

Ahmad Amine

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Education

UNIVERSITY OF PENNSYLVANIA

PhD Student in Electrical and Systems Engineering

Master of Science in Engineering in Robotics. CGPA 3.91/4.0

Relevant Coursework: Autonomous Racing Cars, Learning in Robotics, Model Predictive Control

Philadelphia, PA, USA

August 2023

May 2023

Experience

xLab – University of Pennsylvania

Research Assistant

Philadelphia, PA, USA

June 2022 – Present

- Implemented a ROS2 wrapper for a kinematic model-predictive controller (MPC) for a 1/10th scale autonomous car.
- Achieved a 100x speedup in control frequency by reformulating MPC problem into sparse-matrix form.
- Achieved a further 4x speedup in control frequency by generating optimized C code using CVXPYgen.
- Extended the MPC implementation by using dynamic single-track dynamics for speeds greater than 1m/s.
- Implemented a novel weight-estimation algorithm for Gaussian Process ensembling.
- Achieved a 10x speed-up of an ensemble Gaussian Process MPC to achieve real-time control (30Hz).

TierIV

Controls Team Intern

Shinagawa, Tokyo, Japan

July 2023 – August 2023

- Developed a system identification library that streamlines model identification using a pipeline architecture.
- Achieved 96% average model accuracy on experimental data using the developed system identification pipeline.
- Deployed learned model into simulation as a digital twin of real vehicle to enable controller development in sim.
- Proposed a sparse formulation of an MPC solver which resulted in a 4x speedup in solving time.

Band Industries

Mechatronics Engineer

Montiverdi, Matn, Lebanon

June 2020 – August 2021

- Developed firmware for ARM and Tensilica Xtensa LX6 (RTOS) chips for audio and control applications.
- Participated in bi-weekly sprints on Jira, using Bitbucket and GiT for version control and code reviews.
- Utilized test-driven development to rewrite the BLE communication protocol, using C/C++ and gTest.
- Designed and implemented open-loop motor position control for Roadie 3 to cut costs on hall-effect encoders.

Honors & Awards

University of Pennsylvania

The Dean's Fellowship

Philadelphia, PA

April 2023

- In recognition of exceptional performance and potential for continued high achievement in graduate work.

University of Pennsylvania

Joseph A. Ganster, Jr. and Julia A. Ganster Engineering Fellow

Philadelphia, PA

April 2023

- ESE Endowed Fellowship awarded for “impressive achievements” that are “exceptional among Dean's Fellows”.

LIFE Lebanon

LIFE Scholar

London, United Kingdom

August 2021

- Awarded for "excellent academic record" and "the drive and ambition to be the next leader in my field".

Publications

- Nagy, Tomáš, Ahmad Amine, Truong X. Nghiem, Ugo Rosolia, Zirui Zang, and Rahul Mangharam. 'Ensemble Gaussian Processes for Adaptive Autonomous Driving on Multi-Friction Surfaces'.
- Amine, Ahmad, Mostafa Aldilati, Hadi Hasan, Noel Maalouf, and Imad H. Elhajj. 'Human-Robot Interaction Using VAHR: Virtual Assistant, Human, and Robots in the Loop'.

Skills & Interests

Technical: C/C++; Python; MATLAB; Simulink; ROS1-ROS2; CVX; FreeRTOS; GiT; Linux; Docker

Language: Native Proficiency in Arabic, Fluent in English

Interests: Passionate about mobile photography, music, and automotive technologies.