

# 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

#### Postdoctoral Research Associate

##### University of Lincoln

📅 Jul 2025 – Ongoing 📍 Lincoln, UK

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

#### Researcher Associate

##### University of Lincoln

📅 Jul 2021 – Jul 2025 📍 Lincoln, UK

- **Research Task Leader, EU H2020 DARKO Project:**
  - Led the “Causal Reasoning for Safe Human-Robot Spatial Interaction” research task
  - Managed stakeholder and review meetings
- **M.Sc. Thesis Co-supervisor** (Jan – Jun 2024): Guided research on RL for robot task planning
- **Teaching Assistant** (Oct 2021 – Jun 2022): *Advanced Artificial Intelligence* and *Autonomous and Mobile Robotics* workshops
- **Hands-on Robotics:**
  - Gained extensive experience by deploying and testing research on real mobile robots, including the **TIAGo** platform
  - Competed in the 2023 RoboCup@Home OPL as a LCASTOR RoboCup Team member
  - Developed and troubleshooted robotics software using ROS, Docker, Python, C++ and GitHub

### 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 and HMI requirements
- 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’Eccellenza”) 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,  $\LaTeX$
- **Causality libraries & Tools:** tigramite, CausalFusion

### EVENT PARTICIPATION

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

## PUBLICATIONS


### 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)*.

### Preprints

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

## 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](#), University of Oxford, Jun 2025
- [Enhancing Human-Robot Spatial Interaction through Causal Inference](#), University of Padua, Oct 2023
- Guest lectures on *Causal Discovery for Time-Series* for the Autumn (2023, 2024) and Spring (2024) terms

## OPEN-SOURCE CONTRIBUTIONS

 [lcastri/causalflow](#)

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