

Vasileios Tzoumas

University of Michigan
François-Xavier Bagnoud Aerospace Building
1320 Beal Avenue
Ann Arbor, MI 48109-2140 U.S.A.

<http://vasileiostzoumas.com>
vtzoumas@umich.edu

ACADEMIC EMPLOYMENT

University of Michigan Assistant Professor Department of Aerospace Engineering	2021-present
Massachusetts Institute of Technology Research scientist Laboratory for Information & Decision Systems (LIDS) Department of Aerospace and Aeronautics (AeroAstro) Mentor: Luca Carlone	2019-2020
Massachusetts Institute of Technology Post-doctoral associate Laboratory for Information & Decision Systems (LIDS) Department of Aerospace and Aeronautics (AeroAstro) Mentor: Luca Carlone	2018-2019

EDUCATION

University of Pennsylvania Ph.D. in Electrical and Systems Engineering, GPA: 3.91/4.00 General Robotics, Automation, Sensing and Perception Laboratory (GRASP) Thesis: “Resilient Submodular Maximization for Control and Sensing” Committee: Rakesh Vohra (UPenn); Hamed Hassani (UPenn); Luca Carlone (MIT) Mentors: George J. Pappas (UPenn); Ali Jadbabaie (MIT)	2018
University of Pennsylvania Master of Science in Electrical Engineering, GPA: 4.00/4.00	2016
Wharton School of Business - University of Pennsylvania Master of Arts in Statistics, GPA: 3.94/4.00	2016
National Technical University of Athens Diploma in Electrical and Computer Engineering, GPA: 9.54/10.00 Thesis: “A Game-Theoretic Analysis of Competitive Diffusion Processes over Social Networks” Mentors: Evangelos Markakis (AUEB); Trifon Koussiouris (NTUA)	2012

RESEARCH INTERESTS

Trustworthy Collaborative Autonomy: Safe Learning for Control; Resilient Perception; Perception-Computation-Communication-Control Co-Design; Online Non-Convex, Combinatorial, and Distributed Optimization in Multi-Robot Applications; Resilient Morphable Multi-Rotors.

AWARDS & DISTINCTIONS

13. *Honorable Mention*, IEEE Robotics and Automation Letters (**RA-L**), 2020.

12. *Best Paper Award in Robot Vision*, IEEE International Conference on Robotics and Automation (**ICRA**), 2020.
11. *MATLAB implementation* of the proposed algorithm in the 2020 ICRA paper “Graduated Non-Convexity for Robust Spatial Perception: From Non-Minimal Solvers to Global Outlier Rejection.”
10. *MathWorks news article* on the proposed algorithm in the 2020 ICRA paper “Graduated Non-Convexity for Robust Spatial Perception: From Non-Minimal Solvers to Global Outlier Rejection.”
9. *Best Student Paper Award Finalist*, IEEE Conference on Decision and Control (**CDC**), 2017 (4 finalists out of 1100 accepted papers).
8. *MIT LIDS|ALL Magazine* interview featuring my research on robust autonomy, Algorithms that protect, Vol. 15, 2019.
7. *Best Presentation in Session Award*, American Control Conference (**ACC**), 2015, 2016.
6. *ECE Distinguished Research Fellowship*, University of Illinois at Urbana-Champaign (UIUC), 2012; declined.
5. *Jacobs Fellowship*, University of California at San Diego (UCSD), 2012; declined.
4. *Graduate Fellowship*, University of Pennsylvania, 2012-2018.
3. *Highest honors*, National Technical University of Athens (NTUA), 2011.
2. *Greek Scholarships Foundation Award*, National Technical University of Athens (NTUA), 2008.
1. *Education Award from Eurobank EFG Group*, for ranking 1st among the students of the 1st Experimental Unified Lyceum of Athens at the Pan-Hellenic university admission examinations, 2005.

JOURNAL PUBLICATIONS

- TRO 11. L. Zhou, **V. Tzoumas**, G. J. Pappas, P. Tokekar, “Distributed Resilient Active Target Tracking with Multiple Robots,” *IEEE Transactions on Robotics* (TRO), 2022, conditionally accepted.
- TRO 10. B. Schlotfeldt, **V. Tzoumas**, G. J. Pappas, “Resilient Active Information Acquisition with Teams of Robots,” *IEEE Transactions on Robotics* (TRO), 2022, in press.
- TAC 9. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Robust and Adaptive Sequential Submodular Optimization,” *IEEE Transactions on Automatic Control* (TAC), 2022, in press.
arXiv preprint: 1909.11783.
- TRO 8. P. Antonante,* **V. Tzoumas**,* H. Yang, L. Carlone, “Outlier-Robust Estimation: Hardness, Minimally-Tuned Algorithms, and Applications,” *IEEE Transactions on Robotics* (TRO), 2021, in press.
*Equal contribution.
arXiv preprint: 2007.15109.
- RAL+ICRA 7. H. Yang, P. Antonante, **V. Tzoumas**, L. Carlone, “Graduated Non-Convexity for Robust Spatial Perception: From Non-Minimal Solvers to Global Outlier Rejection,” *IEEE Robotics and Automation Letters* (RAL), Vol. 5, No. 2, 2020, and *IEEE International Conference on Robotics and Automation* (ICRA), 2020.
arXiv preprint: 1909.08605.
[Best Paper Award in Robot Vision, ICRA 2020]
[Honorable Mention, RA-L 2020]
- TAC 6. **V. Tzoumas**, L. Carlone, G. J. Pappas, A. Jadbabaie, “LQG Control and Sensing Co-Design,” *IEEE Transactions on Automatic Control* (TAC), Vol. 66, No. 4, 2021.
arXiv preprint: 1802.08376.

- TAC 5. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Resilient Non-Submodular Maximization over Matroid Constraints,” *IEEE Transactions on Automatic Control* (TAC), 2018, under review. arXiv preprint: 1804.01013.
- TAC 4. A. Jadbabaie, A. Olshevsky, G. J. Pappas, **V. Tzoumas**, “Minimal Reachability is Hard to Approximate,” *IEEE Transactions on Automatic Control* (TAC), Vol. 64, No. 2, 2019. arXiv preprint: 1710.10244.
- RAL+ICRA 3. L. Zhou, **V. Tzoumas**, G. J. Pappas, P. Tokekar, “Resilient Active Target Tracking with Multiple Robots,” *IEEE Robotics and Automation Letters* (RAL), Vol. 4, No. 1, 2019, and *2019 IEEE International Conference on Robotics and Automation* (ICRA), 2019. arXiv preprint: 1809.04032.
- TCNS 2. **V. Tzoumas**, Y. Xue, S. Pequito, P. Bogdan, G. J. Pappas, “Selecting Sensors in Biological Fractional-Order Systems,” *IEEE Transactions on Control of Network Systems* (TCNS), Vol. 5, No. 2, 2018. DOI: 10.1109/TCNS.2018.2809959.
- TCNS 1. **V. Tzoumas**, M. A. Rahimian, G. J. Pappas, A. Jadbabaie, “Minimal Actuator Placement with Bounds on Control Effort,” *IEEE Transactions on Control of Network Systems* (TCNS), Vol. 3, No. 1, 2016. arXiv preprint: 1409.3289.

CONFERENCE PUBLICATIONS

- RAL+ICRA 13. H. Yang, P. Antonante, **V. Tzoumas**, L. Carlone, “Graduated Non-Convexity for Robust Spatial Perception: From Non-Minimal Solvers to Global Outlier Rejection,” *IEEE Robotics and Automation Letters* (RAL), Vol. 5, No. 2, 2020, and *IEEE International Conference on Robotics and Automation* (ICRA), 2020. arXiv preprint: 1909.08605.
[Best Paper Award in Robot Vision, ICRA 2020]
[Honorable Mention, RA-L 2020]
- ICRA 12. L. Zhou, **V. Tzoumas**, P. Tokekar, G. J. Pappas, “Distributed Robust Submodular Maximization for Multi-Robot Planning,” *IEEE International Conference on Robotics and Automation* (ICRA), 2020. arXiv preprint: 1910.01208.
- IROS 11. **V. Tzoumas**,* P. Antonante,* L. Carlone, “Outlier-Robust Spatial Perception: Hardness, General-Purpose Algorithms, and Guarantees,” *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), 2019. arXiv preprint: 1903.11683. *Equal contribution.
- CDC 10. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Resilient Monotone Sequential Maximization,” *57th IEEE Conference on Decision and Control* (CDC), 2018. arXiv preprint: 1803.07954. **Invited paper.**
- IROS 9. B. Schlotfeldt, **V. Tzoumas**, D. Thakur, G. J. Pappas, “Resilient Active Information Gathering with Mobile Robots,” *IEEE/RSJ International Conference on Intelligent Robots and Systems* (IROS), 2018. arXiv preprint: 1803.09730.
- ACC 8. **V. Tzoumas**, L. Carlone, G. J. Pappas, A. Jadbabaie, “Sensing-Constrained LQG Control,” *American Control Conference* (ACC), 2018. arXiv preprint: 1709.08826. **Invited paper.**

- CDC 7. **V. Tzoumas**, K. Gatsis, A. Jadbabaie, G. J. Pappas, “Resilient Monotone Submodular Function Maximization,” *56th IEEE Conference on Decision and Control (CDC)*, 2017.
arXiv preprint: 1703.07280.
Invited paper.
[Best Student Paper Award Finalist, CDC 2017]
- ACC 6. **V. Tzoumas**, N. A. Atanasov, A. Jadbabaie, G. J. Pappas, “Scheduling Nonlinear Sensors for Stochastic Process Estimation,” *American Control Conference (ACC)*, 2017.
arXiv preprint: 1609.08536.
- CDC 5. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Near-Optimal Sensor Scheduling for Batch State Estimation: Complexity, Algorithms, and Limits,” *55th IEEE Conference on Decision and Control (CDC)*, 2016.
arXiv preprint: 1608.07533.
Invited paper.
- ACC 4. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Sensor Placement for Optimal Kalman Filtering,” *American Control Conference (ACC)*, 2016.
arXiv preprint: 1509.08146.
Invited paper. Best presentation in session.
- CDC 3. **V. Tzoumas**, A. Jadbabaie, G. J. Pappas, “Minimal Reachability Problems,” *54th IEEE Conference on Decision and Control (CDC)*, 2015.
arXiv preprint: 1503.07021.
- ACC 2. **V. Tzoumas**, M. A. Rahimian, G. J. Pappas, A. Jadbabaie, “Minimal Actuator Placement with Optimal Control Constraints,” *American Control Conference (ACC)*, 2015.
arXiv preprint: 1503.04693.
Best presentation in session.
- WINE 1. **V. Tzoumas**, C. Amanatidis, E. Markakis, “A Game-Theoretic Analysis of Competitive Diffusion Processes over Social Networks,” *8th International Conference on Web and Internet Economics (WINE)*, 2012.
DOI: 10.1007/978-3-642-35311-6_1.
[Acceptance rate 25%]

THESES PUBLICATIONS

2. **V. Tzoumas**, “Resilient Submodular Maximization for Control and Sensing,” Ph.D. thesis, University of Pennsylvania, 2018.
1. **V. Tzoumas**, “A Game-Theoretic Analysis of Competitive Diffusion Processes over Social Networks,” Diploma thesis, National Technical University of Athens, 2011.

MENTORSHIP EXPERIENCE

University of Michigan

Mentoring 2 Ph.D., 5 M.Sc., and 6 B.Sc. students (names of all team members are found here).

Massachusetts Institute of Technology

- Pasquale Antonante (Ph.D. advisor: Luca Carlone), 2018-2020
Project: “Outlier-robust estimation: Hardness, General-Purpose Algorithms, and Robot Vision Applications.”

University of Pennsylvania

- Brent Schlotfeldt (Ph.D. advisor: George J. Pappas), 2018-2020
Project: “Resilient Active Information Gathering with Mobile Robots.”

Virginia Tech

- Lifeng Zhou (Ph.D. advisor: Pratap Tokekar), 2018-2020
Project: “Resilient Active Target Tracking with Multiple Robots.”

TEACHING

University of Michigan

- Lecturer, *AEROSP 740 - Visual Navigation for Autonomous Aerial Vehicles*, 2021.

Massachusetts Institute of Technology

- Guest lecturer, *16.485 - Visual Navigation for Autonomous Vehicles*, 2020.
- Designed and delivered 3 lectures (1-hour each) on advanced topics of outlier-robust estimation, for the graduate level course *16.485 - Visual Navigation for Autonomous Vehicles*, 2019.
- [Kaufman Teaching Certificate](#) (2-month workshop of 8 sessions, 2-hour each), 2019.

University of Pennsylvania

- *Linear Optimization* (graduate level), Teaching Assistant, 2013.
- *Linear Systems* (graduate level), Teaching Assistant, 2014.

INVITED TALKS & SEMINARS

15. Autonomy Talks, *ETH Zurich*, Institute for Dynamic Systems and Control, 2021. Title: “*Algorithmic Foundations of Resilient Collaborative Autonomy: From Non-Convex Optimization to Perception and Control.*”
14. Controls Seminar, *University of Michigan*, Controls Group, 2021. Title: “*Algorithmic Foundations of Resilient Collaborative Autonomy: From Non-Convex Optimization to Perception and Control.*”
13. Academic Seminar, *University of Michigan*, Sigam Gamma Tau (SGT), 2021. Title: “*Algorithmic Foundations of Resilient Collaborative Autonomy: From Non-Convex Optimization to Perception and Control.*”
12. Theory Group Seminar, *National Technical University of Athens*, 2020. Title: “*Foundations of Resilient Collaborative Autonomy: From Robust Combinatorial Optimization to Perception and Control.*”
11. Chair’s Distinguished Lecture, *University of Michigan*, Aerospace Engineering Department, 2020. Title: “*Foundations of Resilient Collaborative Autonomy: From Robust Combinatorial Optimization to Perception and Control.*”
10. IDSS Special Seminar, *Massachusetts Institute of Technology*, Mechanical Engineering Department and Institute of Data, Systems, and Society, 2020.
Title: “*Foundations of Resilient Collaborative Autonomy: From Combinatorial Optimization to Control and Learning.*”
9. EE Special Seminar, *Harvard University*, Electrical Engineering Department, 2020.
Title: “*Foundations of Resilient Collaborative Autonomy: From Robust Combinatorial Optimization to Perception and Control.*”
8. EE Special Seminar, *Northeastern University*, Electrical Engineering Department, 2020.
Title: “*Foundations of Resilient Collaborative Autonomy: From Combinatorial Optimization to Control and Learning.*”
7. LIDS Student Conference, *Massachusetts Institute of Technology*, 2018.
Title: “*Resilient Monotone Submodular Function Maximization.*”
6. *Institute of Informatics and Telecommunications Seminar*, Demokritos, 2018.
Title: “*Resilient Monotone Submodular Function Maximization.*”

5. *IEEE Conference on Decision and Control (CDC)*, 2018. Title: “*Resilient Monotone Sequential Maximization.*”
4. *IEEE Conference on Decision and Control (CDC)*, 2017. Title: “*Resilient Monotone Submodular Function Maximization.*”
3. *IEEE Conference on Decision and Control (CDC)*, 2016. Title: “*Near-Optimal Sensor Scheduling for Batch State Estimation: Complexity, Algorithms, and Limits.*”
2. *American Control Conference (ACC)*, 2018. Title: “*Sensing-Constrained LQG Control.*”
1. *American Control Conference (ACC)*, 2016. Title: “*Sensor Placement for Optimal Kalman Filtering.*”

COMMUNITY SERVICE

Michigan Postdoctoral Association of the College of Engineering (MPACE), University of Michigan, 2021.

- Participated in a panel discussion (along with 3 more professors from the University of Michigan and MIT) on how to prepare for the Academic Job Market.

AIAA Lunch, University of Michigan, 2021.

- Discussed over lunch with 10 undergraduate and graduate students about aerospace autonomy research, and about best practices in academia.

LIDS mentoring committee, Massachusetts Institute of Technology, 2018-2020.

- Led the organization of monthly meetings between Ph.D. students and post-docs to discuss questions of the Ph.D. students about their research and career progress.
- Organized 1 hour-long events on academic faculty applications, which attracted the majority of the LIDS Ph.D. student and post-doc community (more than 60 attendants per event).

LIDS post-doctoral committee, Massachusetts Institute of Technology, 2018-2019.

- Co-founded the committee to foster a post-doc community where post-docs share their career growth experience and best practices.
- Organized 1 hour-long events on academic faculty applications, where LIDS post-docs with faculty position offers discussed their interview experience with the rest of the LIDS post-docs.
- Organized 1 hour-long events for the LIDS post-docs in the academic market to practice their interview presentations.

PROFESSIONAL SERVICE

Associate Editor (AE):

- IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), 2021-present.

Program committee (PC) member:

- Conference on Robot Learning (CoRL), 2020.

Session organizer:

- IEEE Conference in Decision and Control (CDC), 2016; (with Tyler H. Summers).

Session chair:

- American Control Conference (ACC), 2018.
- IEEE Conference in Decision and Control (CDC), 2016.

Reviewer for journal submissions:

- IEEE Transactions on Automatic Control (TAC), 2014-present.
- Automatica, 2014-present.

- International Journal of Robotics Research (IJRR), 2018-present.
- IEEE Transactions on Robotics (TRO), 2018-present.
- Autonomous Robots (AURO), 2018-present.
- IEEE Transactions on Control of Network Systems (TCNS), 2014-present.
- IEEE Robotics and Automation Letters (RAL), 2019-present.
- IEEE Transactions on Signal Processing (TSP), 2017-present.
- Sensors, 2018-present.
- IEEE Signal Processing Letters (SPL), 2017.
- IEEE Transactions on Network Science and Engineering (TNSE), 2016.
- Physics Letters, 2017.
- Scientific Reports, 2017.

Reviewer for conference submissions:

- IEEE Conference on Decision and Control (CDC), 2014-present.
- American Control Conference (ACC), 2014-present.
- IEEE Conference on Robotics and Automation (ICRA), 2018-present.
- IEEE Conference on Cyber-Physical Systems (ICCPS), 2017.
- IEEE Conference on Control Technology and Applications (CCTA), 2019.
- European Control Conference (ECC), 2015.
- Conference on Web and Network Economics (WINE), 2013-2014.
- Conference on Economics and Computation (EC), 2013.