

# LUCA CASTRI

## AI & Robotics Researcher. Interested in Causal Inference for Robot Autonomy

Nationality Italian Languages Italian (native), English (fluent) 📍 Lincoln, UK

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## ACADEMIC EXPERIENCE

### Research Associate

#### University of Lincoln

📅 Jul 2025 – Ongoing 📍 Lincoln, UK

- Developing AI solutions for multi-robot coordination for the TopFleets project

### Ph.D. Researcher

#### University of Lincoln

📅 Jul 2021 – Jul 2025 📍 Lincoln, UK

- **Research Task Leader, EU H2020 DARKO Project:** Led the causal reasoning research task and managed stakeholder and review meetings
- **M.Sc. Thesis Co-supervisor** (Jan – Jun 2024): Guided research on RL for robot task planning
- **LCASTOR RoboCup Team member** (Jan 2023 – Jul 2023): Competed in the 2023 RoboCup@Home OPL
- **Teaching Assistant** (Oct 2021 – Jun 2022): *Advanced Artificial Intelligence* and *Autonomous and Mobile Robotics* workshops

### Invited Lecturer

#### University of Padua

📅 Nov 2023 – Nov 2024 📍 Padua, Italy

Guest lectures on *Causal Discovery for Time-Series Data* for the Autumn (2023, 2024) and Spring (2024) terms

## PROFESSIONAL EXPERIENCE

### Software Specialist

#### Metapack Engineering

📅 Jan 2020 – Jun 2021 📍 Rome, Italy

- Developed and validated HMI/PLC systems and communication protocols (motors, cameras, printers, PLCs)
- Supported design, test and on-site start-up phases
- Main fields: Pharmaceutical

### Test Engineer

#### Ferrari (via Amaris)

📅 Apr 2019 – Dec 2019 📍 Maranello, Italy

- Analysed logic, HMI requirements and contributed to ECU design and validation
- Key Areas: ADAS – AirBag – Infotainment

## EDUCATION

### Ph.D. in AI and Robotics

#### University of Lincoln

📅 Jul 2021 – Ongoing 📍 Lincoln, UK

- Thesis Submitted: July 2025
- Final Defense: Expected in September 2025
- My research focuses on exploiting causal inference to advance intelligent mobile robotics in dynamic interaction settings, enabling robots to improve prediction, decision-making, and overall autonomy in human-shared environments
- Ph.D. Advisors: [Nicola Bellotto](#) and [Marc Hanheide](#)

### M.Sc. in Control Engineering

#### La Sapienza, University of Rome

📅 Oct 2016 – Jan 2019 📍 Rome, Italy

- Thesis: “*Autonomous car driving systems: new control strategy*” – Advised by [Antonio Carcaterra](#)
- Final Mark: 110/110 (Italian grading system)
- Awarded with the **Honors Program** (“*Percorso d'Ecceellenza*”) for graduating in 2 years with high honors

### B.Sc. in Information and Control Engineering

#### La Sapienza, University of Rome

📅 Sep 2013 – Oct 2016 📍 Rome, Italy

- Thesis: “*Modeling and Control of Robot KUKA LWR4+ in Simulink / VRML*” – Advised by [Alessandro De Luca](#)
- Final Mark: 101/110 (Italian grading system)

## SKILLS

- **Programming Languages:** Python, C++, C, Java, SQL, HTML, CSS
- **AI & Robotics Libraries:** Tensorflow, Keras, Scikit-learn, ROS, Gazebo
- **Robots & Sensors:** [TIAGo](#), Velodyne VLP-16 3D lidar
- **Developer Tools:** Docker, Git,  $\text{\LaTeX}$
- **Causality libraries & Tools:** tigramite, CausalFusion

## EVENT PARTICIPATION

- **Peer Reviewer:** CLear, IROS, ICRA and the ICRA Workshop on Long-term Human Motion Prediction (LHMP)
- **Continuing Education:** Attended the Advanced Course on AI (ACAI 2021)

## PUBLICATIONS

### Preprints 📄

- [L. Castri](#), G. Beraldo and N. Bellotto. (2025), "Causality-enhanced Decision-Making for Autonomous Mobile Robots in Dynamic Environments," *under-review*. 🌐 [Project Website](#)

### Journal Articles 📄

- [L. Castri](#), S. Mghames, M. Hanheide and N. Bellotto. (2024), "CANDOIT: Causal Discovery with Observational and Interventional Data from Time-Series," *Advanced Intelligent Systems*. 🌐 [GitHub repo](#)

### Conference and Workshops Proceedings 👥

- A. Rudenko, Y. Zhu, T. Rodrigues de Almeida, T. Schreiter, [L. Castri](#), N. Bellotto, T. Linder, N. Vaskevicius, L. Palmieri, M. Magnusson, A. J. Lilienthal. (2025), "Hierarchical System to Predict Human Motion and Intentions for Efficient and Safe Human-Robot Interaction in Industrial Environments," *German Robotics Conference (GRC)*.
- E. Stracca, A. Rudenko, L. Palmieri, P. Salaris, [L. Castri](#), N. Mazzi, V. Rakcevic, N. Vaskevicius, T. Linder, N. Bellotto, T. Schreiter, Y. Zhu, M. Castellano-Quero, O. Napolitano, E. Stefanini, L. Heuer, M. Magnusson, A. Swikir and A. Lilienthal (2025), "DARKO-Nav: Hierarchical Risk- and Context-aware Robot Navigation in Complex Intralogistic Environments," *European Robotics Forum (ERF)*.
- S. Mghames, [L. Castri](#), M. Hanheide and N. Bellotto. (2024), "neuROSym: Deployment and Evaluation of a ROS-based Neuro-Symbolic Model for Human Motion Prediction," *IEEE International Conference on Cybernetics and Intelligent Systems (CIS) and IEEE Conference on Robotics, Automation and Mechatronics (RAM)*. 🌐 [GitHub repo](#)
- [L. Castri](#), G. Beraldo, S. Mghames, M. Hanheide and N. Bellotto. (2024), "Experimental Evaluation of ROS-Causal in Real-World Human-Robot Spatial Interaction Scenarios," *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*. 🌐 [Project Website](#)
- [L. Castri](#), G. Beraldo, S. Mghames, M. Hanheide and N. Bellotto. (2024), "ROS-Causal: A ROS-based Causal Analysis Framework for Human-Robot Interaction Applications," *Causal-HRI Workshop, ACM/IEEE International Conference on Human-Robot Interaction (HRI)*. 🌐 [Project Website](#)
- [L. Castri](#), S. Mghames and N. Bellotto. (2023), "Efficient Causal Discovery for Robotics Applications," *Italian Conference on Robotics and Intelligent Machines (I-RIM 3D)*.
- S. Mghames, [L. Castri](#), M. Hanheide and N. Bellotto. (2023), "Qualitative Prediction of Multi-Agent Spatial Interactions," *IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)*.
- S. Mghames, [L. Castri](#), M. Hanheide and N. Bellotto. (2023), "A Neuro-Symbolic Approach for Enhanced Human Motion Prediction," *International Joint Conference on Neural Networks (IJCNN)*.
- [L. Castri](#), S. Mghames, M. Hanheide and N. Bellotto. (2023), "Enhancing Causal Discovery from Robot Sensor Data in Dynamic Scenarios," *Conference on Causal Learning and Reasoning (CLear)*. 🌐 [GitHub repo](#)
- [L. Castri](#), S. Mghames and N. Bellotto. (2023), "From Continual Learning to Causal Discovery in Robotics," *AAAI Bridge Program "Continual Causality"*.
- [L. Castri](#), S. Mghames, M. Hanheide and N. Bellotto. (2022), "Causal Discovery of Dynamic Models for Predicting Human Spatial Interactions," *International Conference on Social Robotics (ICSR)*.
- S. Ghidoni, M. Terreran, D. Evangelista, E. Menegatti, C. Eitzinger, E. Villagrossi, N. Pedrocchi, N. Castaman, M. Malecha, S. Mghames, [L. Castri](#), M. Hanheide and N. Bellotto. (2022), "From Human Perception and Action Recognition to Causal Understanding of Human-Robot Interaction in Industrial Environments," *Convegno Nazionale CINI sull'Intelligenza Artificiale (Ital-IA)*.

## INVITED TALKS

- [Causalflow: A Unified Framework for Causality in Time-Series](#), sktime Meetup Series (Online), Jun 2025
- [Causal Inference for Intelligent Mobile Robots in Dynamic Interaction Settings](#), Oxford Robotics Institute, University of Oxford, Jun 2025
- [Enhancing Human-Robot Spatial Interaction through Causal Inference](#), University of Padua, Oct 2023

## OPEN-SOURCE CONTRIBUTIONS

🌐 [lcastri/causalflow](#)

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A Python library providing a unified framework for time-series causality, with a suite of methods for causal discovery from both observational and interventional data.