Enrico Saccon

RESEARCH INTERESTS PLANNING, ROBOTICS, FLEET MANAGEMENT, PARALLEL COMPUTING

Education

Nov 2022 – Current **PhD in Computer Science**, *University of Trento*, Italy
Topic: Multi-Agent Planning, Temporal Planning, Industrial Robotics.
Goal: Develop a holistic system that through large language models and logic programming is able to plan and verify schedules for industrial robots and execute them, learning from experience.
GitHub: idra-lab/PLOP

Oct 2018 – Jul 2022 **Master Degree in Computer Science**, *University of Trento*, Italy, Final mark: 109
Thesis title: "Comparison of Multi-Agent Path Finding Algorithms for an Industrial Scenario."
Thesis argument: managing a fleet of AGVs in a human populated environment.
Topics: AGV control, robotics principles, path and goal planning, fleet control.
Other strong acquired knowledge:
- Machine learning and deep learning (Tensorflow and PyTorch);
- Real time operating systems;

Sep 2015 – Oct 2018 **Bachelor Degree in Computer Science**, *University of Trento*, Italy
"Implementation of GPU algorithms for robot path planning."
Topics: CUDA GPU programming, robot motion planning, comfort control.

Fellowships

Sep 2022 – Oct 2022 **Research Fellowship – "Predoc"**, *University of Trento*, Italy
Topics: Multi-Agent Path Finding, fleet management
Goal: Creation of a framework encompassing different MAPF algorithms for testing and scalability analysis

Work Experience

Sept 2019 – Dec 2019 **Computer Scientist**, *CreateNet – FBK*, Italy
Work on a cutting-edge deployed system for control and optimization of agricultural irrigation.
Topics: C programming language, LoRaWAN infrastructure, electronic sensor and actuators.

Jan 2019 – Jul 2019 **High School Teacher**, *ITT Buonarroti-Pozzo*, Italy
Taught computer science to high school students:
1^{st} year: mainly problem solving skills; 2^{nd} year: basics of C programming.

Research Experience

Dec 2020 – May 2021 **Student**, *University of Trento*, Italy
Topics:
- Research on **Dubins** curves for optimal control of vehicles;
- Implementation on **GPU** of dynamic programming for multi-point Dubinses;
- **Energetic analysis** of different solutions from embedded systems to server based ones.

Teaching Experience

Fall 2023 [TA] **Robot Planning & its Applications**, *University of Trento*, Italy
Role: Class lectures, laboratory exercises, and exams.

Fall 2023 [Tutor] **Programming 101**, *University of Trento*, Italy
Role: Extra exercises and clarifications for Programming 101 course.

Fall 2022 [TA] **Real Time Operating Systems and Middlewares**, *University of Trento*, Italy
Role: Class lectures and exams.

Publications

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[5] E. Saccon, A. Tikna, D. D. Martini, E. Lamon, M. Roveri, and L. Palopoli, *When prolog meets generative models: A new approach for managing knowledge and planning in robotic applications*, 2023. arXiv: 2309.15049 [cs.RO].

[4] E. Saccon, "Multi-agent open framework: Developing a holistic system to solve mapf (student abstract)," in *Proceedings of the International Symposium on Combinatorial Search*, vol. 16, 2023, pp. 198–199.

[3] E. Saccon, L. Palopoli, and M. Roveri, "Comparing multi-agent path finding algorithms in a real industrial scenario," in *AIxIA 2022–Advances in Artificial Intelligence: XXIst International Conference of the Italian Association for Artificial Intelligence, AIxIA 2022, Udine, Italy, November 28–December 2, 2022, Proceedings*. 2023, pp. 184–197. DOI: 10.1007/978-3-031-27181-6_13.

[2] E. Saccon, P. Bevilacqua, D. Fontanelli, M. Frego, L. Palopoli, and R. Passerone, "Robot Motion Planning: can GPUs be a Game Changer?" *2021 IEEE 45th Annual Computers, Software, and Applications Conference (COMPSAC)*, pp. 21–30, 2021. DOI: 10.1109/COMPSAC51774.2021.00015.

[1] M. Frego, P. Bevilacqua, E. Saccon, L. Palopoli, and D. Fontanelli, "An Iterative Dynamic Programming Approach to the Multipoint Markov-Dubins Problem," *IEEE Robotics and Automation Letters*, vol. 5, no. 2, pp. 2483–2490, 2020. DOI: 10.1109/LRA.2020.2972787.

Public Speaking

Jul 2023 **Speaker**, *Prague*, Czech Republic
16th International Symposium on Combinatorial Search (SoCS 2023)
Presented the extended abstract for the Doctoral Consortium: "Multi-Agent Open Framework: Developing a Holistic System to Solve MAPF"

Nov 2022 **Speaker**, *Udine*, Italy
21st International Conference of the Italian Association for Artificial Intelligence (AIxIA 2022)
Presented the conference paper: "Comparing Multi-Agent Path Finding Algorithms in a Real Industrial Scenario"

Jul 2021 **Speaker**, *Madrid (virtual)*, Spain
IEEE COMPSAC 2021 Intelligent and Resilient Computing for a Collaborative World
Presented the conference paper: "Robot Motion Planning: can GPUs be a Game Changer?"

Skills

Programming Languages: C, C++, Python, Prolog, CPLEX, Matlab, R, Latex, Java, Bash, JavaScript, PolyML

Technologies: Git; CUDA; *Robotics:* ROS, ROS2, Gazebo, MoveIt; *LLMs*: GPT, LaMBDA; *Machine/Deep Learning:* PyTorch, Tensorflow; *Iot:* Contiki-NG; *Web:* Django, NodeJS

Communication and Interpersonal Skills

Good teamworking skills learned through various projects assigned during university courses and partecipations in Hackathon events (Hackathon Italia 2017, Hackathon FBK 2016, Hackathon Google 2018) and Google Hashcode (in 2019, 2020, 2021, 2022).

Languages

English: Full professional knowledge

Professional References

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Marco Roveri, *Associate Professor at University of Trento*, Italy
Phone: +39 366 6023955 Email: marco.roveri@unitn.it

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