LUCA CASTRI

PhD Student in
AI and Robotics
University of Lincoln, UK

lcastri.github.io
lucacastri94@gmail.com
/in/luca-castri/
github.com/lcastri
Lincoln, UK
+39 3341011284|+44 07763735768

SUMMARY

I am a Robotic and AI scientist specialised in Causal Inference applied to Human-Robot Spatial Interaction (HRSI). My research focuses on enabling robots to learn the effects of their behaviours by observing how humans react to the robot's actions and enhancing the quality of the interaction by exploiting the acquired causal knowledge.

Research interests: Causal Inference - Causal Robotics

SKILLS

Robotics & AI:	ROS, Gazebo, Docker, Keras, Tensorflow, Scikit-learn
Computer Science:	Python, C++, Java, SQL, JavaScript, HTML, LaTeX, git, MATLAB & Simulink
Languages:	English - professional proficiency Italian - native

ACADEMIC EXPERIENCE

Apr 2024 — **Causal Discovery for Time-Series Data** — **University of Padua**
- Lecture in the Artificial Intelligence course of the Computer Science program

Apr 2023 — **Causal Discovery** — **University of Padua**
- Lecture in the Artificial Intelligence course of the Computer Science program

Jan/2023 – Jul/2023 — **Team member of LCASTOR RoboCup team** — **University of Lincoln**
- Team member of LCASTOR team competing in the 2023 RoboCup@Home Open Platform League
- Responsible for the "Person Following" task
- Technical tools – libraries – sensors: `ROS, Docker, Python, C++` – Bayes People Tracker – Velodyne VLP-16

Oct/2021 – Jun/2022 — **Associate Demonstrator (Workshop assistant)** — **University of Lincoln**
- Advanced Artificial Intelligence (Autumn term)
- Autonomous and Mobile Robotics (Spring term)

PROFESSIONAL EXPERIENCE

Jan/2020 – Jun/2021 — **Software Specialist** — **Metapack Engineering**
- Analysis of logic and HMI requirements
- HMI and PLC development
- Developing communication protocols for HMI and machine devices (motor, camera, printer, PLC)
- Follow test and start-up procedures
- Acquired skills: Collaborative coding using `GitHub - Python - C++`
- Main fields: Food and beverages – Pharmaceutical

Apr/2019 – Dec/2019 — **Test Engineer** — **Ferrari (Amaris Consultant)**
- Analysis of logic and HMI requirements, legislative constraints and corner cases
- Creation of test cases for single ECU validation
- Planning of test cases creation activities in order to meet deadlines related to software releases
- Collaboration in ECU design process for specification and constraints analysis
- Key Areas: ADAS (ACC, Blind Spot Detection, Park Assist System) – Event Data Record (AirBag) – Infotainment

EDUCATION

Jul/2021 - present — **PhD in AI and Robotics** — **University of Lincoln**
- Supervisors: Nicola Bellotto and Marc Hanheide
- I am currently involved in the European H2020 DARKO project, specifically responsible for the "Causal Reasoning for Safe HRSI" task
- My research involves discovering the features and causal structure underlying an HRSI scenario, and then embedding the causal model into forecasting and decision-making frameworks to enhance HRSI
- I actively participate in review and integration meetings
- Main research topics: Causality, Robotics, Human-Robot Spatial Interaction (HRSI)

Oct/2016 - Jan/2019 — **Master of Science – Control Engineering (Mark: 110/110)** — **La Sapienza University of Rome**
- Relevant modules: Robotics, Process Automation, Multivariable systems, Control system.
- Thesis: "*Autonomous car driving systems: new control strategy*"
- Supervisor: Antonio Carcaterra
- Technical tools: `MATLAB & Simulink, VRML, LaTeX`

Sep/2013 - Oct/2016 **Bachelor of Science – Information and Control Engineering (Mark: 101/110)** **La Sapienza University of Rome**

- Relevant modules: Systems Theory, Automation, Telecommunications, Electronics.
- Thesis: "*Modeling and Control of Robot KUKA LWR4+ in Simulink / VRML*"
- Supervisor: Alessandro De Luca
- Technical tools: `MATLAB & Simulink, VRML, LaTeX`

PUBLICATIONS AND TALKS

For the full list of publication, please have a look at my Google scholar profile.

Experimental Evaluation of ROS-Causal in Real-World Human-Robot Spatial Interaction Scenarios
L. Castri, G. Beraldo, S. Mghames, M. Hanheide and N. Bellotto. (2024) **https://lcastri.github.io/roscausal**
Proceedings of IEEE International Conference on Robot and Human Interactive Communication (RO-MAN)

CAnDOIT: Causal Discovery with Observational and Interventional Data from Time-Series
L. Castri, S. Mghames, M. Hanheide and N. Bellotto. **https://github.com/lcastri/causalflow**
Under review in the Advanced Intelligent Systems journal

ROS-Causal: A ROS-based Causal Analysis Framework for Human-Robot Interaction Applications
L. Castri, G. Beraldo, S. Mghames, M. Hanheide and N. Bellotto. (2024) **https://github.com/lcastri/roscausal**
Causal-HRI Workshop, ACM/IEEE International Conference on Human-Robot Interaction (HRI)

Enhancing Human-Robot Spatial Interaction through Causal Inference
Invited talk at the University of Padua (Oct 2023)

Efficient Causal Discovery for Robotics Applications
L. Castri, S. Mghames and N. Bellotto. (2023)
Proceedings of the Italian Conference on Robotics and Intelligent Machines (I-RIM 3D)

Enhancing Causal Discovery from Robot Sensor Data in Dynamic Scenarios
L. Castri, S. Mghames, M. Hanheide and N. Bellotto. (2023) **https://github.com/lcastri/fpcmci**
Proceedings of the Conference on Causal Learning and Reasoning (CLeaR)

From Continual Learning to Causal Discovery in Robotics
L. Castri, S. Mghames and N. Bellotto. (2023)
AAAI Bridge Program "Continual Causality"

Causal Discovery of Dynamic Models for Predicting Human Spatial Interactions
L. Castri, S. Mghames, M. Hanheide and N. Bellotto. (2022)
Proceedings of the International Conference on Social Robotics (ICSR)

EVENTS PARTICIPATION

Conference Reviewer: *CLeaR - ICRA - IROS*

Workshop Reviewer: *ICRA LHMP*

Attended courses: *Advanced Course on AI (ACAI2021)*