lectures. The lecture introduces formal language theory and automata, Turing machines, decidability/undecidability, recursive function theory, and complexity theory.

Robotics Intern

MAY 2018 - AUGUST 2018

Robert Bosch LLC

Sunnyvale, CA, USA

During this internship, I worked on segmenting time series data into semantic sections while evaluating global goal constraints (Python, TensorFlow)

- Created a deep learning approach for semantic segmentation of raw data streams.
- Validated user behaviors based on usage patterns and high-level semantic tasks

Software Engineering Intern

SEPTEMBER 2014 - DECEMBER 2014

Apromace Data Systems GmbH

Freiberg, SA, Germany

During this internship, I worked on Linux UI development (C++, Qt5)

- Created user interfaces for high-throughput data processing applications
- Created responsive interfaces for large data visualization and efficient processing
- Developed cross-platform graphical user interfaces for Windows, Mac and Linux

Student/Research Assistant

AUGUST 2012 - DECEMBER 2012 | AUGUST 2013 - DECEMBER 2013 | JULY 2014 - SEPTEMBER 2014 | JUNE 2015 - JUNE 2016

TU Bergakademie Freiberg

Freiberg, SA, Germany

I worked as a research assistant in the Humanoid Robotics Group Freiberg:

- Created a distributed software system for human motion capture with multiple Microsoft Kinect cameras (C++, Qt5)
- Developed a system for semantic task detection and fluid transition between them (Python) [ICRA 2017, AURO 2018]
- Created a data loading module for scientific fluid simulations in 3D environments (C++)
- Lead tutorials for undergraduate students as part of the class *Basics of Computer Science* (C, Objective-C)

Publications

JOURNALS

One-shot Learning of Human-Robot Handovers with Triadic Interaction Meshes

DAVID VOGT, SIMON STEPPUTTIS, BERNHARD JUNG, HENI BEN AMOR

Autonomous Robots Journal (AURO)

January 2018

CONFERENCE PAPERS

Modularity through Attention: Efficient Training and Transfer of Language-Conditioned Policies for Robot Manipulation

YIFAN ZHOU, SHUBHAM SONAWANI, MARIANO PHIELIPP, SIMON STEPPUTTIS, HENI AMOR

Conference on Robot Learning (CORL)

December 2022

Concept Learning for Interpretable Multi-Agent Reinforcement Learning

RENOS ZABOUNIDIS, JOSEPH CAMPBELL, SIMON STEPPUTTIS, DANA HUGHES, KATIA P. SYCARA

Conference on Robot Learning (CORL)

December 2022

A System for Imitation Learning of Contact-Rich Bimanual Manipulation Policies

SIMON STEPPUTTIS, MARYAM BANDARI, STEFAN SCHAAL, HENI BEN AMOR

Intelligent Robots and Systems (IROS)

October 2022

Language-Conditioned Imitation Learning for Robot Manipulation Tasks

SIMON STEPPUTTIS, JOSEPH CAMPBELL, MARIANO PHIELIPP, STEFAN LEE, CHITTA BARAL, HENI BEN AMOR

NeurIPS 2020

December 2020

Learning Interactive Behaviors for Musculoskeletal Robots Using Bayesian Interaction Primitives

JOSEPH CAMPBELL, ARNE HITZMANN, SIMON STEPPUTTIS, SHUHEI IKEMOTO, KOH HOSODA, HENI BEN AMOR

Intelligent Robots and Systems (IROS)

November 2019

Improved Exploration through Latent Trajectory Optimization in Deep Deterministic Policy Gradient

KEVIN SEBASTIAN LUCK, MEL VECERIK, SIMON STEPPUTTIS, HENI BEN AMOR, JONATHAN SCHOLZ

Intelligent Robots and Systems (IROS)

November 2019

Probabilistic Multimodal Modeling for Human-Robot Interaction Tasks

JOSEPH CAMPBELL, SIMON STEPPUTTIS, HENI BEN AMOR

Robotics: Science and Systems (RSS)

June 2019

Extrinsic Dexterity through Active Slip Control using Deep Predictive Models

SIMON STEPPUTTIS, YEZHOU YANG, HENI BEN AMOR

International Conference on Robotics and Automation (ICRA)

May 2018

A System for Learning Continuous Human-Robot Interactions from Human-Human Demonstrations

DAVID VOGT, SIMON STEPPUTTIS, STEVE GREHL, BERNHARD JUNG, HENI BEN AMOR

International Conference on Robotics and Automation (ICRA)

May 2017

WORKSHOPS, SYMPOSIUMS AND EXHIBITIONS

Language-Conditioned Human-Agent Teaming

SIMON STEPPUTTIS

Robotics: Science and Systems Pioneers Workshop (RSSPW2022)

June 2022

Language Conditioned Imitation Learning

SIMON STEPPUTTIS, JOSEPH CAMPBELL, MARIANO PHIELIPP, STEFAN LEE, CHITTA BARAL, HENI BEN AMOR | ROBOT EXHIBITION

International Joint Conference on Artificial Intelligence (IJCAI)

January 2021

Imitation Learning of Robot Policies by Combining Language, Vision and Demonstration

SIMON STEPPUTTIS, JOSEPH CAMPBELL, MARIANO PHIELIPP, CHITTA BARAL, HENI BEN AMOR

NeurIPS Workshop on Robot Learning

December 2019

Neural Policy Translation for Robot Control

SIMON STEPPUTTIS, CHITTA BARAL, HENI BEN AMOR

Southwest Robotics Symposium

January 2019

Towards Semantic Policies for Human-Robot Collaboration

SIMON STEPPUTTIS, CHITTA BARAL, HENI BEN AMOR

Southwest Robotics Symposium

January 2018

Learning Human-Robot Interactions from Human-Human Demonstrations (with Applications in Lego Rocket Assembly)

DAVID VOGT, SIMON STEPPUTTIS, RICHARD WEINHOLD, BERNHARD JUNG, HENI BEN AMOR

Conference on Humanoid Robotics (Humanoids)

November 2017

Speech Enhanced Imitation Learning and Task Abstraction for Human-Robot Interaction

SIMON STEPPUTTIS, CHITTA BARAL, HENI BEN AMOR | WORKSHOP ON *Synergies Between Learning and Interaction*

Conference on Intelligent Robots and Systems (IROS)

October 2017

Deep Predictive Models for Active Slip Control

SIMON STEPPUTTIS, HENI BEN AMOR | WORKSHOP ON *(Empirically) Data-Driven Robotic Manipulation*

Robotics: Science and Systems (RSS)

July 2017

Active Slip Control for In-Hand Object Manipulation using Deep Predictive Models

SIMON STEPPUTTIS, HENI BEN AMOR | WORKSHOP ON *Tactile Sensing for Manipulation: Hardware, Modeling, and Learning*

Robotics: Science and Systems (RSS)

July 2017

Awards

Best Poster Award

AWARDED BY NVIDIA

This award was given by NVIDIA for my work on *Neural Policy Translation for Robot Control* presented at the Southwest Robotics Symposium 2019.

Southwest Robotics Symposium

January 2019

CIDSE Doctoral Fellowship

AWARDED BY THE SCHOOL OF COMPUTING, INFORMATICS, AND DECISION SYSTEMS ENGINEERING

Awarded 2017, 2018, 2019, 2020 and 2021 for excellent research progress and strong academic work by the "School of Computing, Informatics, and Decision Systems Engineering".

Arizona State University

January 2017, 2018, 2019, 2020 and 2021

Best Video Award

AWARDED BY THE IEEE-RAS INTERNATIONAL CONFERENCE ON HUMANOID ROBOTICS

Awarded by the conference on humanoid robotics (Humanoids) for our work on *Learning Human-Robot Interactions from Human-Human Demonstrations (with Applications in Lego Rocket Assembly)*

Humanoids

November 2016

Talks

MatchLab Invited Talk

TITLE: "Language-Conditioned Imitation Learning for Robot Manipulation"

Imperial College London

July 2021

Intel AI Labs

TITLE: "Language for Robotics"

Intel Corporation

November 2020

Intel - Deep Learning Community of Practice

TITLE: "Imitation Learning for Adaptive Robot Control Policies from Language, Vision, and Motion"

Intel Corporation

March 2020

Samsung Research America

TITLE: "Semantic Policies For Human-Robot Collaboration"

Mountain View

November 2017

Other Activities

MENTORING AND LEADERSHIP

CIDSE Graduate Student Mentorship Program

MENTOR

I am working as a mentor for junior PhD students and advise them regarding research, advisor selection and PhD life in general at the School of Computing, Informatics, and Decision Systems Engineering.

Arizona State University

Academic year 2019/2020

Student Supervision

ADVISED MULTIPLE STUDENTS DURING THEIR BACHELOR'S AND MASTER'S THESIS

During my work at the Interactive Robotics Lab I worked with five students and advised them during their bachelor's and/or master's thesis to achieve their individual research agendas. Further, in my role as postdoctoral fellow at CMU, I advise students in all stages of their academic career.

Arizona State University / Carnegie

Melon University

2017 - Present

OPEN-SOURCE PROJECTS

Language Policies

AN OPEN-SOURCE FRAMEWORK IN TENSORFLOW TO TEACH ROBOTS HOW TO EXECUTE LANGUAGE COMMANDS

Part of the work presented at NeurIPS 2020 | <https://github.com/ir-lab/LanguagePolicies>

Arizona State University

2017 - Present

Interaction Primitives

AN OPEN-SOURCE PYTHON LIBRARY FOR THE BAYESIAN INTERACTION PRIMITIVES FRAMEWORK

Part of the work presented at RSS 2019 and IROS 2019 | <https://github.com/ir-lab/intprim>

Arizona State University

2017 - Present

ACADEMIC SERVICES

Workshop Organizer

*IEEE International Conference on
Intelligent Robots and Systems*

WORKSHOP ON HUMAN THEORY OF MACHINES AND MACHINE THEORY OF MIND FOR HUMAN AGENT TEAMS

October 2023

I am organizing the workshop at IROS 2022, including soliciting contributions, advertising the workshop, moderating talks and confirming speakers.

Program Committee

Robotics: Science and Systems (RSS)

RSS PIONEERS

June 2023

I am part of the program committee for the RSS Pioneers workshops at RSS 2023.

Program Committee

*Thirty-Seventh AAAI Conference on
Artificial Intelligence (AAAI)*

AAAI-23 STUDENT ABSTRACT AND POSTER PROGRAM

February 2023

I am part of the program committee for the AAAI-23 Student Abstract and Poster Program. My primary responsibility was to review student abstracts submitted to the program.

Program Committee

*IEEE International Conference on
Intelligent Robots and Systems*

WORKSHOP ON SYNERGIES BETWEEN LEARNING AND INTERACTION

October 2017

I was part of the program committee for the workshop on synergies between learning and interaction at IROS 2017. My primary responsibility was to review the workshop contributions.

Conference Reviewer

IROS, ICRA, ROBOTICS AND AUTONOMOUS SYSTEMS JOURNAL, CASE, RA-L, RSS

Skills

Research	Published on multiple international conferences and journals (AURO, RSS, IROS, ICRA, Humanoids)
Leadership	I am working as a mentor for junior PhD students and advise students in the Interactive Robotics Lab
Frameworks	Tensorflow, Robot Operating System (ROS), Qt, Docker
Communication	Assisted in teaching multiple classes with individual student groups
Programming Languages	Python, C++, C, MatLab, Java
Teamwork and Collaboration	Worked on multiple joint research projects in Europe and the United States