

LUCA CASTRI

PhD Student in
AI and Robotics
University of Lincoln, UK



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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 behaviors 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, Keras, Tensorflow, Scikit-learn
Computer Science: Python, C++, Java, SQL, JavaScript, HTML, \LaTeX , git, MATLAB & Simulink
Languages: English - professional proficiency
Italian - native

ACADEMIC EXPERIENCE

- 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, 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
• Handling motors and sensors and data coming from various sensors and cameras
• Developing communication protocols for HMI and machine devices (motor, camera, printer, PLC)
• Follow test and start-up procedures
Main fields: Food and beverages – Pharmaceutical
- Apr/2020 – Dec/2020 **Test Engineer** Ferrari (Amaris Consultant)
• Analysis of logic and HMI requirements, legislative constraints and corner cases
• Creation of test cases for single ECU validation
• Support to test engineer for the comprehension and the execution of tests
• 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 Task 4 in Work Package 5, titled "Causal Reasoning for Safe HRSI". 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
- 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

PUBLICATIONS AND TALKS

Enhancing Human-Robot Spatial Interaction through Causal Inference

Invited talk at the University of Padua (Oct 2023)

Enhancing Causal Discovery from Robot Sensor Data in Dynamic Scenarios

<https://github.com/lcastri/fpcmci>

L. Castri, S. Mghames, M. Hanheide and N. Bellotto.

Proceedings of the Conference on Causal Learning and Reasoning (CLear 2023)

From Continual Learning to Causal Discovery in Robotics

L. Castri, S. Mghames and N. Bellotto.

AAAI Bridge Program "Continual Causality" 2023

Causal Discovery of Dynamic Models for Predicting Human Spatial Interactions

L. Castri, S. Mghames, M. Hanheide and N. Bellotto.

Proceedings of the International Conference on Social Robotics (ICSR 2022)