Tzanis Anevlavis

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EXPERIENCE

Amazon Seattle, WA, USA

∘ **Applied Scientist II, Flight Control and Modeling, Prime Air** *07 Nov. 2022 - Present*

Currently working on flight control and navigation for Amazon Prime Air, a drone for autonomous package delivery. My work spans across a wide range of science and software for GNC features and safety-critical algorithms used by our autonomous drone, while ensuring it meets performance criteria and satisfies FAA safety requirements.

∘ **Applied Scientist II, Navigation, Amazon Scout** *20 June 2022 - 04 Nov. 2022*

Worked on safe motion planning and controls for Amazon Scout, a ground robot for autonomous delivery.

- Implemented and delivered a production level feature for detecting unintended and uncontrolled motion on the robot, ensuring it comes to a safe stop while minimizing false positive alarms.
- Worked on design proposals of motion planning algorithms for the safe navigation of the robot in uncertain, dynamically changing environments with pedestrians, vehicles, and other obstacles.

University of California, Los Angeles Los Angeles, CA, USA

∘ **Graduate Student Researcher** *28 Mar. 2018 - 31 May 2022*

Worked on topics of nonlinear and safety-critical control, estimation and optimal control, and formal methods.

- *Safety-critical control.* Designed novel algorithms for computing *Robust Controlled Invariant Sets*, which formally guarantee system safety. Developed a library (C++, MATLAB), which was used to synthesize safety controllers for CrazyFlie drone obstacle avoidance tasks (ROS). [repo]
- *Formal methods: robustness in system verification.* Proved lower complexity bounds for the Robust Linear-time Temporal Logic (rLTL) verification problem. The logic rLTL offers advantages over classic LTL, such as verifying system robustness and providing insights on property violations. Developed the first tool (C/C++) for rLTL verification. [repo]
- *Optimization in dynamic environments.* Provided efficient algorithms for network synthesis based on *submodular* optimization.
- Published in 9 conferences and 2 journals.

Parallel Systems Inc. Culver City, CA, USA

∘ **Software Engineering Intern, Perception** *12 April 2021 - 05 Sep. 2021*

- Evaluated different Deep Neural Networks (DNN) for monocular depth estimation on driving datasets, and compared to classic computer vision algorithms. Explored features learned by each DNN.
- Deployed DNNs for real-time inference onboard a moving rail vehicle using NVIDIA DeepStream, and implemented object-specific distance estimation procedures as part of a larger perception software.

EDUCATION

University of California, Los Angeles (UCLA) Los Angeles, CA, USA

∘ **Ph.D.**, Electrical & Computer Engineering. *Sep. 2016 - May 2022*

GPA: 3.91/4.00. Supervisor: Prof. Paulo Tabuada.

National Technical University of Athens (NTUA) Athens, Greece

∘ **Diploma (B.Sc. & M.Sc. Equivalent)**, Electrical & Computer Engineering. *Sep. 2009 - Oct. 2015*

GPA: 8.68/10.0 (Top 10%). Supervisor: Prof. George P. Papavassilopoulos.

Selected coursework: Linear dynamical systems, Geometric nonlinear control, Stochastic optimal control, Verification and control of hybrid systems, Convex optimization, Adaptation & learning, Neural networks & deep learning, Digital signal processing, Artificial intelligence for robotics.

TECHNICAL SKILLS

Languages: MATLAB, C/C++, Python.

Software/tools: Git, Docker, VSCode, OpenCV, PyTorch, NVIDIA DeepStream, Gurobi, ipopt, ROS.

Technical knowledge: Control theory, Motion planning, Optimal control, Reinforcement learning, Optimization, State estimation and sensor fusion, SLAM, Computer vision, Formal methods.

AWARDS

1. **Gerondelis Foundation Scholarship**, 2018: Awarded to Greek students in recognition of academic excellence in the US.
2. **UCLA EE Departmental Fellowship**, 2016: Awarded to the top incoming Ph.D. students.
3. **Eurobank EFG Award**, 2009: Awarded to the top scoring students in the National University Admissions Examination.

PUBLICATIONS

Peer-reviewed Journal Articles:

J1. **T. Anevlavis**, Z. Liu, N.Ozay, and P. Tabuada, "Controlled invariant sets: implicit closed-form representations and applications," *IEEE Transactions on Automatic Control*.

J2. **T. Anevlavis**, M. Philippe, D. Neider, P. Tabuada, "Being correct is not enough: efficient verification using robust linear temporal logic," *ACM Transactions on Computational Logic* 23, 2, Article 8, 2022.

J3. J. Engwerda, B. van Aarle, **T. Anevlavis**, "Debt stabilization games in a monetary union: What are the effects of introducing eurobonds?", *Journal of Macroeconomics*, Volume 59, 2019.

J4. **T. Anevlavis**, G. Papavassilopoulos, J. Engwerda, B. van Aarle, "Debt stabilization in the presence of endogenous risk premia: A dynamic game approach," *Macroeconomic Dynamics*, Volume 23 (7) 2019.

Peer-reviewed Conference Articles:

C1. **T. Anevlavis**, J. Bunton, J. Coleman, M.G. Dogan, E. Grippo, A. Souza, C. Fragouli, B. Krishnamachari, M. Maness, K. Olson, P. Shenoy, P. Tabuada, and G. Verma, "Network synthesis for tactical environments: scenario, challenges, and opportunities," *Proc. SPIE 12113, Artificial Intelligence and Machine Learning for Multi-Domain Operations Applications IV,* (6 June 2022).

C2. Z. Liu, **T. Anevlavis**, N. Ozay, and P. Tabuada, "Automaton-based Implicit Controlled Invariant Set Computation for Discrete-Time Linear Systems," *In 2021 IEEE 60th Conference on Decision and Control (CDC).*

C3. J. Bunton, **T. Anevlavis**, G. Verma, C. Fragouli, and P. Tabuada, "Split to win: near-optimal sensor network synthesis via path-greedy subproblems," *In IEEE Military Communications Conference (MILCOM).*

C4. L. Pannocchi, **T. Anevlavis**, and P. Tabuada, "Trust your supervisor: quadrotor obstacle avoidance using controlled invariant sets," *In 2021 IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS).*

C5. **T. Anevlavis**, Z. Liu, N.Ozay, and P. Tabuada, "An enhanced hierarchy for (robust) controlled invariance," *In 2021 American Control Conference (ACC).*

C6. **T. Anevlavis**, J.Bunton, A.Parayil, J.George, and P. Tabuada, "To beam or not to beam? Beamforming with submodularity-inspired group sparsity," *In 2020 IEEE 59th Conference on Decision and Control (CDC).*

C7. **T. Anevlavis**, and P. Tabuada, "A simple hierarchy for computing controlled invariant sets," *In Proceedings of the 23rd ACM International Conference on Hybrid Systems: Computation and Control (HSCC '20).*

C8. **T. Anevlavis**, and P. Tabuada, "Computing controlled invariant sets in two moves," *In 2019 IEEE 58th Conference on Decision and Control (CDC).*

C9. **T. Anevlavis**, D. Neider, M. Philippe, and P. Tabuada, "Evrostos: The rLTL Verifier," *In Proceedings of the 22nd ACM International Conference on Hybrid Systems: Computation and Control (HSCC '19).*

C10. **T. Anevlavis**, M. Philippe, D. Neider, P. Tabuada, "Verifying rLTL formulas: now faster than ever before!," *In 2018 IEEE Conference on Decision and Control (CDC).*

SERVICE

Technical Program Committee Membership:

- ACM International Conference on Hybrid Systems: Computation and Control (HSCC) 2021, Poster and Demo Session.

Referee / Reviewer Roles:

- Journals:
  1. IEEE Transactions on Automatic Control (2019, 2021, 2022).
  2. IEEE Control Systems Letters (2019, 2024).
  3. SIAM Journal on Control and Optimization (2020).
  4. IEEE Robotics and Automation Letters (2021, 2023).
- Conferences:
  1. IEEE Conference Decision and Control (2019, 2020, 2021, 2023, 2024).
  2. IEEE International Conference on Robotics and Automation (2022).
  3. American Control Conference (2023).

Scholarship Reviewer:

- UCLA Samueli Scholarship (2023).

SELECTED PROJECTS FOR AUTONOMOUS VEHICLES AND AGENTS (GitHub)

Verification of hybrid systems UCLA, 2021
Modeled the behavior of an ego-car with respect to speed limits and the behavior of the environment with interacting Timed Automata. Verified the model for deadblocks and other desired temporal properties. (UPPAAL)

Model Predictive Controller (MPC) for autonomous cars UCLA, 2021
Implemented a nonlinear MPC for path following in a realistic game simulator. Designed a cost function to represent a trade-off between accuracy in path following, fuel efficiency, and driving comfort. (C++, ipopt)

Path planning in a highway UCLA, 2021
Implemented a path planning module for a car to safely navigate in a highway with other traffic. Sensor fusion measurements were used to predict the evolution of the surrounding environment. (C++)

State estimation and sensor fusion with Extended Kalman Filter (EKF) UCLA, 2021
Implemented an EKF to estimate the state of a moving car given noisy LiDAR and RADAR data. (C++)

Perception for autonomous driving UCLA, 2021
Used computer vision techniques, e.g., color selection, edge detection, Hough line transformation, and homography transformation, to perform lane detection and get bird's eye view in highway videos. (Python, OpenCV)

Reinforcement Learning (RL) playground UCLA, 2020
Multi-agent RL for a 2 vs 2 soccer game (OpenAI Gym) using Proximal Policy Optimization. (Python)

Trajectory tracking, control, and localization for unmanned drones UCLA, 2018
Safe trajectory tracking using MPC for CrazyFlie drones with TWR communication protocol. (C++, ROS, Gurobi)

TEACHING EXPERIENCE

Teaching Assistant, "Digital Signal Processing Design" UCLA 25 Sept. 2017 - 23 Mar. 2018
Instructed senior undergraduate students in real-time embedded systems, digital signal and image processing on TI LCDK boards.

Tutor, "Electrical Design" NTUA 2013 - 2015
Organized discussion sessions to mentor and guide first year undergraduate students through the course's final project and exams.

EXTRACURRICULAR

- Past memberships:
  - Institute of Electrical and Electronics Engineers (IEEE), Student Member
  - Association for Computing Machinery (ACM), Professional Member
  - Mensa Greece
  - NTUA ECE Student Council, 2010-2015.