

Alexandros “Alex” Tsolovikos

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Education

Ph.D., Aerospace Engineering, The University of Texas at Austin [May 2023]

- Doctoral candidate in the Department of Aerospace Engineering and Engineering Mechanics.
- GPA: **4.00/4.00**
- Relevant Coursework: Robot Learning, Stochastic Optimal Control, Autonomous Robots, Statistical Estimation, Linear Systems, Optimal Control, Nonlinear Dynamics, Multivariable Control Systems, Fluid Mechanics, Dynamics of Turbulence

BS/MS, Mechanical Engineering, National Technical University of Athens [February 2018]

- Bachelor of Science & Master of Science; 5-year joint degree; 300 ECTS
- GPA: **9.06/10.00** (early graduate with *highest honors*; top 10 among undergraduate class of 180 students)
- Concentration: Air and Ground Transport Vehicles
- Relevant Coursework: Computational Fluid Dynamics, Optimization Methods in Aerodynamics, Computational Methods in Turbomachines, Flight Dynamics, Control Systems, Microprocessor-Based Control
- Thesis: “*Deformation of Computational Meshes Using Delaunay Graph Parameterization – Applications in the Adjoint-Based Aerodynamic Shape Optimization*”

Work Experience

Environment Perception Engineering Intern, Aptiv [June 2021 – August 2021]

- Remote internship supporting the Advanced Engineering/Road Model team in Agoura Hills, CA.
- Working on a Radar-based Simultaneous Localization and Mapping framework that uses pose graphs and loop closures to create a Radar occupancy gridmap from scratch.
- Dynamically updating occupancy gridmap as the vehicle visits an already mapped area multiple times.
- Developing ROS pipeline in Python and C++.

Environment Perception Engineering Intern, Aptiv [June 2020 – July 2020]

- Remote internship supporting the Advanced Engineering/Road Model team in Agoura Hills, CA.
- Developed a sensor fusion framework for lane marker estimation from vision, HD maps, GNSS, and odometry information, along with necessary data pipelines and visualization tools in Python.

Research Experience

Graduate Researcher, The University of Texas at Austin [August 2018 – Present]

- Research interests:
 - Physics-informed machine learning for control of nonlinear, stochastic *ordinary* and *partial differential equations*.
 - Data-driven reduced-order modeling for turbulent flow control using modal analysis and sparsity-promoting techniques.
 - Stochastic optimal control with non-parametric models (e.g. Gaussian processes).
 - Pedestrian motion prediction using Gaussian processes and context information.

- Computational Engineering: Direct numerical simulations (DNS) of turbulent flows.
- Currently pursuing research on control and estimation of high-dimensional nonlinear systems, such as turbulent flows, described by PDEs using data-driven modeling techniques (such as dynamic mode decomposition, Koopman operators, Gaussian processes, and physics-informed neural networks) and stochastic optimal control and estimation methods.

Undergraduate/Associate Researcher, National Technical University of Athens [May 2017 – July 2018]

- Group: *Parallel CFD and Optimization Unit*
- Research interests:
 - Adjoint-based optimization of partial differential equations (e.g. aerodynamic shape optimization).
 - Grid generation and manipulation; computational geometry.
 - Computational fluid dynamics (CFD).
- Developed and programmed a fast dynamic grid morpher based on Delaunay triangulation parameterization for OpenFOAM in C++ and coupled it with the adjoint-based aerodynamic shape optimization software.
- Set up a fluid-structure interface between ANSYS and an in-house CFD software for simulating the deformation of an inflatable wing.
- Programmed an adjoint error-based grid refinement tool for the OpenFOAM environment for use in automatic mesh generation and for improving the accuracy of computing functionals of interest.

Skills

Programming:	Proficient in C/C++, Python, Matlab, Fortran 95, Unix
Libraries/Tools:	PyTorch, ROS, GPyTorch, GTSAM, Numpy, Eigen (C++), Git, OpenCV, CGAL, OpenFOAM, Arduino
Other Tools:	LaTeX, MS Office (ECDL Expert), Solidworks, ANSYS, LS-DYNA, EASY
Languages:	English (fluent), Italian (basic), Greek (native)

Publications

Journal Articles

- **Tsolovikos, A.**, Suryanarayanan, S., Bakolas, E., Goldstein, D., (2020), “Model predictive control of material volumes with application to vortical structures”, *AIAA Journal*, 2021.
- **Tsolovikos, A.**, Bakolas, E., Suryanarayanan, S., Goldstein, D., (2020), “Estimation and control of fluid systems using sparsity-promoting dynamic mode decomposition with control”, *IEEE Control Systems Letters*.
- Gkaragkounis, K., Papoutsis-Kiachagias, E., **Tsolovikos, A.**, Giannakoglou, K., (2020), “The effect of grid displacement methods on continuous adjoint-based sensitivity derivatives in aerodynamic and conjugate heat transfer problems”, *Engineering Optimization*.

Conference Papers

- **Tsolovikos, A.**, Bakolas, E. (2021), “Cautious Nonlinear Covariance Steering using Variational Gaussian Process Predictive Models”, to be presented at the *Modeling, Estimation and Control Conference 2021*.
- Saravanos, A.D., **Tsolovikos, A.**, Bakolas, E. and Theodorou, E.A. (2021), Distributed Covariance Steering with Consensus ADMM for Stochastic Multi-Agent Systems, *Robotics: Science and Systems 2021*.
- Bakolas, E., **Tsolovikos, A.**, (2020), “Greedy finite-horizon covariance steering for discrete-time stochastic nonlinear systems based on the unscented transform”, *American Control Conference 2020*, Denver, CO, July 1-3, 2020.
- **Tsolovikos, A.**, Suryanarayanan, S., Bakolas, E., Goldstein, D., (2020), “Toward model-based control of near-wall turbulent coherent structures”, *AIAA SciTech 2020*, Orlando, FL, January 6-10, 2020.

Teaching Experience

Teaching Assistant, The University of Texas at Austin

[August 2018]

- Assisted in the *Linear Systems* course by grading and holding review sessions (Spring 2019, Fall 2020 & Spring 2021).
- Assisted in the *Compressible Flow* course by lecturing, grading and holding office hours (Spring 2019).
- Taught and supervised the *Low-Speed Aerodynamics Lab*; graded lab reports, and held office hours (Fall 2018).
- Assisted in the *Applied Aerodynamics* course by grading homework and holding office hours (Fall 2018).

Awards and Fellowships

- “Graduate Dean’s Prestigious Fellowship Supplement” Fellow (September 2020)
- “**A. Onassis Foundation Scholarship**” for Ph.D. studies in Aerospace Engineering (September 2020 - May 2023, valued at over \$40,000)
- “Hellenic Professional Society of Texas Scholarship” recipient (February 2020)
- “Gerondelis Foundation Graduate Study Scholarship” recipient (December 2019)
- “**Graduate Continuing Fellowship**” awarded by the Graduate School at the University of Texas at Austin (June 2019 – May 2020, \$44,000 toward tuition and stipend)
- “KARY” award for the highest GPA in the Mechanical Engineering School during the academic year 2015 – 2016 (September 2017)
- “Thomaideio” award for the highest GPA in the 5th and 6th semesters in the Mechanical Engineering School (September 2017)
- “Christos Papakyriakopoulos” award for the highest score in mathematics courses (September 2015)
- “A Great Moment for Education” award for the highest score in University Entrance Examinations, Eurobank (2013)