

Fadel Tarhini

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Education

- Doctorate in Automation and Robotics**, Université de Technologie de Compiègne Oct. 2022 – Oct. 2025
- Ph.D. thesis on the development of a holistic energy-efficiency system architecture for autonomous over-actuated electric vehicles.
- Masters in Robotics Intelligent Systems**, Université de Technologie de Compiègne Sep. 2021 – Sep. 2022
- Master 2 degree specialized in control, navigation, and perception of autonomous systems in mutual interaction (systems of systems).
- Diplome in Mechanical Engineering**, Lebanese University (LU) Sep. 2017 – Sep. 2022
- Focusing on Automatic Control, Sensors, Automobiles, Energy, Thermodynamics, Heat transfer, Materials, Construction and Machine design

Experience

- Doctoral Researcher**, Université de Technologie de Compiègne Oct. 2022 – Oct. 2025
- Developed advanced control algorithms (Super-Twisting Sliding Mode, LPV/ $\mathcal{H}_\infty$, and MPC) to enhance path-tracking, speed control, stability, and energy efficiency in autonomous over-actuated vehicles.
 - Designed and implemented novel torque allocation methods, optimizing energy consumption while maintaining robustness and high control performance.
 - Innovated trajectory and speed planning strategies that balance energy savings, safety, and passenger comfort.
 - Integrated energy-conscious and safety-aware decision-making strategies into holistic vehicle architecture.
 - Achieved significant advancements in energy savings across decision-making, trajectory planning, and actuator coordination modules.
- Graduate Research Supervisor**, CNRS, Heudiasyc UMR 7253 April 2024 – Sep. 2024
- Guided the development of a Model Predictive Control (MPC) framework optimized for path-tracking and stability enhancement in autonomous vehicles.
 - Oversaw the design and implementation of control algorithms, ensuring seamless integration with vehicle dynamics for real-time application.
 - Facilitated knowledge dissemination through the review and refinement of technical documentation to effectively report results and insights.
- Research Intern**, CNRS, Heudiasyc UMR 7253 Feb. 2022 – July 2022
- Developed a comprehensive control architecture combining lateral, longitudinal, stability, and maneuverability control for autonomous over-actuated vehicles.
 - Integrated a novel torque allocation strategy, achieving enhanced energy economy across the vehicle's operational spectrum.

Publications

1. **F. Tarhini**, R. Talj and M. Doumiati, "Safe and Energy-Efficient Jerk-Controlled Speed Profiling for On-Road Autonomous Vehicles," in IEEE Transactions on Intelligent Vehicles, 2024, doi: [10.1109/TIV.2024.3416551](https://doi.org/10.1109/TIV.2024.3416551).
2. **F. Tarhini**, R. Talj and M. Doumiati, "Dual-Level Control Architectures for OverActuated Autonomous Vehicle's Stability, Path-Tracking, and Energy Economy," in IEEE Transactions on Intelligent Vehicles, vol. 9, no. 1, pp. 287-303, Jan. 2024, doi:[10.1109/TIV.2023.3333273](https://doi.org/10.1109/TIV.2023.3333273).
3. **F. Tarhini**, R. Talj and M. Doumiati. "Dynamic and real-time continuous look-ahead distance for autonomous vehicles: an explicit formulation". Vehicle System Dynamics, vol. 62, no. 9, pp. 2210–2236, 2023. doi:[10.1080/00423114.2023.2280215](https://doi.org/10.1080/00423114.2023.2280215).
4. **F. Tarhini**, R. Talj and M. Doumiati, "Hybrid energy-efficient local path planning for autonomous vehicles in dynamic environments", 2024 IEEE 27th International Conference on Intelligent Transportation Systems (ITSC), Edmonton, Canada, 2024.
5. **F. Tarhini**, R. Talj and M. Doumiati, "Driving Towards Energy Efficiency: A Novel Torque Allocation Strategy

for In-Wheel Electric Vehicles,” 2023 IEEE 26th International Conference on Intelligent Transportation Systems (ITSC), Bilbao, Spain, 2023, pp. 1022-1029, doi: [10.1109/ITSC57777.2023.10421905](https://doi.org/10.1109/ITSC57777.2023.10421905).

6. **F. Tarhini**, R. Talj, and M. Doumiati, “Multi-objective control architecture for an autonomous in-wheel driven electric vehicle”. IFAC-PapersOnLine, 56(2):11470–11476, 2023, doi: [10.1016/j.ifacol.2023.10.436](https://doi.org/10.1016/j.ifacol.2023.10.436)
7. **F. Tarhini**, R. Talj, and M. Doumiati, “Adaptive Look-Ahead Distance Based on an Intelligent Fuzzy Decision for an Autonomous Vehicle,” 2023 IEEE Intelligent Vehicles Symposium (IV), Anchorage, AK, USA, 2023, pp. 1-8, doi: [10.1109/IV55152.2023.10186791](https://doi.org/10.1109/IV55152.2023.10186791)

Skills

💡 **Technical Expertise:** Autonomous Systems, Robotics, Control Theory, Vehicle Dynamics, Control Allocation, Optimization, Robust Control, Optimal Control, Motion Planning, Decision-Making, System modeling, Simulation.

🔗 **Programming Languages:** MATLAB, Python, C, Assembly Language, HTML, CSS

⚙️ **Simulation and Modeling:** Simulink, SCANr Studio, SolidWorks, AutoCAD, COMSOL Multiphysics, Veloview

🔧 **Optimization and Control:** YALMIP, CasADi, OSQP, SM, MPC, $\mathcal{H}_\infty$

📄 **Document Preparation:** LaTeX, Microsoft Office Suite

Languages

🗣️ **Languages:** Arabic (Native), English (Fluent), French (Professional Proficiency, B1)