Simon **Kolker**

Contact details

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Skills

Languages:
- C++, C#, HTML, CSS, JavaScript, TypeScript, Python with NumPy, Pandas and Matplotlib.

Frameworks:
- .NET, Flask, React, Unity, Jekyll.

Tools:
- Git, GitHub Actions CI, Docker, CMake, GoogleTest, Linux.

Other:
- Algorithm design, networking, REST APIs, technical writing, LaTeX.

Hobbies

- Creative Writing
- Film-making
- Walking the dog

Summary

Computer Science PhD candidate specialising in formalising philosophical moral theories in multi-objective probabilistic planning. Published at major international conferences and workshops. Experience with heuristic planning in Markov decision processes, formal argumentation frameworks and methods for explainable AI.

Education

PhD Computer Science – *University of Manchester* **2022–2026**

- Produced formal framework for ethical decision-making under uncertainty. Integrated multi-objective optimisation with argumentation procedure based on moral philosophy.
- Implemented framework in C++ with a Python library for environment specification GitHub
- Built full-stack explanation tool to visualise results with React/D3.js with C++ planner above as backend. GitHub
- Member of Autonomy and Verification Network which has expertise in robotics, formal methods, human-computer interaction, standards and policy.
- PhD funded with a university awarded studentship.

BSc Computer Science (1ST Class) – *University of Liverpool* **2019–2022**

- Includes Efficient Sequential Algorithms (92%), Principles of C and Memory Management (83%) and App Development (93%).
- Final Year Project: Virtual Reality meeting room. Unity XR environment with .NET socket-based peer-to-peer networking in C#. Used Windows API for image capture; JPEG compression for screen sharing. GitHub

A-Levels – *Sir John Deanes' Sixth Form College* **2017–2019**

- Mathematics, Computer Science, Media Studies (AAA)

Experience

Graduate Teaching Assistant **2022–2024**

- Assisted in Software Engineering, Principles of Computer Architecture, and Data Structures & Algorithms.
- Guided large student cohorts through technical concepts, adapting communication style for different levels of expertise.
- Assessed code and lab reports for correctness and quality.
- Supervised undergraduate honours project on machine ethics under moral uncertainty for Reinforcement Learning, using computational social choice.
- Awarded Associate Fellowship with Advance HE for teaching and professional practice.

Outreach Representative **2024-Present**

- Public engagement workshops on robotics programming at outreach events, communicating technical concepts to non-specialist audiences.
- Events included Jodrell Bank for Royal Society Summer Science on Tour Exhibition, Space Week at the Trafford Centre and the University of Manchester Community Festival.
- Supported Python programming workshop for secondary school students from under-represented backgrounds.

Experience Continued

Postgraduate Research Representative **2024-Present**

- Contributed to student-staff liaison committee meetings on academic policy, programme development, and inclusivity.
- Organised induction events, coordinating with department stakeholders.
- Co-organised PGR Symposium event. Designed mugs for participants with images from best paper and thesis nominations.

Programme Committee Member

- Peer-reviewed papers for numerous academic venues including Formal Ethical Agents and Robots Workshop 2025, AAMAS conference 2026 and the AAAI Machine Ethics Workshop 2026.

Publicity Chair – *Space Mission Challenges with Information Technology & Space Computing Conference* **2024**

- Coordinated with organising committee of industry and academic researchers including NASA, JPL and Caltech.
- Managed communications strategy for international conference including calls for papers, event communications and online presence. Also chaired paper presentation session.

Website Chair – *Formal Methods for Autonomous Systems* **2025-Present**

- Coordinated with international organising committee.
- Maintained and redesigned Jekyll website. Followed iterative development cycle using organiser and participant feedback.

Mentor & Representative – *University of Liverpool* **2022**

- Welcomed freshers to the City. Led department tour for undergraduate open day.

Publications

Towards Responsibly Non-Compliant Machines **2026**

- Co-authored paper on conditions for autonomous system non-compliance.
- To be presented at Rebellion and Disobedience workshop at AAMAS 2026.

Uncertain Machine Ethics Planning **2025**

- Accepted full paper at AAMAS 2025, an ICORE A* ranked international conference.
- Researched probabilistic planning under moral and outcome uncertainty. Modelled ethical properties as competing objectives. Solution candidates filtered with practical reasoning layer that generates explainable ethical arguments.
- Presented in-person at conference in Detroit, USA.

Applying Ethical Decision Making on Space Missions **2024**

- Evaluated ethical decision-making framework in safety-critical environments.
- Presented in-person at conference in California, USA.

Selecting Ethical Actions by Retrospection on Hypothetical Outcomes **2023**

- Computational Machine Ethics workshop at KR 2023.
- Operationalised a philosophical ethics procedure for ethical decision making with uncertain outcomes. Preserved verifiability and explainability. Presented in-person at conference workshop in Rhodes, Greece.

Machine Ethical Decisions with Hypothetical Retrospection **2023**

- Coordination, Organisations, Institutions, Norms and Ethics (COINE) workshop at AAMAS 2023. Presented in-person at conference workshop in London, UK.

References Available on Request