LUCA CASTRI

AI & Robotics Researcher | Interested in Causal Inference for Robot Autonomy

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

lcastri.github.io   lcastri   lcastri   lucacastri94@gmail.com   +39 3341011284|+44 07763735768   List of Publications

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 troubleshot 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 (`TCP/IP`, `UDP`) for 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 – Sept 2025   Lincoln, UK

- My research focused 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
- Thesis: "*Causal Inference for Intelligent Mobile Robots in Dynamic Interaction Settings*"
- 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`, `Matlab/Simulink`
- **AI & Robotics Libraries:** `Tensorflow`, `Keras`, `Scikit-learn`, `ROS`, `ROS2`, `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 ☆ 63 5

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