# Daniel Zelazo | Curriculum Vitae

Faculty of Aerospace Engineering, Technion-Israel Institute of Technology
Technion City, Haifa, 32000 – Israel
+972 (0) 4 829 3196 • dzelazo@technion.ac.il
zelazo.net.technion.ac.il

## Education

**University of Washington** **Seattle, WA**
*Ph.D.* *2004-2009*
Aeronautics & Astronautics Engineering

**thesis**: *Graph-theoretic Methods for the Analysis and Synthesis of Networked Dynamic Systems*

**supervisors**: Prof. Mehran Mesbahi

**Massachusetts Institute of Technology** **Cambridge, MA**
*M.Eng.* *1999–2001*
Electrical Engineering & Computer Science

**thesis**: *Study of a MEMS Laser Range Finder: Integration, Performance and Design of a 2-Axis Mirror Control System*

**supervisors**: Prof. Jeffery Lang (MIT), Dr. Mark Mescher (Draper Laboratory)

**Massachusetts Institute of Technology** **Cambridge, MA**
*B.Sc.* *1995–1999*
Electrical Engineering & Computer Science

## Academic Appointments

**Technion-Israel Institute of Technology** **Haifa, Israel**
**Faculty of Aerospace Engineering**
*Assosciate Professor* *July 2018 - Present*

**Technion-Israel Institute of Technology** **Haifa, Israel**
**Faculty of Aerospace Engineering**
*Assistant Professor* *October 2012 - July 2018*

**University of Stuttgart** **Stuttgart, Germany**
**Institute for Systems Theory & Automatic Control**
*Research Associate & Lecturer* *March 2010 - September 2012*

**University of Washington** **Seattle, WA**
*Research Associate* *September 2009 - February 2010*

**University of Washington** **Seattle, WA**
*Research Assistant* *January 2005 - August 2009*

**Draper Laboratory** **Cambridge, MA**
**Autonomous Systems Group**
*Research Assistant, Draper Fellow* *September 1999 - February 2001*

## Teaching Experience

**Analysis and Control of Multi-Agent Systems** **Rafael Advanced Defense Systems Ltd.**
*Lecturer, July 2018*

**Robust Control Theory (088792)** **Technion**
*Lecturer, Spring 2016, 2018*

**Control Theory (084738)** **Technion**
*Lecturer, Winter 2015, 2016, 2017*

**Networked Dynamic Systems (086730)** **Technion**
*Lecturer, Spring 2013, 2014, 2015, 2017, 2018 Winter 2015*

**Undergraduate Seminar in Control Theory (085804)** **Technion**
*Lecturer, Spring 2015, 2017*

**Dynamic Systems* (084730/084737)** **Technion**
*Lecturer, Winter 2013/14, 2014/15*

**Analysis and Control of Multi-Agent Systems** **University of Stuttgart**
*Lecturer, Winter 2011, 2012, Summer 2013, 2014, 2015*

**Hauptseminar Technische Kybernetik** **University of Stuttgart**
*Lecturer, Winter 2010*

**Linear Systems Theory** **University of Washington**
*Teaching Assistant, Winter 2005*

**Design of Automatic Control Systems** **University of Washington**
*Teaching Assistant, Winter 2005*

**Control Systems Sensors and Actuators** **University of Washington**
*Teaching Assistant, Spring 2004*

*For the academic year 2014/15, I was responsible for designing and integrating 6 new laboratory exercises for the new Dynamic Systems (084737) and Control Theory (084738) courses. My tasks include designing the objectives and exercises for each lab and writing a lab manual.

## Work Experience

**Bellevue Montessori School** **Bellevue, WA**
*Physical Science Specialist - Teacher* *September 2005 – June 2009*
Physical science teacher for grades 3-5.

**Sagetech Corporation** **Hood River, OR**
*Lead Control Systems Engineer* *June 2005 – January 2006*
Developed control, guidance, and navigation algorithms for DARPA funded Peregrine UAV Killer project.

**Junshin Girls' School** **Tokyo, Japan**
*English Teacher* *September 2003 – April 2004*
English conversation teacher for middle school and high school.

**Texas Instruments Japan Ltd.** **Tsukuba, JP**
*Research Engineer* *March 2001 – July 2003*
Conceived and developed a TI proprietary technology on wavelet based perceptual compression of audio sample sets.

## Funded Research Grants

**NSF-BSF** **$117,355 - 3 years**
***PIs:*** *Daniel Zelazo, Xudong Chen (University of Colorado - Boulder),*
Muhamed Ali Belabbas (University of Illinois, Urbana-Champagne) *October 2018 – September 2021*
Foundations of Secure Multi-agent Networked Systems

**Israel Ministry of Energy** **375,000NIS - 1 year**
***PIs:*** *Daniel Zelazo, Beni Cukurel (Technion)* *October 2018 – September 2019*
Optimal Economic Dispatch of CHP Micro Gas Turbines

**Technion Autonomous Systems Program** **$34,500 - 1 year**
***PI:*** *Daniel Zelazo* *December 2017 – November 2018*
Coordination and Control of Multi-Agent Systems in Harsh Environments

**Israel Ministry of Defense** **100,000NIS - 1 year**
***PI:*** *Daniel Zelazo* *December 2017 – November 2018*
Coordination of UAV Teams with Communication Constraints: Coverage and Formation Control with Mobile Relays

**Grand Technion Energy Program** **$40,000 - 2 years**
***PIs:*** *Daniel Zelazo, Beni Cukurel (Technion)* *April 2015 – March 2017*
Optimal Operation of the Smart-Grid Equipped with a Distributed Network of Micro-Gas Turbines

**German-Israeli Foundation (GIF)** **€180,000 - 4years**
***PIs:*** *Daniel Zelazo, Frank Allgöwer (University of Stuttgart)* *January 2014 – December 2018*
A Duality Framework for the Analysis and Design of Networked Dynamical Systems

**Israel Science Foundation (ISF)** **800,000NIS - 5 years**
***PI:*** *Daniel Zelazo* *October 2013 – October 2018*
Analysis and Design of Robust Networked Dynamic Systems

## Student Advising and Mentoring

### Post-Docs

**Dr. Anoop Jain**: Technion *November 2017 - Present*

**Dr. Dwaipayan Mukherjee**: Technion *June 2015 - November 2017*

**Dr. Shiyu Zhao**: Technion *April 2014 - July 2015*

### PhD

**Miel Sharf**: Technion *February 2016 - Present*

**Noam Leiter**: Technion *October 2015 - Present*

### Master

**Mayank Sewlia**: Technion *June 2018 - Present*

**Yoav Palti**: Technion *October 2016 - Present*

**Douglas Goldenberg**: Technion *August 2018*

**Oshri Rozenheck**: Technion *June 2016*

**Yaniv Ben Shoushan**: Technion *December 2016*

### Undergraduate/Diploma

**Benjamin Briegel**: University of Stuttgart *2011*

**Jing Qi**: University of Stuttgart *2011*

### Visiting Students

**Hao Chen**: National University of Defense Technology (China) *November 2017 - December 2018*

**Daniel Frank**: University of Stuttgart (Germany) *October 2017 - March 2018*

**Minh Trinh Hoang**: Gwangju Institute of Science & Technology (Korea) *March 2016 - August 2016*

**Miguel Dias**: Instituto Superior Técnico (Portugal) *August 2016 - September 2016*

**Johannes Rist**: Technical University Munich (Germany) *June 2016 - August 2016*

### External Thesis Committees

**Daniel Frank**: University of Stuttgart (Germany), MSc *July 2018*

**David Dovrat**: Technion (Israel), MSc *January 2017*

**Geoff Stacey**: Australian National University (Australia), PhD *January 2017*

**Levi Itshak Bellaiche**: Technion (Israel), MSc *August 2015*

**Simone Schuler**: University of Stuttgart (Germany), PhD *March 2014*

**Orel Ron**: Tel Aviv University (Israel), MSc *March 2014*

### Outreach

**Liran Attar**: Israel Ministry of Education *January 2016 - Present*

Mentor high-school student on a year-long research project

## Professional Activities

### Memberships

- Member IEEE CSS Technical Committee on Networks and Communications (2015 - present)
- Member IEEE RAS Technical Committee on Multi-Robot Systems (2014 - present)
- Member IFAC Technical Committee 1.5: Networked Systems (2014 - present)
- IEEE Member

### Editorial Boards, Conferences, and Symposiums

**Program Chair**: The 27th Mediterranean Conference on Control and Automation 2019

**Publicity Chair**: The 27th Mediterranean Conference on Control and Automation 2019

**Associate Editor** : IEEE Control Systems Letters (L-CSS) Jan. 2017 - Dec. 2020

**Organizer-Workshop *Rigidity theory for multi-agent systems meets parallel robots: Towards the discovery of common models and methods***: IFAC World Congress 2017

**Associate Editor (contributed papers)**: 7th IFAC Workshop on Distributed Estimation and Control in Networked Systems (NeCSys) 2018, 56th Israel Annual Conference on Aerospace Sciences (IACAS) 2016, Symposium on Mathematical Theory of Networks and Systems (MTNS) 2014

**Organizer-Invited Session *Rigidity theory for problems in multi-robot coordination*** : IEEE Conference on Decision and Control (CDC) 2015

**Program Committee**: 1st International Symposium on Swarm Behavior and Bio-Inspired Robotics 2015, Symposium on Mathematical Theory of Networks and Systems (MTNS) 2016, International Symposium on Multi-robot and Multi-Agent Systems 2017

**Session Chair**: IEEE Conference on Decision and Control (CDC) 2011,2014,2017,2018
International Conference on Signal Processing 2002

### Reviewer

- IEEE Transactions on Automatic Control
- IEEE Transactions on Control of Network Systems
- IEEE Transactions on Robotics
- IEEE Transactions on Network Science and Engineering
- IEEE Transactions on Control Systems Technology
- Automatica
- Systems & Control Letters
- International Journal of Robust and Nonlinear Control
- Journal of Mathematical Analysis and Applications
- European Journal of Control
- Transactions on Mobile Computing
- Conference on Robot Communication and Coordination
- IEEE Conference on Decision and Control
- IEEE Multi-conference on Systems and Control
- ACM Transactions on Embedded Computing
- Communications in Nonlinear Science and Numerical Simulations
- International Conference on Robotics and Automation
- Linear Algebra and its Applications
- Autonomous Robots
- European Physics Journal Special Topics
- International Journal of Control
- IEEE Transactions on Aerospace and Electronic Systems
- Scientific Reports (Nature)
- Journal of Guidance, Control, and Navigation
- American Control Conference
- IFAC Word Congress
- European Control Conference
- Israeli Annual Conference on Aerospace Sciences

## Volunteer Work

**MIT Educational Counselor**: Interview prospective MIT students *2014 - present*

## Awards, Honors, and Prizes

**Outstanding Contribution in Reviewing**: J. Mathematical Analysis & Applications *2017*
**L. Kraus Research Fund**: Technion Research Authority ($3,600) *2017*
**Hanin Prize**: Outstanding Young Faculty in Aerospace ($3,000) *2017*
**Special Research Grant**: Technion Research Authority ($10,000) *2016*
**J. and J. Gringorten Aeronautical Research Fund**: Technion ($1,500) *2015*
**Finalist - Best Student Paper**: AIAA Infotech@Aerospace Conference *2009*
**Best Presentation in Session**: American Control Conference *2008*
**Andris Vagners Memorial Fellowship**: University of Washington *2006*
**Draper Laboratory Fellow**: Draper Laboratory *1999-2001*

## Languages

- **English**: Native
- **Hebrew**: Professional working proficiency

- **Japanese**: Limited working proficiency
- **German**: Limited working proficiency

## Publications, Patents, and Invited Talks

### Journals

[J1] Y. Liu, J. Montenbruck, D. Zelazo, M. Odelga, S. Rajappa, H. Bülthoff, F. Allgöwer, and A. Zell, "A distributed control approach to formation balancing and maneuvering of multiple multirotor uavs," *IEEE Transactions on Robotics*, vol. 34, no. 4, pp. 870–882, Aug. 2018.

[J2] M. Hoang, S. Zhao, Z. Sun, D. Zelazo, B. Anderson, and H. Ahn, "Bearing-based formation control of a group of agents with leader-first follower structure," *IEEE Transactions on Automatic Control (early access)*, May 2018.

[J3] M. Hoang, D. Zelazo, and H. Ahn, "Pointing consensus and bearing-based solutions to the fermat-weber location problem," *IEEE Transactions on Automatic Control (submitted)*, Mar. 2018.

[J4] M. Hoang, D. Muhkerjee, D. Zelazo, and H. Ahn, "Formations on directed cycles with bearing-only measurements," *International Journal of Robust and Nonlinear Control*, vol. 28, no. 3, pp. 1074–1096, Feb. 2018.

[J5] A. Jain, M. Sharf, and D. Zelazo, "Regularization and feedback passivation in cooperative control of passivity-short systems: A network optimization perspective," *IEEE Control Systems Letters*, vol. 2, no. 4, pp. 731–736, 2018.

[J6] D. Muhkerjee and D. Zelazo, "Robustness of consensus over weighted digraphs," *IEEE Transactions on Network Sciences and Engineering (accepted)*, 2018.

[J7] Q. Tran, M. Hoang, D. Zelazo, D. Muhkerjee, and H. Ahn, "Finite-time bearing-only formation control via distributed global orientation estimation," *IEEE Transactions on Control of Network Systems (accepted)*, 2018.

[J8] D. Muhkerjee and D. Zelazo, "Consensus of higher order agents: Robustness and heterogeneity," *IEEE Transactions on Control of Network Systems (submitted)*, Dec. 2017.

[J9] M. Sharf and D. Zelazo, "Analysis and synthesis of mimo multi-agent systems using network optimization," *IEEE Transactions on Automatic Control (submitted)*, Nov. 2017.

[J10] J. M. Montenbruck, D. Zelazo, and F. Allgöwer, "Fekete points, formation control, and the balancing problem," *IEEE Transactions on Automatic Control*, vol. 62, no. 10, pp. 5069–5081, Oct. 2017.

[J11] S. Zhao and D. Zelazo, "Translational and scaling formation maneuver control via a bearing-based approach," *IEEE Transactions on Control of Network Systems*, vol. 4, no. 3, pp. 429–438, Sep. 2017.

[J12] J. Rist, M. Dias, M. Palman, D. Zelazo, and B. Cukurel, "Economic dispatch of a single micro-gas turbine under chp operation," *Applied Energy*, vol. 200, pp. 1–18, May 2017.

[J13] S. Zhao and D. Zelazo, "Bearing rigidity theory and its applications for control and estimation of network systems: Life beyond distance rigidity," *IEEE Control Systems Magazine (accepted for publication)*, Mar. 2017.

[J14] M. Sharf and D. Zelazo, "A network optimization approach to cooperative control synthesis," *IEEE Control Systems Letters*, vol. 1, no. 1, pp. 86–91, 2017.

[J15] D. Zelazo and M. Bürger, "On the robustness of uncertain consensus networks," *IEEE Transactions on Control of Network Systems*, vol. 4, no. 2, pp. 170–178, 2017.

[J16] S. Zhao and D. Zelazo, "Bearing-only network localization: localizability, sensitivity, and distributed protocols," *Automatica*, vol. 69, pp. 334–341, 2016.

[J17] ——, "Bearing rigidity and almost global bearing-only formation stabilization," *IEEE Transactions on Automatic Control*, vol. 61, no. 6, pp. 1255–1268, 2016.

[J18] D. Zelazo, A. Franchi, H. H. Bülthoff, and P. Robuffo Giordano, "Decentralized rigidity maintenance control with range-only measurements for multi-robot systems," *International Journal of Robotics Research*, vol. 34, no. 1, pp. 105–128, Jan. 2015.

[J19] M. Bürger, D. Zelazo, and F. Allgöwer, "Duality and network theory in passivity-based cooperative control," *Automatica*, vol. 50, no. 8, pp. 2051–2061, Aug. 2014.

[J20] ——, "Hierarchical clustering of dynamical networks using a saddle-point analysis," *IEEE Transactions on Automatic Control*, vol. 58, no. 1, pp. 113–124, Jan. 2013.

[J21] D. Zelazo, M. Bürger, and F. Allgöwer, "A finite-time dual method for negotiation between dynamical systems," *SIAM Journal on Control and Optimization*, vol. 51, no. 1, pp. 172–194, Jan. 2013.

[J22] D. Zelazo, S. Schuler, and F. Allgöwer, "Cycles and performance in consensus networks," *Systems & Control Letters*, vol. 62, no. 1, pp. 85–96, Jan. 2013.

[J23] D. Zelazo, R. Dai, and M. Mesbahi, "An energy management system for off-grid power systems," *Energy Systems*, vol. 3, no. 2, pp. 153–179, Jan. 2012.

[J24] D. Zelazo and M. Mesbahi, "Graph-theoretic analysis and synthesis of relative sensing networks," *IEEE Transactions on Automatic Control*, vol. 56, no. 5, pp. 971–982, May 2011.

[J25] ——, "Edge agreement: graph-theoretic performance bounds and passivity analysis," *IEEE Transactions on Automatic Control*, vol. 56, no. 3, pp. 544–555, Mar. 2011.

### Peer Reviewed Conferences

[C1] M. Sharf and D. Zelazo, "Network identification: a passivity and network optimization approach," in *IEEE Conference on Decision and Control (accepted)*, Miami, Florida, Dec. 2018.

[C2] D. Zelazo, M. Mesbahi, and M.-A. Belabbas, "Graph theory in systems and controls," in *IEEE Conference on Decision and Control (accepted)*, Miami, Florida, Dec. 2018.

[C3] D. Frank, D. Zelazo, and F. Allgöwer, "Bearing-only formation control with limited visual sensing: two agent case," in *7th IFAC Workshop on Distributed Estimation and Control in Networked System (accepted)*, Groningen, The Netherlands, Sep. 2018.

[C4] M. H. Trinh, D. Zelazo, Q. V. Tran, and H.-S. Ahn, "Pointing consensus for rooted out-branching graphs," in *American Control Conference*, Milwaukee, WI, Jun. 2018, pp. 3648–3653.

[C5] N. Leiter and D. Zelazo, "The aggregating consensus protocol: a case study of behavioral multi-agent systems," in *58th Israel Annual Conference on Aerospace Sciences*, Haifa, Israel, Feb. 2018.

[C6] D. Mukherjee and D. Zelazo, "Robust consensus of higher order agents over cycle graphs," in *58th Israel Annual Conference on Aerospace Sciences*, Haifa, Israel, Feb. 2018.

[C7] M. H. Trinh, D. Mukherjee, D. Zelazo, and H.-S. Ahn, "Finite-time bearing-only formation control," in *IEEE Conference on Decision and Control*, Melbourne, Australia, Dec. 2017, pp. 1578–1583.

[C8] S. Zhao, Z. Sun, D. Zelazo, M. H. Trinh, and H.-S. Ahn, "Laman graphs are generically bearing rigid in arbitrary dimensions," in *IEEE Conference on Decision and Control*, Melbourne, Australia, Dec. 2017, pp. 3356–3361.

[C9] N. Leiter and D. Zelazo, "Graph-based model reduction of the controlled consensus protocol," in *IFAC World Congress*, Toulouse, France, Jul. 2017, pp. 9866–9871.

[C10] M. H. Trinh, D. Mukherjee, D. Zelazo, and H.-S. Ahn, "Planar bearing-only cyclic pursuit for target capture," in *IFAC World Congress*, Toulouse, France, Jul. 2017, pp. 10 553–10 558.

[C11] Y. Ben Shoushan and D. Zelazo, "Negotiation between dynamical systems with connectivity constraints," in *57th Israel Annual Conference on Aerospace Sciences*, Tel-Aviv, Israel, Feb. 2017.

[C12] D. Mukherjee, M. H. Trinh, D. Zelazo, and H.-S. Ahn, "Bearing-only cyclic pursuit in 2-d for capture of moving target," in *57th Israel Annual Conference on Aerospace Sciences*, Tel-Aviv, Israel, Feb. 2017.

[C13] J. Rist, M. Dias, D. Zelazo, B. Cukurel, and M. Palman, "Optimal combined heat and power integration of a micro-gas turbine unit in distributed energy generation," in *57th Israel Annual Conference on Aerospace Sciences*, Tel-Aviv, Israel, Feb. 2017.

[C14] D. Mukherjee and D. Zelazo, "Consensus over weighted digraphs: a robustness perspective," in *55th IEEE Conference on Decision and Control*, Las Vegas, Nevada, Dec. 2016, pp. 3438–3443.

[C15] ——, "Robustness of heterogeneous cyclic pursuit," in *56th Israel Annual Conference on Aerospace Sciences*, Haifa, Israel, Mar. 2016.

[C16] F. Schiano, A. Franchi, D. Zelazo, and P. Giordano, "A rigidity-based decentralized bearing formation controller for groups of quadrotor uavs," in *IEEE/RSJ International Conference on Intelligent Robots and Systems*, Daejeon, Korea, 2016, pp. 5099–5106.

[C17] M. M. Montenbruck, D. Zelazo, and F. Allgöwer, "Retraction balancing and formation control," in *54th IEEE Conference on Decision and Control*, Osaka, Japan, Dec. 2015, pp. 3645–3650.

[C18] D. Zelazo, P. Giordano, and A. Franchi, "Bearing-only formation control using an $se(2)$ rigidity theory," in *54th IEEE Conference on Decision and Control*, Osaka, Japan, Dec. 2015, pp. 6121–6126.

[C19] S. Zhao and D. Zelazo, "Bearing-based formation stabilization with directed interaction topologies," in *54th IEEE Conference on Decision and Control*, Osaka, Japan, Dec. 2015, pp. 6115–6120.

[C20] ——, "Bearing-based formation maneuvering," in *IEEE International Symposium on Intelligent Control*, Sydney, Australia, Sep. 2015, pp. 658–663.

[C21] O. Rozenheck, S. Zhao, and D. Zelazo, "A proportional-integral controller for distance-based formation tracking," in *European Control Conference*, Linz, Austria, Jul. 2015, pp. 1693–1698.

[C22] S. Zhao and D. Zelazo, "Bearing-based distributed control and estimation of multi-agent systems," in *European Control Conference*, Linz, Austria, Jul. 2015, pp. 2207–2212.

[C23] O. Rozenheck, S. Zhao, and D. Zelazo, "Formation velocity tracking with proportional control," in *55th Israel Annual Conference on Aerospace Sciences*, Haifa, Israel, Feb. 2015.

[C24] S. Zhao and D. Zelazo, "Bearing-constrained formation control using bearing measurements," in *55th Israel Annual Conference on Aerospace Sciences*, Haifa, Israel, Feb. 2015.

[C25] D. Zelazo and M. Bürger, "On the definiteness of the weighted laplacian and its connection to effective resistance," in *53rd IEEE Conference on Decision and Control*, Los Angeles, CA, Dec. 2014, pp. 2895–2900.

[C26] D. Zelazo, A. Franchi, and P. R. Giordano, "Rigidity theory in se(2) for unscaled relative position estimation using only bearing measurements," in *European Control Conference*, Strasbourg, France, Jun. 2014, pp. 2703–2708.

[C27] M. Bürger, D. Zelazo, and F. Allgöwer, "On the steady-state inverse-optimality of passivity-based cooperative control," in *4th IFAC Workshop on Distributed Estimation and Control in Networked System*, V. Daniel, Ed., Koblenz, Germany, Sep. 2013, pp. 138–143.

[C28] S. Schuler, D. Zelazo, and F. Allgöwer, "Robust design of sparse relative sensing networks," in *European Control Conference*, Zürich, Switzerland, 2013, pp. 1860–1865.

[C29] S. Schuler, D. Zelazo, and F. Allgöwer, "Design of sparse relative sensing networks," in *51st IEEE Conference on Decision and Control*, Maui, HI, Dec. 2012, pp. 2749–2754.

[C30] D. Zelazo and F. Allgöwer, "Eulerian consensus networks," in *51st IEEE Conference on Decision and Control*, Maui, HI, Dec. 2012, pp. 4715–4720.

[C31] M. Bürger, D. Zelazo, and F. Allgöwer, "Combinatorial insights and robustness analysis for clustering in dynamic networks," in *American Control Conference*, Montreal, Canada, 2012, pp. 454–459.

[C32] D. Zelazo and F. Allgöwer, "Growing optimally rigid formations," in *American Control Conference*, Montreal, Canada, 2012, pp. 3901–3906.

[C33] D. Zelazo, A. Franchi, F. Allgöwer, H. H. Bülthoff, and P. Robuffo Giordano, "Rigidity maintenance control for multi-robot systems," in *Proceedings of Robotics: Science and Systems*, Sydney, Australia, 2012, pp. 473–480.

[C34] D. Zelazo, S. Schuler, and F. Allgöwer, "Cycles and sparse design of consensus networks," in *51st IEEE Conference on Decision and Control*, Maui, HI, 2012, pp. 3803–3813.

[C35] B. Briegel, D. Zelazo, M. Bürger, and F. Allgöwer, "On the zeros of consensus networks," in *50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, Dec. 2011, pp. 1890–1895.

[C36] M. Bürger, D. Zelazo, and F. Allgöwer, "Network clustering: a dynamical systems and saddle-point perspective," in *50th IEEE Conference on Decision and Control and European Control Conference*, Orlando, FL, Dec. 2011, pp. 7825–7830.

[C37] D. Zelazo, M. Bürger, and F. Allgöwer, "A distributed real-time algorithm for preference-based agreement," in *Proc. 18th IFAC World Congress*, B. Sergio, Ed., Milan, Italy, Aug. 2011, pp. 8933–8938.

[C38] D. Zelazo and M. Mesbahi, "$\mathcal{H}_\infty$ performance and robust topology design of relative sensing networks," in *American Control Conference*, Baltimore, MD, 2010, pp. 4474–4479.

[C39] ——, "$\mathcal{H}_2$ performance of agreement protocol with noise: an edge based approach," in *48th IEEE Conference on Decision and Control and 28th Chinese Control Conference*, Shanghai, China, Dec. 2009, pp. 4747–4752.

[C40] ——, "$\mathcal{H}_2$ performance of relative sensing networks: analysis and synthesis," in *AIAA Infotech@Aerospace Conference and AIAA Unmanned ...Unlimited Conference*, vol. 21, Seattle, WA, Apr. 2009, pp. 1–14.

[C41] ——, "$\mathcal{H}_2$ analysis and synthesis of networked dynamic systems," in *2009 American Control Conference*, St. Louis, MO, 2009, pp. 2966–2971.

[C42] D. Zelazo, A. Rahmani, J. Sandhu, and M. Mesbahi, "Decentralized formation control via the edge laplacian," in *American Control Conference*, Seattle, WA, Jun. 2008, pp. 783–788.

[C43] D. Zelazo and M. Mesbahi, "On the observability properties of homogeneous and heterogeneous networked dynamic systems," in *47th IEEE Conference on Decision and Control*, 2008, pp. 2997–3002.

[C44] D. Zelazo, A. Rahmani, and M. Mesbahi, "Agreement via the edge laplacian," in *46th IEEE Conference on Decision and Control*, New Orleans, LA, Dec. 2007, pp. 2309–2314.

[C45] D. Zelazo, "Boundary filter design for biorthogonal filter banks," in *6th International Conference on Signal Processing, 2002.*, Beijing, China, 2002, pp. 45–48.

## Book Chapters

[B1] D. Zelazo, M. Bürger, and F. Allgöwer, "Dynamic negotiation under switching communication," in *Mathematical System Theory – Festschrift in Honor of Uwe Helmke on the Occasion of his Sixtieth Birthday*, K. Hüper and J. Trumpf, Eds., CreateSpace, 2013, pp. 479–500.

[B2] D. Zelazo and M. Mesbahi, "Graph-theoretic methods for networked dynamic systems: heterogeneity and h2 performance," in *Efficient Modeling and Control of Large-Scale Systems*, J. Mohammadpour and K. M. Grigoriadis, Eds., Boston, MA: Springer US, 2010, pp. 219–249.

## Patents

[P1] S.-W. J. Fu, K. J. Karimi, M. Mesbahi, and D. Zelazo, "Power management control system," Patent US20130297089, Nov. 2013.

[P2] D. Zelazo and S. D. Trautmann, "Sharing wavelet domain components among encoded signals," Patent US 7890335, Feb. 15, 2011.

[P3] A. Sakurai, S. Trautmann, and D. Zelazo, "Time-scale modification of audio based on power-complementary iir filter decomposition," Patent 20 070 081 663, Apr. 2007.

[P4] S. Trautmann, A. Sakurai, and D. Zelazo, "Time-scale modification of audio using bark bands," Patent 20 070 083 377, Apr. 2007.

[P5] D. Zelazo, "Designing boundary filters for a biorthogonal filter bank," Patent US 7062430, Jun. 13, 2006.

[P6] D. Zelazo and S. D. Trautman, "Efficient reconstruction," Patent US 7039665, May 2, 2006.

[P7] A. Sakurai, S. Trautmann, and D. Zelazo, "Time-scale modification of music signals based on polyphase filterbanks and constrained time-domain processing," Patent US 6982377, Jan. 3, 2006.

[P8] S. Trautmann, A. Sakurai, and D. Zelazo, "Time-scale modification of audio using separated frequency bands," Patent 20 050 137 730, Jun. 2005.

### Letters and Technical Reports

[L1] M. Sharf and D. Zelazo, *On certain properties of convex functions*, Mar. 2017. arXiv: 1703.00867.

[L2] A. Holland and D. Zelazo, *Sensitivity analysis in control versus biology*, Letter to the Editor of PLoS Biology regarding the 2009 PLoS Biol 7(1) e10000015 and e1000021 articles, 2011.

### Poster Presentations

[Po1] J. Rist, M. Dias, D. Zelazo, B. Cukurel, and M. Palman, *Economic dispatch of a single micro-gas turbine under chp operation*, Future Electric Power Systems and the Energy Transition, Champéry, Switzerland, Feb. 2017.

[Po2] M. Bürger, D. Zelazo, and F. Allgöwer, *Hierarchical clustering of dynamical networks using a saddle-point analysis*, Control Theory: Mathematical Perspectives on Complex Networked Systems, Oberwolfach, Germany, Feb. 2012.

[Po3] ——, *Coordination-free optimization and dynamic negotiation in peer-to-peer systems*, Algorithms and Dynamics Over Networks, Torino, Italy, Feb. 2012.

[Po4] D. Zelazo, S. Schuler, and F. Allgöwer, *Performance and design of cycles in consensus networks*, Control Theory: Mathematical Perspectives on Complex Networked Systems, Oberwolfach, Germany, Feb. 2012.

[Po5] M. Bürger, D. Zelazo, and F. Allgöwer, *Hierarchical clustering of dynamical networks using a saddle-point analysis*, IEEE CSS/UCSB CCDC Workshop on Vistas in Control, Santa Barbara, CA, Nov. 2011.

[Po6] ——, *Hierarchical clustering of dynamical networks using a saddle-point analysis*, 2011 Santa Barbara Control Workshop: Decision, Dynamics and Control in Multi-Agent Systems, Santa Barbara, CA, Jun. 2011.

[Po7] ——, *A finite-time dual method for negotiation between dynamical systems*, International Conference on Simulation Technology (SimTech2011), Stuttgart, Germany, Jun. 2011.

### Invited Conference and Workshop Lectures

[Tlk1] D. Zelazo, *Formations over directed graphs and local coordinate frames*, 2017 Asian Control Conference Workshop: Advances in distributed control and formation control systems, Invited Talk, Gold Coast, Australia, Dec. 2017.

[Tlk2] ——, *Sensor modalities in multi-robot coordination: Constraints and solutions*, SWARM 2017: The 2nd International Symposium on Swarm Behavior and Bio-Inspired Robotics, Keynote Talk, Kyoto, Japan, Nov. 2017.

[Tlk3] ——, *Fekete points, formation control, and the balancing problem*, Symposium on Control theory and Power Engineering, IEEE ICSEE, Invited Talk, Eilat, Israel, Nov. 2016.

[Tlk4] ——, *Rigidity extensions for bearing-based formation control*, Taxonomies of Interconnected Systems: Partial and Imperfect Information in Multi-Agent Networks, CDC Workshop, Invited Talk, Osaka, Japan, Dec. 2015.

[Tlk5] ——, *Bearing-based formation control problems*, Taxonomies of Interconnected Systems: Partial and Imperfect Information in Multi-Agent Networks, CDC Workshop, Invited Talk, Osaka, Japan, Dec. 2015.

[Tlk6] ——, *Rigidity theory for multi-robot coordination*, IAAC workshop on Motion Control Methods in Robotics, Invited Talk, Herzeliya, Israel, Nov. 2015.

[Tlk7] ——, *Uncertain consensus networks: Robustness and its connection to effective resistance*, Control Theory: A Mathematical Perspective on Cyber-Physical Systems, Mathematisches Forschungsinstitut Oberwolfach Workshops, Invited Talk, Oberwolfach, Germany, Feb. 2015.

[Tlk8] ——, *Uncertain consensus networks: Robustness and its connection to effective resistance*, 2nd Swedish-Israeli Control Conference, Invited Talk, Haifa, Israel, Nov. 2014.

[Tlk9] ——, *Rigidity theory for multi-robot coordination: Architectural needs and implementation challenges*, Taxonomies of Interconnected Systems: Topology in Distributed Robotics, IROS Workshop, Invited Talk, Chicago, IL, Sep. 2014.

### Invited Seminar Talks

[ST1] D. Zelazo, *A network optimization approach to the analysis and synthesis of cooperative control systems*, Bar-Ilan University, Ramat Gan, Israel, May 2018.

[ST2] ——, *Architectures of multi-agent systems: dynamic properties and information exchange networks*, University of Colorado - Boulder, Boulder, Colorado, Apr. 2018.

[ST3] ——, *Fekete points, formation control, and the balancing problem*, Technion - Israel Institute of Technology, Control & Systems Theory Seminar, Haifa, Israel, Jun. 2017.

[ST4] ——, *Fekete points, formation control, and the balancing problem*, IRISA - CNRS, Rennes, France, Feb. 2017.

[ST5] ——, *Fekete points, formation control, and the balancing problem*, LAAS - CNRS, Toulouse, France, Feb. 2017.

[ST6] ——, *Cyclically-monotone relations and their use in passivity-based cooperative control*, University of Groningen, Groningen, The Netherlands, Feb. 2017.

[ST7] ——, *Distributed negotiation methods for multi-agent dynamical systems*, University of Tel-Aviv, Tel-Aviv, Israel, Dec. 2014.

[ST8] ——, *Uncertain consensus networks: Robustness and its connection to effective resistance*, University of Washington, Seattle, WA, Dec. 2014.

[ST9] ——, *Coordination and control of multi-robot systems*, EUROAVIA: Fly In - Technion, Haifa, Israel, Nov. 2014.

[ST10] ——, *Robustness of uncertain consensus networks*, University of Illinois at Urbana-Champaign, Urbana-Champaign, IL, Sep. 2014.

[ST11] ——, *Control and estimation of multi-agent systems with bearing-only sensing: Rigidity theory for se(2)*, Colloquium Technische Kybernetik Seminar Series, University of Stuttgart, Stuttgart, Germany, Jul. 2014.

[ST12] ——, *Distributed negotiation methods for multi-agent dynamical systems*, University of Freiburg, Freiburg, Germany, Jul. 2014.

[ST13] ——, *Duality and network theory in passivity-based cooperative control*, University of Osaka, Osaka, Japan, Sep. 2013.

[ST14] ——, *Rigidity maintenance for multi-robot systems*, University of Tokyo, Tokyo, Japan, Sep. 2013.

[ST15] ——, *Distributed negotiation methods for multi-agent dynamical systems*, Jilin University, Changchun, China, Sep. 2013.

[ST16] ——, *Performance and design of cycles in consensus networks*, North China Electric Power University, Beijing, China, Sep. 2013.

[ST17] ——, *Rigidity theory for multi-agent systems*, Max Planck Institute, Tübingen, Germany, Aug. 2013.

[ST18] ——, *Distributed negotiation methods for multi-agent dynamical systems*, University of Washington, Robotics, Controls, and Mechatronics Seminar, Seattle, WA, Dec. 2012.

[ST19] ——, *Formation rigidity: Dynamic maintenance and optimality*, Australian National University, Canberra, Australia, Jul. 2012.

[ST20] ——, *Multi-agent systems: Perspectives on theory and applications*, Technion - Israel Institute of Technology, Haifa, Israel, Mar. 2012.

[ST21] ——, *Networked dynamic systems: Theory and application for aerospace systems*, Technion - Israel Institute of Technology, Haifa, Israel, Mar. 2012.

[ST22] ——, *Optimization as a tool for analysis: From dynamic negotiations to cluster synchronization*, Tokyo Institute of Technology, Tokyo, Japan, Jan. 2012.

[ST23] ——, *An introduction to multi-agent systems*, University of Osaka, Osaka, Japan, Jan. 2012.

[ST24] ——, *Optimization as a tool for analysis: From dynamic negotiations to cluster synchronization*, University of Miami, Miami, FL, Dec. 2011.

[ST25] ——, *Edge-agreement: Graph-theoretic performance bounds and passivity analysis*, TÜ München, München, Germany, Aug. 2010.

[ST26] ——, *Graph-theoretic methods for the analysis and synthesis of networked dynamic systems*, University of Stuttgart, Kolloquium Technische Kybernetic, Stuttgart, Germany, Oct. 2009.

[ST27] ——, *Networked dynamic systems*, Technion - Israel Institute of Technology, Control & Systems Theory Seminar, Haifa, Israel, Mar. 2009.