

# Melkior Ornik

---

Department of Aerospace Engineering  
University of Illinois at Urbana-Champaign  
319H Talbot Laboratory  
104 S. Wright St, Urbana, IL 61801

Coordinated Science Laboratory  
University of Illinois at Urbana-Champaign  
346 CSL Building  
1308 W. Main St, Urbana, IL 61801

Phone: (217) 300-9653

E-mail: [mornik@illinois.edu](mailto:mornik@illinois.edu)

WWW: <http://mornik.ae.illinois.edu/>

CURRENT POSITIONS	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL, USA Assistant Professor, Department of Aerospace Engineering Assistant Professor, Department of Electrical and Computer Engineering (0%) Assistant Professor, Coordinated Science Laboratory (0%)  <b>Discovery Partners Institute</b> , Chicago, IL, USA Affiliate (0%)	<b>2019 –</b> <b>2019 –</b> <b>2019 –</b>  <b>2020 –</b>
PREVIOUS POSITIONS	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL, USA Adjunct Assistant Professor, Department of Aerospace Engineering (0%)  <b>University of Texas at Austin</b> , Austin, TX, USA Research Associate, Institute for Computational Engineering and Sciences Postdoctoral Fellow, Institute for Computational Engineering and Sciences	<b>2018</b>  <b>2018</b> <b>2017 – 2018</b>
EDUCATION	<b>University of Toronto</b> , Toronto, ON, Canada  Ph.D., Electrical and Computer Engineering Thesis: <i>New Mathematical Tools in Reach Control Theory</i> Advisor: Mireille E. Broucke  <b>Queen's University</b> , Kingston, ON, Canada  M.Sc., Mathematics and Statistics Thesis: <i>Some Observations on Orbits of Driftless Bilinear Systems</i> Advisor: Andrew D. Lewis  <b>University of Zagreb</b> , Zagreb, Croatia  B.Sc., Mathematics	<b>2017</b>        <b>2013</b>       <b>2011</b>
VISITING RESEARCH	<b>University of Texas at Austin</b> , Austin, TX, USA <b>Technion – Israel Institute of Technology</b> , Haifa, Israel <b>Queen's University</b> , Kingston, ON, Canada <b>Weizmann Institute of Science</b> , Rehovot, Israel	<b>2017</b> <b>2016</b> <b>2012</b> <b>2011</b>
JOURNAL PUBLICATIONS	[1] J.-B. Bouvier, M. Ornik. Designing resilient linear driftless systems. Submitted. [2] H. Chen, M. Ornik, K. Ho. Game-theoretic approach to incentivize commercial participation in space infrastructure development and deployment. Submitted. [3] Z. Dai, K. Xu, M. Ornik. Repulsion-based p-dispersion with distance constraints in non-convex polygons. Submitted.	

- [4] M. Ornik, U. Topcu. Learning and planning for time-varying MDPs using maximum likelihood estimation. Submitted.
- [5] M. O. Karabag, M. Ornik, U. Topcu. Deception in supervisory control. Submitted.
- [6] Y. Savas, M. Ornik, M. Cubuktepe, M. O. Karabag, U. Topcu. Entropy maximization for Markov decision processes under temporal logic constraints. *IEEE Transactions on Automatic Control*, 65(4), pp. 1552–1567, 2020.
- [7] M. Ornik, S. Carr, A. Israel, U. Topcu. Control-oriented learning on the fly. *IEEE Transactions on Automatic Control*, 2019.
- [8] M. Ornik, M. E. Broucke. Chattering in the reach control problem. *Automatica*, 89, pp. 201–211, 2018.
- [9] M. E. Broucke, M. Ornik, A. Mansouri. A topological obstruction in a control problem. *Systems & Control Letters*, 108, pp. 71–79, 2017.
- [10] M. Ornik, M. E. Broucke. Characterization of a topological obstruction to reach control by continuous state feedback. *Mathematics of Control, Signals, and Systems*, 29(2), 2017.
- [11] M. Moarref, M. Ornik, M. E. Broucke. An obstruction to solvability of the reach control problem using affine feedback. *Automatica*, 71, pp. 229–236, 2016.
- [12] M. Ornik. Modeling the role of mutations and density independent dispersal in evolutionary rescue. *Journal of Biological Systems*, 22(1), pp. 123–132, 2014.
- [13] F. Nawaz, M. Ornik. Explorative probabilistic planning with unknown target locations. Accepted to *59th IEEE Conference on Decision and Control*, 2020.
- [14] M. Ornik. Guaranteed reachability for systems with unknown dynamics. Accepted to *59th IEEE Conference on Decision and Control*, 2020.
- [15] M. Ornik. Measuring target predictability for optimal environment design. Accepted to *59th IEEE Conference on Decision and Control*, 2020.
- [16] P. Thangeda, M. Ornik. PROTRIP: Probabilistic risk-aware optimal transit planner. Accepted to *23rd IEEE International Conference on Intelligent Transportation Systems*, 2020.
- [17] F. Blahoudek, T. Brázdil, P. Novotný, M. Ornik, P. Thangeda, U. Topcu. Qualitative controller synthesis for consumption Markov decision processes. *32nd International Conference on Computer-Aided Verification*, part II, pp. 421–447, 2020.
- [18] J.-B. Bouvier, M. Ornik. Resilient reachability for linear systems. *21st IFAC World Congress*, 2020.
- [19] P. Thangeda, M. Ornik. Safety-guaranteed, accelerated learning in MDPs with local side information. *2020 American Control Conference*, pp. 1099–1105, 2020.
- [20] Y. Savas, V. Gupta, L. J. Ratliff, M. Ornik, U. Topcu. Incentive design for temporal logic objectives. *58th IEEE Conference on Decision and Control*, pp. 2251–2258, 2019.
- [21] M. O. Karabag, M. Ornik, U. Topcu. Optimal deceptive and reference policies for supervisory control. *58th IEEE Conference on Decision and Control*, pp. 1323–1330, 2019.
- [22] Z. Xu, M. Ornik, A. A. Julius, U. Topcu. Information-guided temporal logic inference with prior knowledge. *2019 American Control Conference*, pp. 1891–1897, 2019.

PEER-REVIEWED  
CONFERENCE  
PUBLICATIONS

- [23] M. O. Karabag, M. Ornik, U. Topcu. Least inferable policies for Markov decision processes. *2019 American Control Conference*, pp. 1224–1231, 2019.
- [24] M. Ornik, S. Carr, A. Israel, U. Topcu. Myopic control of systems with unknown dynamics. *2019 American Control Conference*, pp. 1064–1071, 2019.
- [25] M. Ornik, J. Fu, N. T. Lauffer, W. K. Perera, M. Alshiekh, M. Ono, U. Topcu. Expedited learning in MDPs with side information. *57th IEEE Conference on Decision and Control*, pp. 1941–1948, 2018.
- [26] M. Ornik, M. S. Moura, A. Peplowski, M. E. Broucke. Adaptive cruise control design using reach control. *21st IEEE International Conference on Intelligent Transportation Systems*, pp. 111–116, 2018.
- [27] Y. Savas, M. Ornik, M. Cubuktepe, U. Topcu. Entropy maximization for constrained Markov decision processes. *56th Annual Allerton Conference on Communication, Control, and Computing*, pp. 911–918, 2018.
- [28] M. Ornik, U. Topcu. Deception in optimal control. *56th Annual Allerton Conference on Communication, Control, and Computing*, pp. 821–828, 2018.
- [29] M. Bucić, M. Ornik, U. Topcu. Graph-based controller synthesis for safety-constrained, resilient systems. *56th Annual Allerton Conference on Communication, Control, and Computing*, pp. 297–304, 2018.
- [30] P. Mercader, M. Ornik, P.-O. Gutman, I. Ioslovich. Optimal signal timing for multi-phase intersections. *15th IFAC Symposium on Control in Transportation Systems*, pp. 476–481, 2018.
- [31] M. Ornik, M. E. Broucke. A graph-theoretic approach to the reach control problem. *56th IEEE Conference on Decision and Control*, pp. 4952–4957, 2017.
- [32] M. Ornik, M. E. Broucke. A nerve-theoretic result on the problem of a topological obstruction in reach control. *56th IEEE Conference on Decision and Control*, pp. 3009–3114, 2017.
- [33] M. Ornik, M. Moarref, M. E. Broucke. An automated parallel parking strategy using reach control theory. *20th World Congress of the International Federation of Automatic Control*, pp. 9419–9424, 2017.
- [34] M. Ornik, A. C. Sniderman, M. E. Broucke, G. M. T. D’Eleuterio. Pattern identification in distributed systems. *55th IEEE Conference on Decision and Control*, pp. 6895–6900, 2016.
- [35] M. Ornik, M. E. Broucke. Characterizing equilibria in reach control under affine feedback. *10th IFAC Symposium on Nonlinear Control Systems*, pp. 1078–1083, 2016.
- [36] M. Ornik, M. E. Broucke. A topological obstruction to reach control by continuous state feedback. *54th IEEE Conference on Decision and Control*, pp. 2258–2263, 2015.
- [37] M. Ornik, M. E. Broucke. On a topological obstruction in the reach control problem. *2015 AMMCS-CAIMS Congress*, pp. 677–687, 2015.
- [38] H. El-Kebir, M. Ornik. In-flight air density estimation and prediction for hypersonic flight vehicles. *23rd AIAA International Space Planes and Hypersonic Systems and Technologies Conference*, 2020.
- [39] H. Chen, M. Ornik, K. Ho. Incentive design for commercial participation in space logistics infrastructure development and deployment. *70th International Astronautical Congress*, 2019.

	[40] D. Ge, M. Ornik, U. Topcu. Robust myopic control for systems with imperfect observations. <i>2018 AAS/AIAA Astrodynamics Specialist Conference</i> , pp. 3057–3072, 2018.	
STUDENT RESEARCH PAPERS	[41] M. Ornik, A. Šušnjara (supervised by Z. Drmač). Neki prilozi teoriji egzaktne rekonstrukcije poligona [Some Contributions to the Theory of Exact Polygon Reconstruction]. <i>University of Zagreb Rector's Award winning paper</i> , 2012.	
	[42] M. Berljafa, S. Muhvić, M. Ornik (supervised by S. Singer). Računanje Gaussovih integracijskih formula za sažimajuću bazu [Computation of Gaussian Quadrature Formulae for Compression Basis]. <i>University of Zagreb Rector's Award nominated paper</i> , 2011.	
FUNDED PROJECTS	<b>Seedling: Synthesis of Control Protocols for Integrated Mission Planning, Resource Management and Information Acquisition</b> <b>2020 – 2021</b> Funding source: Defense Advanced Research Projects Agency Role: co-Principal Investigator ( <i>45% of funding</i> ) Total award amount: \$293,258	
	<b>LDRD: Learning of Time-Varying Dynamics</b> <b>2019 – 2020</b> Funding source: Sandia National Laboratories Role: Principal Investigator ( <i>100% of funding</i> ) Total award amount: \$75,000	
	<b>Safety-Constrained and Efficient Learning for Resilient Autonomous Space Systems</b> <b>2019 – 2022</b> Funding source: NASA Role: Principal Investigator ( <i>60% of funding</i> ) Total award amount: \$500,000	
	<b>Enhancing Opportunities for Research and Training in Space Engineering</b> <b>2018 – 2021</b> Funding source: US Department of Education Role: Faculty Team member ( <i>funding shared among 8 department faculty members</i> ) Total award amount: \$1,194,000	
INSTRUCTION	<b>University of Illinois at Urbana-Champaign</b> , Urbana, IL, USA AE 353: Aerospace Control Systems <b>Fall 2019, Fall 2020</b> AE 504: Optimal Aerospace Systems <b>Spring 2019, Spring 2020</b> AE 597: Independent Study <b>Fall 2018, Summer 2020</b> AE 497: Independent Study <b>Fall 2019, Spring 2020</b>	
RECENT HONORS	Included on the <i>List of Teachers Ranked as Excellent by Their Students</i> <b>Spring 2020</b> Included on the <i>List of Teachers Ranked as Excellent by Their Students</i> <b>Spring 2019</b>	