Alice Plebe

(she/her)

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CURRENT POSITION

Research fellow *05/2024 – present*
Department of Computer Science, University College London, United Kingdom
Research topic: collaboration in multi-agent systems based on large language models.

PAST POSITIONS

Postdoctoral fellow *11/2020 – 04/2024*
Department of Industrial Engineering, University of Trento, Italy
Research topic: autonomous driving systems inspired by cognitive science and neuroscience.

Visiting researcher *02/2020 – 06/2020*
Department of Cognitive Robotics, TU Delft, Netherlands
Supervisor: Julian Kooij
Research topic: visual perception systems for autonomous driving using cognitive-inspired occupancy grid mapping.

Research scholarship holder *05/2017 – 10/2017*
Department of Mathematics and Computer Science, University of Catania, Italy
Supervisor: Sebastiano Battiatio
Research topic: hazard simulation algorithms for fire propagation in industrial plants.

EDUCATION

PhD in Information and Communication Technology *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 *11/2016*
Department of Mathematics and Computer Science, University of Catania, Italy
Thesis: "Multi-objective genetic algorithm for interior lighting design"
Supervisor: Mario Pavone

Bachelor's degree in Computer Science, 110/110 cum laude *07/2014*
Department of Mathematics and Computer Science, University of Catania, Italy
Thesis: "Fast computation of minimum separation distance between polyhedra in 3D"
Supervisor: Vincenzo Cutello

AWARDS

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

PROJECTS

UK Research and Innovation EPSRC project "Satisficing Trust in Human-Robot Teams" *05/2024 – present*
Role: member of the research team of University College London.
Contribution: development of artificial agents based on large language models to study trust in multi-agent systems.

Horizon Europe project "Sunrise" (`ccam-sunrise-project.eu`) *02/2023 – 04/2024*
Role: member of the research team of University of Trento.
Contribution: development of machine learning algorithms for Operational Design Domain analysis in safety assessment of autonomous vehicles.

EU Horizon 2020 project "Dreams4Cars" (`www.dreams4cars.eu`) *11/2017 – 01/2020*
Role: member of the research team of University of Trento.
Contribution: development of cognitive-inspired neural networks for prediction and generation of novel visual scenarios in autonomous driving.

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.

EDITORIAL ROLES

Frontiers in Neurorobotics *10/2023 – present*
Member of the Editorial Board as Review Editor.

PUBLIC ENGAGEMENT

The Conversation *07/2024*
Published an article titled *Driverless cars still lack common sense. AI chatbot technology could be the answer.* `[link]`

SUMMER SCHOOLS AND TRAINING COURSES

CapoCaccia Workshop for Neuromorphic Intelligence *05/2023*
Institute of Neuroinformatics, University of Zurich and ETH Zurich
2–week workshop on neuromorphic engineering, covering the biological foundations and the hardware implementations.

Training on Deep Learning for Autonomous Vehicles – Perception *10/2018*
NVIDIA Deep Learning Institute, Munich, Germany
8–hour intensive course on the development of perception applications for autonomous vehicles using deep neural architectures and specialized NVIDIA computing platforms.

International Summer School on AI and Games *05/2018*

University of Crete, Chania, Greece
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
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
30–hour training program on fundamental techniques of 3D character animation using the software Blender.

Architectural Rendering in Blender *05/2014*
Architecture Academy, blenderguru.com
40–hour training program on advanced techniques of 3D architectural visualization using the software Blender.

VOLUNTEER WORK

Voxel Community (`www.voxel.community`) *11/2021 – 04/2024*
Trento, Italy
Organized and provided mentoring for courses within the Voxel Community, Trento's first transqueer-inclusive community, aimed at supporting and empowering women for careers in tech.

PROFESSIONAL EXPERIENCE

Virtual forensic reconstructions *2014 – 2021*
Produced animated 3D reconstructions of criminal events for multiple criminal proceedings commissioned by Italian Public Prosecutor's offices and Defense Attorneys.

Virtual demo of smart–home device *09/2017 – 11/2017*
Morpheos Srl, Catania, Italy
Produced an animated 3D demo presenting the design and components of a smart–home hub.

Virtual demo of surveillance system *05/2015 – 07/2015*
Temix Communication Engineering, Catania, Italy
Produced an animated 3D demo presenting a homeland security system with communication and surveillance features.

Internship on software development *12/2012 – 02/2013*
NCE Network Consulting Engineering, Catania, Italy
Developed Python and XML modules for the open-source business management software OpenERP.

SKILLS

Programming languages and Frameworks
Python, TensorFlow, PyTorch, C/C++, Wolfram Mathematica.

Computer graphics software and Game engines
Blender, Unity.

Languages
Italian, native speaker.
English, proficient.

List of Publications

JOURNALS

1. Alice Plebe, Henrik Svensson, Sara Mahmoud, and Mauro 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

2. Alice Plebe and Mauro 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

3. Mauro Da Lio, Antonello Cherubini, Gastone Pietro Rosati Papini, and Alice 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

4. Alice Plebe, Gastone Pietro Rosati Papini, Antonello Cherubini, and Mauro 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

5. Mauro Da Lio, Riccardo Donà, Gastone Pietro Rosati Papini, and Alice 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

6. Gastone Pietro Rosati Papini, Alice Plebe, Mauro Da Lio, and Riccardo 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

7. Alice Plebe and Mauro 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

8. Alice Plebe, Mauro Da Lio, and Daniele 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

9. Alice Plebe and Giorgio 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. Antonello Cherubini, Gastone Pietro Rosati Papini, Alice Plebe, Angela Giugliano, Mirko Muro, and Mauro 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. Antonello Cherubini, Gastone Pietro Rosati Papini, Alice Plebe, and Mauro 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. Sara Mahmoud and Alice 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. Alice Plebe, Julian FP Kooij, Gastone Pietro Rosati Papini, and Mauro 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. Alice Plebe and Mauro 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. Alice Plebe and Mauro 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. Alice Plebe and Mauro 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. Alice Plebe, Riccardo Donà, Gastone Pietro Rosati Papini, and Mauro 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. Alice Plebe, Gastone Pietro Rosati Papini, Riccardo Donà, and Mauro 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. Alice Plebe, Vincenzo Cutello, and Mario 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. Mauro Da Lio, Alice Plebe, Daniele Bortoluzzi, Gastone Pietro Rosati Papini, and Riccardo 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. Alice Plebe, Vincenzo Cutello, and Mario 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. Alice Plebe and Mario 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. Alice Plebe and Giorgio 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