

LUKE BEDDOW

🌐 <https://lukebeddow.github.io/> @ lukebeddow@gmail.com
☎ +44 7500 877597 🏠 London, United Kingdom

WORK EXPERIENCE

Doctoral Researcher (PhD), *University College London* Oct 2020 - Oct 2024

- Developed and deployed new learning-based methods for robotic grasping, particularly using deep reinforcement learning. Resulted in three first author publications at top robotics venues (see below).
- Achieved state of the art 95%+ grocery grasping reliability (11% median improvement vs related work).
- Designed, built, and programmed an autonomous robotic system, integrating six sensors and ten actuators. Created, trained, and thoroughly tested an autonomous feedback controller (>5000 grasps).
- Implemented entire robotic system, including mechatronic design and sensing; simulation modelling (C++); data collection and deep learning (Python); and deployment of autonomous controller (ROS).
- Successfully bridged the gap between research and deployment, requiring exceptional practical skills and problem solving. Solely developed, maintained, and tested a scalable codebase (>40k source code lines).

Postgraduate Teaching Assistant (during PhD), *University College London* Jan 2021 - Jan 2024

- Taught robotics masters modules, including vision-based grasping in simulators (C++, Python). Gave lectures and tutorials, supervised dissertations, formulated assessments, worked in and managed teams.
- Received exceptional feedback from module leaders, colleagues, and students on quality of disseminating complex topics, management and organisational skills, as well as approachable and friendly demeanour.

Research & Development Intern, *Jacobs 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.

MEng Mechanical Engineering, *First Class (79%)*, *University of Bath* 2015 - 2020
Dissertation: Computational mathematical modelling of flexure robots.

A-Levels, *Alleyn's School* 2013 - 2015
4 A*s in Maths, Further Maths, Physics, and Chemistry.

SKILLS

- Programming:** Advanced Python (4+ years, incl. PyTorch, NumPy, SciPy, Matplotlib, Pandas); advanced C/C++ (4+ years); experienced Bash, Make/CMake, Unix, Git, MATLAB
- Robotics:** Grasping and manipulation expert; strong experience with physics simulation, sensor fusion, hardware/software integration, autonomous control systems, and ROS
- Machine Learning:** Reinforcement learning expert; strong experience with computer vision, imitation learning, supervised learning, applying ML to real systems, and handling sensor data
- Conscientiousness:** Very disciplined, self-motivated, organised, and effective (PhD, side projects)
- Teamwork:** Collaborative, friendly, team-orientated (PhD, R&D, teaching, team sports, band)
- Communication:** Highly adept technical communicator (papers, posters, international presentations), received excellent feedback on teaching (delivering lectures and running tutorials)
- Creativity:** Produced novel research and new ML methods, exceptional problem solver having integrated complex robotic grasping pipeline, innovative designer (CAD 10+ years)

RESEARCH PUBLICATIONS (FIRST AUTHOR)

Reinforcement Learning Grasping with Force Feedback from Modeling of Compliant Fingers. IEEE/ASME Transactions on Mechatronics, 2024. DOI: 10.1109/TMECH.2024.3450269

Created a novel grasping approach and a mathematical model for a compliant gripper in a physics simulator, and developed a reinforcement learning method which grasped 42 real groceries with 95.0% success rate.

Evaluating a Movable Palm in Caging Inspired Grasping using a Reinforcement Learning-based Approach. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2024. DOI: Presented at conference, open access available, IEEE XPlore pending

Utilised reinforcement learning, an automated data collection pipeline, and rigorous real-world testing, to train 24 different models for different hardware, in order to optimise design parameters and reach 96.0% reliability.

A Caging Inspired Gripper using Flexible Fingers and a Movable Palm. IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021. DOI: 10.1109/IROS51168.2021.9635873

Presented a novel grasping concept and built from scratch a robotic gripper prototype. Demonstrated with real world testing that grasping was robust to disturbances, justifying and validating the design choices.

AWARDS AND ACHIEVEMENTS

2021 – Best Poster Award

University College London

£100 prize for best poster at UCL Robotics Workshop.

2017 - 2020 – Academic commendations

University of Bath

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

2016 – BP Centurion Prize

University of Bath

£1000 prize for top three academic placement in cohort.

2009 - 2014 – School scholarship and prizes

Alleyns School

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

COMMUNITY OUTREACH

- Reviewer for top robotics conferences and journals: ICRA, IROS, RAL.
- 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.

INTERESTS

- I am passionate about robotics, as shown by my PhD topic and research.
- I wrote from scratch a chess engine in C++, first with a traditional evaluation function and subsequently compiling it into Python and applying deep learning for a neural evaluator (see website).
- I enjoy sport, having represented school, club, and university for team sports (football, hockey, frisbee).
- I love music, I am self-taught at bass and guitar, have achieved Grade 8 trumpet, and play in a band.