

# MAX YANG

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## EDUCATION

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**PhD Engineering Mathematics, University of Bristol** Bristol, United Kingdom 2021 ▶ 2025 (Anticipated)

*Department of Engineering Mathematics and Bristol Robotics Laboratory*

EPSRC funded PhD, supervised by Prof. David Barton and Prof. Nathan Lepora.

Research Theme: Towards real-world dexterous manipulation skills with tactile sensing using physics-based simulators and sim-to-real deep reinforcement learning.

**MEng Aeronautical Engineering, Imperial College London** London, United Kingdom Sep 2015 ▶ Jun 2019

*Department of Aeronautics*

Integrated Master's Degree. Obtained 1st Class Honours. Result: 77%

Thesis: "Optimal Control and its Role in Cancer Treatment" supervised by Dr. Thulasi Mylvaganam.

## RESEARCH EXPERIENCE

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**General In-hand Manipulation with Touch** Jun 2023 ▶ Feb 2024

- Multi-axis in-hand object rotation with touch adaptive to different shapes and hand orientation, utilizing the allegro hand equipped with custom vision-based tactile sensors.

**Robosoft Manipulation Competition: Robot Food Handling** Jan 2023 ▶ Apr 2023

- Led the development of vision-tactile robotic system to perform food pick-and-place and pouring tasks.
- Developed vision-based grasping algorithm and control architecture for cluttered bin-picking.

**Deep Reinforcement Learning for Goal-Conditioned Tactile Pushing** Jan 2022 ▶ Dec 2022

- Explored the application of model-based and model-free reinforcement learning for long-horizon goal-conditioned object pushing with only touch feedback.

**Master Thesis: Optimal Control for Cancer Treatment** Jan 2019 ▶ Jun 2019

- Implemented an optimal control algorithm to optimize the delivery of chemotherapy during cancer treatment using a mathematical model of tumor growth.

## PUBLICATIONS

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- [1] **Yang, M.**, Lu, C., Church, A., Lin, Y., Ford C., Li, H., Psomopoulou, E., Barton, D.A., and Lepora, N.F., "AnyRotate: Gravity-Invariant In-hand Rotation with Sim-to-Real Touch", *Under Review 2024*.
- [2] Lin, Y., Church, A., **Yang, M.**, Li, H., Lloyd, J., Zhang, D. and Lepora, N.F., "Bi-Touch: Bimanual Tactile Manipulation with Sim-to-Real Deep Reinforcement Learning", *IEEE Robotics and Automation Letters 2023*.
- [3] **Yang, M.**, Lin, Y., Church, A., Lloyd, J., Zhang, D., Barton, D.A. and Lepora, N.F., "Sim-to-Real Model-Based and Model-Free Deep Reinforcement Learning for Tactile Pushing", *IEEE Robotics and Automation Letters. 2023*.
- [4] Fan, W., **Yang, M.**, Xing, Y., Lepora, N.F. and Zhang, D., "Tac-VGNN: A Voronoi Graph Neural Network for Pose-Based Tactile Servoing", *IEEE International Conference on Robotics and Automation 2023*.

## AWARDS AND HONORS

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**EPSRC Doctoral Training Partnership PhD Studentship** 2021-2025

**Imperial Aeronautics Scholar** 2017

**Ian Ross Scholarship for STEM Undergraduate Students** 2016

## WORK EXPERIENCE

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### Teaching Assistant, University of Bristol, United Kingdom

Jan 2022 ▶ Now

- Co-supervised Msc research projects in physics-based simulation for dexterous manipulation, visuotactile manipulation, and summer projects on RL for tactile robotics.
- Coordinated lab sessions and supervised assessment projects.
- Prepared and showcased robot manipulation demonstrations for workshops and open days.

### Research and Development Engineer, Sagentia Innovation, United Kingdom

Sep 2019 ▶ Sep 2021

- Implemented vision models (Mask R-CNN and U-Net) for agricultural navigation and vine detection.
- System identification and tuning of high-precision surgical motor.
- Demonstrated expertise in conducting market research, capturing requirements, and effectively planning and executing technical projects.

### Undergraduate Assistant, Imperial College London, United Kingdom

Jan 2019 ▶ May 2019

- Provided support during Computing labs to ensure smooth lab operations.

### Research and Technology Summer Intern, Airbus, France

Jun 2018 ▶ Sep 2018

- Investigated the application of predictive maintenance for the latest A350 aircraft, examining the current data transmission pipeline and performing feasibility analysis.

## CONFERENCE AND WORKSHOP PRESENTATIONS

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### Generalizable and Robust Tactile Pushing using Sim-to-Real Deep Reinforcement Learning

*ICRA 2023 Vitac Workshop*

June 2023

### Vision and Tactile Pose Identification for Picking a Target without Collision

*ICRA 2023 Vitac Workshop*

June 2023

### Robust Goal-Conditioned Tactile Pushing using Deep Reinforcement Learning

*The 4th UK Manipulation Workshop*

Jan 2023

## PROFESSIONAL SERVICES

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Robotics: Reviewer of ICRA (2024), RA-L (2023), IROS (2023)

## SKILLS

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**Programming Language:** Python, C/C++, C#, MATLAB and Simulink

**Software:** Pytorch, TensorFlow, Git, ROS, IsaacGym, Pybullet, Unity3D

**Research Interest:** Reinforcement Learning, Optimal Control, Dexterous Manipulation, Tactile Sensing, Sim-to-Real Transfer

**Language:** English, Mandarin