

Aalok Patwardhan

Dyson Robotics Lab, Imperial College London

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Education

PhD — Robotics and Computer Vision | Advisor: Prof. Andrew J. Davison FREng FRS

London, UK

IMPERIAL COLLEGE LONDON — DYSON ROBOTICS LAB

2021 – now

- **Distributed Multi-Robot Coordination**
for path planning, information acquisition and consensus within a swarm using Gaussian Belief Propagation (GBP) for Factor Graph inference.
- **Monocular Visual Odometry**
using RGB data for Simultaneous Localisation and Mapping (**SLAM**), exploiting scene structure for rotation estimation with uncertainty.

MEng Engineering — 1st Class with Distinction

Cambridge, UK

UNIVERSITY OF CAMBRIDGE – EMMANUEL COLLEGE

2014 – 2018

- Computer Vision | Signal Processing | (Optimal) Control Systems

Publications

- **Aalok Patwardhan***, Callum Rhodes*, Gwangbin Bae, Andrew J. Davison, 2024.
U-ARE-ME: Uncertainty-Aware Rotation Estimation in Manhattan Environments. * Indicates equal contribution.
- **Aalok Patwardhan**, Andrew J. Davison, 2024.
A Distributed Multi-Robot Framework for Exploration, Information Acquisition and Consensus. IEEE ICRA, 2024 (**oral**).
- **Aalok Patwardhan**, Riku Murai, Andrew J. Davison. 2023.
Distributing Collaborative Multi-Robot Planning With Gaussian Belief Propagation. IEEE Robotics and Automation Letters, 8(2): 552-559.
- **Aalok Patwardhan**, Andrew J. Davison, 2023.
Distributed Formation Planning for Robot Swarms. Workshop on Distributed Graph Algorithms for Robotics at IEEE ICRA, 2023.

Relevant Experience

Peer Reviewer, IEEE — ROBOTICS & AUTOMATION LETTERS (RA-L) | CONFERENCES: ICRA, IROS

Director of Studies, Engineering and AI — CAMBRIDGE PROGRAMMES LTD.

2023 – now

- Designing and leading an engineering curriculum for a two week academic summer school with a focus on generative AI.

Signal Processing Engineer — CAMBRIDGE CONSULTANTS LTD.

2018 – 2021

- Lead engineer retrofitting generative deep learning models for use in the recovery of lossy compressed audio data.
- System modelling and unit testing of the PHY layer in 4G/5G communications software.
- Researched and implemented low-power signal processing algorithms for embedded systems, improved efficiency by 50%.
- Designed and implemented the sensory pipeline for crowd-navigating robot including radar data and computer vision.

Undergraduate Research Placement — UNIVERSITY OF CAMBRIDGE, TOYOTA MOTORS EUROPE

2017

- Modelled the effects of predictive control to minimise discomfort in humans using the Internal Model principle behind 'why we can't tickle ourselves'. Liaised with TME for validation against experimental results.

Teaching Experience

2022 – now **Teaching Assistant, Robotics**, Imperial College London

2017 – now **Private Tutor**, GCSE, A-Level Mathematics and Physics, University Admissions Guidance

2015 – now **Lead Mentor**, Cambridge Programmes Ltd. Summer School

Awards

2021 – 2025 **Dyson Research Fellowship Award**, Dyson Ltd. & EPSRC

2023 **Best Poster Prize (runner-up)**, Imperial College London PhD Competition

2018 **Wallace Prize in Engineering**, Emmanuel College, University of Cambridge

Skills

SOFTWARE DEVELOPMENT

- Python, Numpy and Pytorch for deep learning.
- Parallelised C++ for distributed algorithms.
- 3D simulation and OpenGL graphics.
- Gitlab for Continuous Integration (CI).

LANGUAGES

- Fluent in English, Marathi and Hindi.
- Conversational in Spanish and French.