

LUKE BEDDOW

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WORK EXPERIENCE

- Doctoral Research**, *University College London* Oct 2020 - Sep 2024
- Developed deep reinforcement learning grasping methods, for a novel gripper which I designed and built.
 - Trained models, managed an extensive codebase, deployed on real hardware with end-to-end integration.
 - Creative (produced novel research), problem-solver (real world 95.0% reliability), diligent (4yr project).
- Postgraduate Teaching Assistant**, *University College London* Jan 2021 - Jan 2024
- Teaching robotics masters modules, including vision-based grasping using OpenCV (C++ and Python).
 - Gave lectures, created tutorials, ran classes, developed courseworks, managed and worked in teams.
- Research & Development Intern**, *Jacob Douwe Egberts* Jul 2017 - Jul 2018
- Coffee machine development, patent analysis, prototyping, conducting experiments, presenting results.
 - Highly collaborative team working, including three supplier visits abroad alongside different teams.

EDUCATION

- PhD Computer Science**, *University College London* 2020 - 2024
Research Topic: Learning-based robotic grasping of grocery items. Thesis submission Sep. 2024.
- MEng Mechanical Engineering**, *First Class (79%), University of Bath* 2015 - 2020
Disseration: Computational mathematical modelling of flexure robots.
- A-Levels**, *Alley's School* 2013 - 2015
4 A*s in Maths, Further Maths, Physics, and Chemistry.

SKILLS

- Programming:** Python, C/C++, MATLAB, ROS, Git, Make, CMake, Arduino, LaTeX
- Machine Learning:** SL, RL, PyTorch, NumPy, SciPy, Weights & Biases, Stable Baselines, Lin. Algebra
- ML for Robotics:** Expert knowledge of current research, 4yrs applied experience with grasping
- Computer Vision:** Torchvision, OpenCV, pyrealsense2, CNNs, GANs
- Design & Build:** CAD (Solidworks, Inventor, Solid Edge), Workshop (3D printer, lathe, mill, etc)
- Conscientiousness:** Highly disciplined and motivated, creative problem-solver, testing and safety focused
- Communication:** Delivered lectures, tutorials, international presentations, posters
- Teamwork:** Group projects, work placement, teaching, collaborations, friendly, people-orientated

RESEARCH PUBLICATIONS

Reinforcement learning grasping with force feedback from modeling of compliant fingers, Transactions on Mechatronics, 2024

L. Beddow, H. Wurdemann and D. Kanoulas

Designed a novel gripper, created a mathematical model in a physics simulator (MuJoCo), and developed a reinforcement learning method, learning to grasp 42 real groceries with 95.0% success rate.

Evaluating a movable palm in caging inspired grasping using a reinforcement learning-based approach, IROS 2024

L. Beddow, H. Wurdemann and D. Kanoulas

Applied a reinforcement learning approach to optimise gripper design parameters, and demonstrate an improvement from using a movable palm. Showed 96.0% grasp success rate in the real world.

Reinforcement learning-based grasping via one-shot affordance localization and zero-shot contrastive languageimage learning, SII 2024

X. Long*, L. Beddow*, D. Hadjivelichkov, A. M. Delfaki, H. Wurdemann and D. Kanoulas (*equal contribution)

Combined a reinforcement learning grasping approach with a visual affordance model (AffCors) and object identification, using CLIP. Showed 72.0% real world grasp success rate in moderate clutter.

A caging-inspired gripper using flexible fingers and a movable palm, IROS 2021

L. Beddow, H. Wurdemann and D. Kanoulas

Presented a novel gripper design and grasping concept which combined compliant fingers and a movable palm, to cage objects, which is suited to grasping grocery items.

AWARDS AND ACHIEVEMENTS

2016 – BP Centurion Prize

University of Bath

£1000 prize for top three academic placement in cohort.

2017 - 2020 – Academic commendations

University of Bath

Received university commendation for outstanding performance in each of 2nd, 3rd, and 4th year of degree.

2009 - 2014 – School scholarship and prizes

Alleyns School

Academic scholarship at 11+, prizes for academic achievement 2011, 2012, 2014.

COMMUNITY OUTREACH

- Fundraising and running events as part of Jacob Douwe Egberts Banbury charity committee.
- Volunteer lecture teaching robotics to school girls as part of Bio-Robots: Crawl, Jump, and Slither!
- Local tennis coaching, children ages 5-14 over three years, and London Youth Games volunteering.
- Reviewer for top robotics conferences and journals: ICRA, IROS, RAL.