Charlie Street

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UoB Staff Profile

Research

NEEDS UPDATE: I am a postdoctoral research assistant in the Goal-Oriented Autonomous Long-Lived Systems (GOALS) Lab at the Oxford Robotics Institute, University of Oxford. My current research is focused on the robust continuous-time coordination of multi-robot systems under uncertainty. To achieve this, I apply planning, model checking, and task allocation techniques to continuous-time models of multi-robot behaviour.

Research Interests

- Planning Under Uncertainty
- Multi-Robot Coordination
- Formal Methods for Robotics
- Continuous-Time and Non-Stationary Planning Models

Research Positions

- **University of Birmingham** **Jan 2023 - Present**
  - Research Fellow in Computer Science
- **Oxford Robotics Institute, University of Oxford** **July 2022 - Dec 2022**
  - Postdoctoral Research Assistant in AI for Autonomous Systems

Education

- **DPhil in Engineering Science at the University of Oxford** **2018-2022**
  - Thesis: *Multi-Robot Coordination Under Temporal Uncertainty*
  - Supervisors: Nick Hawes, Bruno Lacerda, and Manuel Mühlig
- **MSci in Computer Science at the University of Birmingham** **2014-2018**
  - Thesis: *IntelliJam: An Intelligent Agent for Musical Improvisation*
  - Supervisor: Peter Tino
  - Degree Class: First Class with Honours (Average: 92%)
  - Awarded Undergraduate Distinguished Dissertation Prize 2018
  - Awarded Best in Degree Programme 2014/15, 2015/16, 2016/17, and 2017/18
  - Awarded IBM Team Project Prize 2015/16
  - Awarded BCS Prize for Best in Year 2014/15

Contribution to Projects

- **CONVINCE** **2023-Present**
  - Context-Aware Verifiable and Adaptive Dynamic Deliberation (UKRI grant number 10042096)
  - Worked on WP3 - Task and Motion Planning in Dynamic Environments
- **First Fleet** **2020-2021**
  - Deploying Multi-Robot Systems in Agricultural Environments
  - Implemented Multi-Robot Planning System
- **Team ORIon (RoboCup Competition Team)** **2019-2021**
  - Deploying Service Robots in Domestic Environments
  - Led Team ORIon and Task-Level Planning Sub-Team

Supervision

PhD Students

- **Stefano Bernagozzi (with M. Mansouri and L. Natale)** **2023-Present**
  - Topic: *Behaviour Trees for Robotics*
- **Weijian Zhang (with M. Mansouri)** **2023-Present**
  - Topic: *Human-Aware Formation Control for Multi-Robot Systems*

Final Year Projects/MSc Dissertations

- **Rushikesh Bagul (with M. Mansouri)** **2023**
  - Topic: *Statistical Model Checking for Behaviour Trees*
  - Assisted in generating idea for dissertation project
- **Alex Rutherford (with B. Lacerda and N. Hawes)** **2021-2022**
  - Topic: *Multi-Agent Reinforcement Learning with a Model-Based Simulator*
- **Yifeng Wei (with B. Lacerda)** **2020-2021**
  - Topic: *Trial-Based Search for Generalised Stochastic Petri Nets*
- **James Wheadon (with N. Hawes)** **2019-2020**
  - Topic: *Multi-Agent Path Finding in Continuous Time*
- **Han Zhou (with B. Lacerda)** **2018-2019**
  - Topic: *Auctioning for Multi-Robot Coordination*

Internships

- **Tom Liu (with N. Hawes)** **2021**
  - Topic: *Generalising Duration Distributions Across Topological Maps*
- **Clarissa Costen (with N. Hawes)** **2019**
  - Topic: *Continuous-Time Markov Chains for Shared Autonomy*

Outreach

- **Led Robot Demonstrations at Goodwood Festival of Speed** **2021**
- **Led Robot Demonstration at University Open Day** **2019**
- **Assisted with Robot Demonstration at Blenheim Palace** **2019**

Reviewing

- **Journal Reviewing:** IEEE Transactions on Robotics (T-RO); IEEE Robotics and Automation Leters (RA-L); Frontiers in Robotics and AI.
- **Conference Programme Committee:** AAAI Conference on Artificial Intelligence (AAAI) - 2023, 2024; International Conference on Autonomous Agents and Multiagent Systems (AAMAS) - 2023; AAMAS Demo Track - 2024; Robotics: Science and Systems (RSS) - 2023-2024 (CHECK RSS 2023-2024 IS PC NOT JUST REVIEWER).
- **Conference Reviewing:** AAAI Conference on Artificial Intelligence (AAAI) - 2020; International Conference on Autonomous Agents and Multiagent Systems (AAMAS) - 2020, 2021; International Joint Conference on Artificial Intelligence (IJCAI) - 2019; International Conference on Automated Planning and Scheduling (ICAPS) - 2020-2022; Conference on Neural Information Processing Systems (NeurIPS) - 2020, 2021; IEEE International Conference on Robotics and Automation (ICRA) - 2020, 2024; IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS) - 2021-2023; International Conference on Principles of Knowledge Representation and Reasoning (KR) - 2021; European Conference on Mobile Robots (ECMR) - 2019; Advances in Cognitive Systems - 2020.
- **Workshop Programme Committee:** Workshop on Planning and Robotics (PlanRob) @ ICAPS 2023.

Teaching

- Guest Lecture: MSc Advanced Robotics, University of Birmingham 2023, 2024
  - Title: Multi-Robot Planning Under Uncertainty
  - Helped write 2024 exam paper

Talks

- Tutorial at AAMAS, London May 2023
  - Title: Multi-Robot Planning Under Uncertainty
- ICAPS Journal Presentation Track June 2022
  - Title: Congestion-Aware Policy Synthesis for Multi-Robot Systems

Publications

[1] Charlie Street, Bruno Lacerda, Manuel Mühlig, and Nick Hawes. "Right Place, Right Time: Proactive Multi-Robot Task Allocation Under Spatiotemporal Uncertainty". In: *Journal of Artificial Intelligence Research* 79 (2024), pp. 137–171

[2] Charlie Street, Masoumeh Mansouri, and Bruno Lacerda. "Formal Modelling for Multi-Robot Systems Under Uncertainty". In: *Current Robotics Reports* 4.3 (2023), pp. 55–64.

[3] Weijian Zhang, Charlie Street, and Masoumeh Mansouri. "Multi-Formation Planning and Coordination for Object Transportation". In: *Proceedings of the European Conference on Mobile Robots (ECMR)*. 2023.

[4] Charlie Street, Sri Sadhan Jujjavarapu, Michael Nai-An Chen, Sanjoy Paul, and Nick Hawes. "Analysing the Effects of Congestion on Hybrid Order Picking Systems using a Discrete-Event Simulator". In: *Proceedings of the 18th International Conference on Intelligent Autonomous Systems*. 2023.

[5] Bruno Lacerda, Anna Gautier, Alex Rutherford, Alex Stephens, Charlie Street, and Nick Hawes. "Decision-Making under Uncertainty for Multi-Robot Systems". In: *AI Communications* 35.4 (2022), pp. 433–441.

[6] Charlie Street, Bruno Lacerda, Michal Staniaszek, Manuel Mühlig, and Nick Hawes. "Context-Aware Modelling for Multi-Robot Systems Under Uncertainty". In: *Proceedings of the 21st International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2022.

[7] Charlie Street, Sebastian Pütz, Manuel Mühlig, Nick Hawes, and Bruno Lacerda. "Congestion-Aware Policy Synthesis for Multirobot Systems". In: *IEEE Transactions on Robotics* 38.1 (2022), pp. 262–280.

[8] Charlie Street, Bruno Lacerda, Manuel Mühlig, and Nick Hawes. "Multi-Robot Planning Under Uncertainty with Congestion-Aware Models". In: *Proceedings of the 19th International Conference on Autonomous Agents and Multiagent Systems (AAMAS)*. 2020.