Joe Watson

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Education

Technische Universität Darmstadt   *Darmstadt, Germany*   **2019 - present**
Computer Science Ph.D.

Part of the Intelligent Autonomous Systems group researching Robot Learning, supervised by Prof. Jan Peters

Peterhouse, University of Cambridge   *Cambridge, UK*   **2012 - 2016**
Information & Computer Engineering MEng, BA (Hons)   Distinction, First class

Thesis: Deep Learning for Robotic Grasping, vision-based grasping with a Baxter robot using Caffe and ROS, supervised by Dr. Fumiya Iida

Modules include: Robotics, Computer Vision, Statistical Pattern Processing, Digital Filters & Spectrum Estimation, Nonlinear Systems & Control

	Jack Weinstock Prize for Electrical and Information Sciences (2016, 2017)	Peterhouse Engineering College Prize (2015, 2016, 2017)
Honours	Charles Babbage Senior Scholarship of Peterhouse (2015-2017)	2nd Year Integrated Design Project Prize (2014)
	Engineering Professors' Council Essay Prize, Highly Commended (2013)	1st Year Computing Prize (2013)

Experience

Software Engineer, CMR Surgical   *Cambridge, UK*   **Autumn 2016 - Winter 2018**

- Worked on Versius, a novel robotic system designed to revolutionize laparoscopic surgery, through to CE Mark accreditation
- Focused on the robot control and signal processing algorithms for the manipulators, through research, experimentation and software development using C and Python
- Implemented software features for microcontroller subsystems of the product from requirements to tests
- Contributed towards the technical documentation of the microcontroller subsystem, included the technical specification, test specifications and risk analysis

Publications

PREPRINTS

Stochastic Control through Approximate Bayesian Input Inference Watson, J., Abdulsamad, H., Findeisen, R., Peters J. (2021)
A Differentiable Newton-Euler Algorithm for Real-World Robotics Lutter, M., Silberbauer, J., Watson, .J, Peters, J (2021)

JOURNAL PUBLICATIONS

Benchmarking Structured Policies and Policy Optimization for Real-World Dexterous Object Manipulation,
Funk, N. et al. *IEEE Robotics and Automation Letters, Special Issue: Robotic Grasping and Manipulation Challenges and Progress* (2021)

CONFERENCE ARTICLES

Differentiable Physics Models for Real-world Offline Model-based Reinforcement Learning,
Lutter, M., Silberbauer, J., Watson, .J, Peters, J. *International Conference on Robotics and Automation (ICRA)* (2021)
Latent Derivative Bayesian Last Layer Networks,
Watson, J.★, Lin, J.A.★, Klink, P., Pajarinen, J., Peters J. *International Conference on Artificial Intelligence and Statistics (AISTATS)* (2021)
Advancing Trajectory Optimization with Approximate Inference: Exploration, Covariance Control and Adaptive Risk,
Watson, J., Peters J. *American Control Conference (ACC)* (2021)
Stochastic Optimal Control as Approximate Input Inference,
Watson, J., Abdulsamad, H., Peters J. *Conference on Robot Learning* (CoRL) (2019)
Real-World, Real-Time Robotic Grasping with Convolutional Neural Networks,
Watson, J., Hughes, J., Iida F., *18th Towards Autonomous Robotic Systems (TAROS)* (2017)

WORKSHOP PAPERS

Neural Linear Models with Gaussian Process Priors,
Watson, J.★, Lin, J.A.★, Kink, P., Peters, J. *Advances in Approximate Bayesian Inference (AABI)* (2021)
Active Inference or Control as Inference? A Unifying View,
Imohiosen, A★, Watson, J.★, Peters, J. *International Workshop on Active Inference* (2020)
A Differentiable Newton Euler Algorithm for Multi-body Model Learning,
Lutter, M., Silberbauer, J., Watson, .J, Peters, J. *Structured Approaches to Robot Learning Workshop, R:SS* (2020)

BOOK CHAPTERS

Control as Inference? Comparing Path Integral and Message Passing Methods for Optimal Control,
Watson, J. *Reinforcement Learning Algorithms: Analysis and Applications, Springer International* (2020)

Teaching

ROBOT LEARNING (2020) Lead teaching assistant for the TU Darmstadt course and MOOC, hosted on the KI Campus platform. Designed lectures on probabilistic graphical models, approximate optimal control, state estimation, model-based reinforcement learning, system identification and Bayesian reinforcement learning.

Academic Supervision

MSC THESIS	T. Gossard	Approximate Bayesian Inference for Structured Model Learning	(with M. Lutter)
MSC THESIS	Y. Eich	Distributionally Robust Optimization for Hybrid Systems	(with H. Abdulsamad)
MSC THESIS	J. Lin	Functional Variational Inference for Bayesian Neural Networks	(with P. Klink)
MSC THESIS	J. Silberbauer	Differentiable Newton Euler Algorithm for Multi-body Model Learning	(with M. Lutter)
MSC THESIS	L. Williamson	Learning Nonlinear Dynamical Systems with the Koopman Operator	
BSC THESIS	M. Ali	An Educational Framework for Robot Learning	
BSC THESIS	F. Damken	Variational Autoenconders for Koopman Dynamical Systems	
INTERNSHIP.	A. Imohiosen	Variational Input Inference for Control	
HONORS THESIS	C. Voelcker	Sequential Monte Carlo Input Inference for Control	

Invited Talks

IOB	Basel, Switzerland	The Promise and Pitfalls of Control as Inference	2021
IFAT, Universität Madgeburg	Madgeburg, Germany	Advancing Trajectory Optimization with Approximate Inference	2021
ATR Institute	Kyoto, Japan	Stochastic Optimal Control as Approximate Input Inference	2019
RIKEN Institute	Tokyo, Japan	Stochastic Optimal Control as Approximate Input Inference	2019
Preferred Networks	Tokyo, Japan	Stochastic Optimal Control as Approximate Input Inference	2019

Academic Service

Reviewed for NeurIPS (2020*, 2021*), ICML (2021), AISTATS (2021), CoRL (2021), ICLR (2022), Neurocomputing, IEEE Robotics and Automation Letters *Reviewer award

Competencies

Software Engineering (Python, C, git), machine learning (PyTorch), robotics (ROS), design (TikZ, LaTeX, Photoshop, Illustrator)

Academic Interests

Robotics, stochastic optimal control, approximate inference, system identification, reinforcement learning

References available on request