

Alice Plebe

(she/her)

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CURRENT POSITION

Postdoctoral Research fellow

01/05/2024 – present

Department of Computer Science, University College London, United Kingdom

Investigating trust in multi-agent systems as a mechanism for collaboration when agents work together to solve tasks. This research explores how language can be used to articulate task requirements and shape beliefs about teammates' trustworthiness, thereby facilitating dynamic partnerships in environments where agents must rapidly assess each other's capabilities.

PAST POSITIONS

Postdoctoral Research fellow

15/11/2020 – 30/04/2024

Department of Industrial Engineering, University of Trento, Italy

Conducted research in human-inspired autonomous driving by exploring the field from multiple perspectives. This work involved categorizing existing approaches inspired by cognitive science, neuroscience, and psychology at various levels of abstraction; developing a driving agent based on the concept of affordances; and implementing a novel emergent human-vehicle collaboration paradigm grounded in distributed cognition principles.

Visiting PhD student

01/02/2020 – 30/06/2020

Department of Cognitive Robotics, TU Delft, Netherlands

Supervisor: Julian Kooij

Developed an occupancy grid mapping algorithm inspired by human cortical magnification—the mechanism by which the brain prioritizes the central visual field over the periphery. This approach warps the grid to expand the region surrounding the ego-vehicle, enabling more precise obstacle predictions in this critical area compared to a uniform grid.

Research scholarship holder

01/05/2017 – 31/10/2017

Department of Mathematics and Computer Science, University of Catania, Italy

Developed a real-time computational geometry algorithm to compute minimum separation distances between complex 3D shapes. Integrated this algorithm into Blender to simulate fire propagation at a Sicilian oil refinery, accurately assessing how close flames approached high-risk components and enhancing overall fire hazard evaluation.

EDUCATION

PhD in Information and Communication Technology

20/04/2021

Department of Information Engineering and Computer Science, University of Trento, Italy

Thesis: “Cognitively guided modeling of visual perception in intelligent vehicles”

Supervisor: Mauro Da Lio

Master's degree in Computer Science, 110/110 cum laude

29/11/2016

Department of Mathematics and Computer Science, University of Catania, Italy

Thesis: “A multi-objective genetic algorithm for interior lighting design”

Supervisor: Mario Pavone

Bachelor's degree in Computer Science, 110/110 cum laude

25/07/2014

Department of Mathematics and Computer Science, University of Catania, Italy

Thesis: “Real-time computation of minimum separation distance between 3D polyhedra”

Supervisor: Vincenzo Cutello

AWARDS

Best Student Paper Award 05/05/2019
5th International Conference on Vehicle Technology and Intelligent Transport Systems.
Paper: *A. Plebe et al.*, “Mental Imagery for Intelligent Vehicles”.

TEACHING

Lecturer, “Vision-Language-Action models for robotics and autonomous vehicles” (12 hours). 2023/24
Course from the Doctoral School in Materials, Mechatronics and Systems engineering,
University of Trento.

Guest Lecturer, “Intelligent vehicles and autonomous driving” (10 hours). 2022/23
Course from the Graduate Degree in Mechatronics engineering, University of Trento.

Teaching assistant, “C++ programming for Numerical Analysis” (20 hours). 2022/23
Course from the Undergraduate Degree in Industrial engineering, University of Trento.

Teaching assistant, “C++ programming for Numerical Analysis” (20 hours). 2021/22
Course from the Undergraduate Degree in Industrial engineering, University of Trento.

PROJECTS

UK Research and Innovation EPSRC project “Satisficing Trust in Human-Robot Teams” 05/2024 – present
Role: Research team member, University College London.
Contribution: Developed artificial agents based on large language models to investigate trust as a collaboration mechanism in multi-agent systems.

Horizon Europe project “Sunrise” (ccam-sunrise-project.eu) 02/2023 – 04/2024
Role: Research team member, University of Trento.
Contribution: Developed machine learning algorithms for Operational Design Domain analysis in the safety assessment of autonomous vehicles.

EU Horizon 2020 project “Dreams4Cars” (www.dreams4cars.eu) 11/2017 – 01/2020
Role: Research team member, University of Trento.
Contribution: Developed cognitively inspired deep neural networks for predicting and generating novel visual scenarios in autonomous driving.

PUBLIC ENGAGEMENT

The Conversation 07/2024
Published an article titled “Driverless cars still lack common sense. AI chatbot technology could be the answer”. [[link](#)]
The Conversation is a platform that provides academic insights to a wide public audience. The article discusses the limitations of current autonomous vehicle technology, arguing that the integration of large language models could address the gap in common sense reasoning.

VOLUNTEER WORK

Voxel Community (github.com/voxel-community) 11/2021 – 04/2024
Trento, Italy
Organized and mentored courses within the city’s transqueer-inclusive community dedicated to supporting individuals who identify as women in pursuing careers in tech. This initiative empowered women*, particularly those finishing high school or beginning bachelor’s studies, to enter a field that remains predominantly male-dominated. Provided guidance on both technical career skills and strategies for recognizing, addressing, and overcoming toxic behaviors in academic and professional settings.

SUMMER SCHOOLS AND TRAINING COURSES

CapoCaccia Workshop for Neuromorphic Intelligence 05/2023

Institute of Neuroinformatics, University of Zurich and ETH Zurich

Completed a 2-week workshop on neuromorphic engineering that covered both the biological foundations and hardware implementations.

Training on Deep Learning for Autonomous Vehicles – Perception 10/2018

NVIDIA Deep Learning Institute, Munich, Germany

Completed an 8-hour intensive course on developing perception applications for autonomous vehicles, leveraging deep neural architectures and specialized NVIDIA computing platforms.

International Summer School on AI and Games 05/2018

University of Crete, Chania, Greece

Completed a 40-hour summer school on artificial intelligence techniques for procedural content generation and player modeling in video games.

International Summer School on Deep Learning 07/2017

University of Deusto, Bilbao, Spain

Completed a 50-hour summer school covering fundamentals of deep learning and its applications, including computer vision, machine translation, and language processing.

Character Animation in Blender 05/2016

Associazione HackSpace Catania, Catania, Italy

Completed a 30-hour training program on fundamental techniques of 3D character animation using Blender, a 3D computer graphics software.

Architectural Rendering in Blender 05/2014

Architecture Academy, blenderguru.com

Completed a 40-hour training program on advanced techniques of 3D architectural visualization using Blender, a 3D computer graphics software.

PROFESSIONAL EXPERIENCE

Virtual forensic reconstructions 2014 – 2021

Served as a consultant for Italian Public Prosecutor's offices in various criminal proceedings, developing highly accurate 3D virtual reconstructions of criminal events—primarily in cases involving organized crime murders. The role involved reconstructing plausible 3D reenactments of the spatiotemporal sequence leading up to the crime, based on deductions from evidence and clues gathered by forensic investigators.

Virtual demo of smart-home device 09/2017 – 11/2017

Morpheos S.r.l., Catania, Italy

Created a 3D video demonstration for a smart-home hub device, showcasing its design and components, developed by Morpheos S.r.l.

Virtual demo of surveillance system 05/2015 – 07/2015

Temix Communication Engineering S.r.l., Catania, Italy

Created a 3D video demonstration for a homeland security system with communication and surveillance features developed by Temix Communication Engineering.

List of Publications

JOURNALS

1. T. Dorigo, G. D. Brown, C. Casonato, A. Cerdà, J. Ciarrochi, M. Da Lio, N. D'Souza, N. R. Gauger, S. C. Hayes, S. G. Hofmann, R. Johansson, M. Liwicki, F. Lotte, J. J. Nieto, G. Olivato, P. Parnes, G. Perry, A. Plebe, I. M. Rao, N. Rezaei, F. Sandin, A. Ustyuzhanin, G. Vallortigara, P. Vischia, and N. Yazdanpanah. Artificial intelligence in science and society: the vision of USERN. *IEEE Access*, 13:15993–16054, 2025. doi: 10.1109/ACCESS.2025.3529357. URL <https://doi.org/10.1109/ACCESS.2025.3529357>
2. A. Cherubini, G. P. Rosati Papini, A. Plebe, M. Piazza, and M. Da Lio. Bootstrapped neural models for predicting self-driving vehicle collisions with quantified confidence: Offline and online applications. *IEEE Transactions on Intelligent Vehicles*, [early access], 2025. doi: 10.1109/TIV.2024.3512786. URL <https://doi.org/10.1109/TIV.2024.3512786>
3. A. Plebe, H. Svensson, S. Mahmoud, and M. Da Lio. Human-inspired autonomous driving: A survey. *Cognitive Systems Research*, 83:101169, 2024. ISSN 1389-0417. doi: 10.1016/j.cogsys.2023.101169. URL <https://doi.org/10.1016/j.cogsys.2023.101169>
4. A. Plebe and M. Da Lio. Bio-inspired circular latent spaces to estimate objects' rotations. *Frontiers in Computational Neuroscience*, 17, 2023. ISSN 1662-5188. doi: 10.3389/fncom.2023.1268116. URL <https://doi.org/10.3389/fncom.2023.1268116>
5. M. Da Lio, A. Cherubini, G. P. Rosati Papini, and A. Plebe. Complex self-driving behaviors emerging from affordance competition in layered control architectures. *Cognitive Systems Research*, 79: 4–14, 2023. doi: 10.1016/j.cogsys.2022.12.007. URL <https://doi.org/10.1016/j.cogsys.2022.12.007>
6. A. Plebe, G. P. Rosati Papini, A. Cherubini, and M. Da Lio. Distributed cognition for collaboration between human drivers and self-driving cars. *Frontiers in Artificial Intelligence*, 5:910801, 2022. doi: 10.3389/frai.2022.910801. URL <https://doi.org/10.3389/frai.2022.910801>
7. M. Da Lio, R. Donà, G. P. Rosati Papini, and A. Plebe. The biasing of action selection produces emergent human-robot interactions in autonomous driving. *IEEE Robotics and Automation Letters*, 7(2):1254–1261, 2022. doi: 10.1109/LRA.2021.3136646. URL <https://doi.org/10.1109/LRA.2021.3136646>
8. G. P. Rosati Papini, A. Plebe, M. Da Lio, and R. Donà. A reinforcement learning approach for enacting cautious behaviours in autonomous driving system: Safe speed choice in the interaction with distracted pedestrians. *IEEE Transactions on Intelligent Transportation Systems*, 23(7):8805–8822, 2021. doi: 10.1109/TITS.2021.3086397. URL <https://doi.org/10.1109/TITS.2021.3086397>
9. A. Plebe and M. Da Lio. On the road with 16 neurons: Towards interpretable and manipulable latent representations for visual predictions in driving scenarios. *IEEE Access*, 8:179716–179734, 2020. doi: 10.1109/ACCESS.2020.3028185. URL <https://doi.org/10.1109/ACCESS.2020.3028185>
10. A. Plebe, M. Da Lio, and D. Bortoluzzi. On reliable neural network sensorimotor control in autonomous vehicles. *IEEE Transactions on Intelligent Transportation Systems*, 21:711–722, 2020. doi: 10.1109/TITS.2019.2896375. URL <https://doi.org/10.1109/TITS.2019.2896375>
11. A. Plebe and G. Grasso. Conceptual integrity without concepts. *International Journal of Software Engineering and Knowledge Engineering*, 28(7):955–981, 2018. doi: 10.1142/S0218194018400120. URL <https://doi.org/10.1142/S0218194018400120>

CONFERENCES, WORKSHOPS, BOOK CHAPTERS

1. A. Cherubini, G. P. Rosati Papini, A. Plebe, A. Giugliano, M. Muro, and M. Da Lio. A subsumption scheme for emergent collaboration of self-driving vehicles in intersections. In *Proceedings of the 17th IFAC Symposium on Control of Transportation Systems (CTS)*, volume 58, pages 43–47. Elsevier, 2024. doi: 10.1016/j.ifacol.2024.07.316. URL <https://doi.org/10.1016/j.ifacol.2024.07.316>
2. A. Cherubini, G. P. Rosati Papini, A. Plebe, and M. Da Lio. Energy costs of safe speed policies in a pedestrian-crossing scenario. In *Proceedings of the 35th IEEE Intelligent Vehicles Symposium (IV)*, pages 1–6. IEEE, 2023. doi: 10.1109/IV55152.2023.10186594. URL <https://doi.org/10.1109/IV55152.2023.10186594>
3. S. Mahmoud and A. Plebe. A critical look into cognitively-inspired artificial intelligence. In *8th International Workshop on Artificial Intelligence and Cognition (AIC)*, 2022. URL <https://www.diva-portal.org/smash/record.jsf?pid=diva2:1700578>
4. A. Plebe, J. F. Kooij, G. P. Rosati Papini, and M. Da Lio. Occupancy grid mapping with cognitive plausibility for autonomous driving applications. In *Proceedings of the IEEE/CVF International Conference on Computer Vision (ICCV)*, pages 2934–2941, 2021. doi: 10.1109/ICCVW54120.2021.00328. URL <https://doi.org/10.1109/ICCVW54120.2021.00328>
5. A. Plebe and M. Da Lio. Neurocognitive-inspired approach for visual perception in autonomous driving. In *Smart Cities, Green Technologies and Intelligent Transport Systems*, pages 113–134. Springer International Publishing, Cham, 2021. doi: 10.1007/978-3-030-68028-2_6. URL https://doi.org/10.1007/978-3-030-68028-2_6
6. A. Plebe and M. Da Lio. Visual perception for autonomous driving inspired by convergence–divergence zones. In *Proceedings of the 11th International Symposium on Image and Signal Processing and Analysis (ISPA)*, pages 204–208. IEEE, 2019b. doi: 10.1109/ISPA.2019.8868473. URL <https://doi.org/10.1109/ISPA.2019.8868473>
7. A. Plebe and M. Da Lio. Variational autoencoder inspired by brain’s convergence–divergence zones for autonomous driving application. In *Proceedings of the 20th International Conference on Image Analysis and Processing (ICIAP)*, volume 11751 of *Lecture Notes in Computer Science*, pages 367–377. Springer, Cham, 2019a. doi: 10.1007/978-3-030-30642-7_33. URL https://doi.org/10.1007/978-3-030-30642-7_33
8. A. Plebe, R. Donà, G. P. Rosati Papini, and M. Da Lio. Mental imagery for intelligent vehicles. In *Proceedings of the 5th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS)*, pages 43–51. Science and Technology Publications, 2019b. doi: 10.5220/0007657500430051. URL <http://doi.org/10.5220/0007657500430051>
9. A. Plebe, G. P. Rosati Papini, R. Donà, and M. Da Lio. Dreaming mechanism for training bio-inspired driving agents. In *Proceedings of the 2nd International Conference on Intelligent Human Systems Integration (IHSI)*, pages 429–434. Springer, Cham, 2019c. doi: 10.1007/978-3-030-11051-2_65. URL https://doi.org/10.1007/978-3-030-11051-2_65
10. A. Plebe, V. Cutello, and M. Pavone. Optimizing costs and quality of interior lighting by genetic algorithm. In *Computational Intelligence: 9th International Joint Conference, IJCCI 2017 Funchal-Madeira, Portugal, November 1-3, 2017 Revised Selected Papers*, pages 19–39. Springer International Publishing, Cham, 2019a. doi: 10.1007/978-3-030-16469-0_2. URL https://doi.org/10.1007/978-3-030-16469-0_2
11. M. Da Lio, A. Plebe, D. Bortoluzzi, G. P. Rosati Papini, and R. Donà. Autonomous vehicle architecture inspired by the neurocognition of human driving. In *Proceedings of the 4th International Conference on Vehicle Technology and Intelligent Transport Systems (VEHITS)*, pages 507–513. Science and Technology Publications, 2018. doi: 10.5220/0006785605070513. URL <http://doi.org/10.5220/0006785605070513>
12. A. Plebe, V. Cutello, and M. Pavone. Evolving illumination design following genetic strategies. In *Proceedings of the 9th International Joint Conference on Computational Intelligence (IJCCI)*, pages 289–296. Science and Technology Publications, 2017. doi: 10.5220/0006501902890296. URL <http://dx.doi.org/10.5220/0006501902890296>
13. A. Plebe and M. Pavone. Multi-objective genetic algorithm for interior lighting design. In *Proceedings of the 3rd International Workshop on Machine learning, Optimization, and Big Data (MOD)*,

volume 10710 of *Lecture Notes in Computer Science*, pages 222–233. Springer, Cham, 2017. doi: 10.1007/978-3-319-72926-8_19. URL https://doi.org/10.1007/978-3-319-72926-8_19

14. A. Plebe and G. Grasso. Particle physics and polyedra proximity calculation for hazard simulations in large-scale industrial plants. In *Proceedings of the 12th International Conference of Computational Methods in Sciences and Engineering (ICCMSE)*, pages 090003–1–090003–4. American Institute of Physics Publishing, 2016. doi: 10.1063/1.4968690. URL <http://dx.doi.org/10.1063/1.4968690>