

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

MARCH 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

RESEARCH 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++)
- Application of software development standards in a large-scale project and code base (Git, Mercurial)

Research Associate

Arizona State University

2017 - 2021

Tempe, AZ, USA

Since January 2017 I have worked on various projects at the Interactive Robotics Lab 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 slippage (Python, Keras, ROS) [Paper: ICRA 2018]
- Build an exo-skeleton for astronauts by developing intelligent hardware and software components that assist and empower human cognition, dexterity and ingenuity (Python, C, C++, ROS)

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 Engineer Intern

SEPTEMBER 2016 - DECEMBER 2016

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

TEACHING EXPERIENCE

Instructor

SUMMER 2020

Arizona State University

Tempe, AZ, USA

I am giving the lecture for *Introduction to Theoretical Computer Science* as sole instructor for 80 undergraduate students. The lecture introduces formal language theory and automata, Turing machines, decidability/undecidability, recursive function theory, and complexity theory.

Teaching Assistant

2017 - 2021

Arizona State University

Tempe, AZ, USA

My passion for teaching has led me to work as a teaching Assistant at Arizona State University on multiple occasions. Duties included creating course materials like homework, quizzes, midterms, and finals, as well as designing various programming projects (Python, MatLab, Java).

- Introduction to Theoretical Computer Science (Spring 2018, 2019, 2020)
- Artificial Intelligence (Fall 2017)
- Advances in Robot Learning (Spring 2017, Spring 2021)
- Introduction to Robotics (Spring 2021)
- Object Orientated Programming and Data Structures (Spring 2017)

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

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

IEEE: 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

IEEE: 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

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

Conference on Robotics and Automation (ICRA)

May 2017

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

WORKSHOPS, SYMPOSIUMS AND EXHIBITIONS

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

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

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

Extracurricular 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.

Arizona State 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

Program Committee

WORKSHOP ON SYNERGIES BETWEEN LEARNING AND INTERACTION

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.

Intelligent Robots and Systems

October 2017

Conference Reviewer

IROS, ICRA, ROBOTICS AND AUTONOMOUS SYSTEMS JOURNAL, CASE

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