Babak Heydari

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Research Summary

My research integrates **systems engineering**, **network science**, **artificial intelligence**, and **management and strategy** to study the modeling, design, and governance of *complex sociotechnical systems*. A central theme of this work is **how to align centralized design and governance interventions with decentralized adaptation, strategic behavior, and emergent collective dynamics**. Current research areas include human–AI and multi-agent systems, adaptive information and network interventions, strategic behavior of AI agents, organizational innovation, and the resilience and governance of digital platforms and ecosystems.

EDUCATION

Ph.D. Dept. of Electrical Engineering and Computer Science 2002-2008
University of California, Berkeley May 2008

- Ph.D. Minor, Economics and Management Science
- Graduate Certificate, Management of Technology, Haas Business School (May 2007)

M.S. Dept. of Electrical Engineering and Computer Science 2002-2005
University of California, Berkeley May 2005

B.S. in Electrical Engineering and Chemistry 1998-2002
Sharif University of Technology June 2002

ACADEMIC APPOINTMENTS

Professor and Associate Chair 2026-Present
Engineering and Network Science Northeastern University Boston, MA

Professor, *Department of Mechanical and Industrial Engineering*;
Core Faculty, *Network Science Institute and Institute for Experiential AI*;
Affiliated Faculty, *School of Public Policy and Urban Affairs*;

Associate Professor with Tenure 2018-2026
Department of Mechanical and Industrial Engineering Dept., Northeastern University Boston, MA

Assistant Professor (Received Tenure in April 2018) 2011-2018
School of Systems and Enterprises, Stevens Institute of Technology Hoboken, NJ

ACADEMIC LEADERSHIP EXPERIENCE

Chair of Scientific Advisory Committee (SAC) 2020-2025
Singapore-ETH Future Resilient Systems (FRS)

President and Chair of the Executive Committee 2021-2023
Council of Engineering Systems Scholars and Universities (CESUN)

Associate Chair of Graduate Studies 2025-Present
Department of Mechanical and Industrial Engineering, Northeastern University

INDUSTRY EXPERIENCE

Technical Lead 2006-2009
TagArray Co. Los Altos, CA

- VC-funded RFID Network startup, funding: Intel Capital and NSF SBIR, acquired by Maxim.

Co-Founder and Vice President 2008-2009
Spantas Co. Sunnyvale, CA

- Silicon Valley startup with a founding team that includes a former CEO (Faraj Alaee) who has successfully led two companies to IPO
- Gbps WLAN company with my Ph.D. work as the core technology

PUBLICATIONS

Books and Book Chapters

B1. **Babak Heydari**, Ozlem Ergun, Rashmi Dyal-Chand, Yakov Bart, "Re-Engineering Sharing", Cambridge University Press, 2023

B2. **Babak Heydari**, "A Sociotechnical Ecosystem Perspective of Sharing Economy Platforms." in Re-Engineering the Sharing Economy: Design, Policy, and Regulation, Cambridge University Press, 2023

B3. Daniel O'Brien, **Babak Heydari**, Laiyang Ke, "How the Sharing Economy is Reshaping the Dynamics of Neighborhoods", in Re-Engineering the Sharing Economy: Design, Policy, and Regulation, Cambridge University Press, 2023

B4. **Babak Heydari**, Ozlem Ergun, Rashmi Dyal-Chand, Yakov Bart, "Future Themes in the Sharing Economy.", in Re-Engineering the Sharing Economy: Design, Policy, and Regulation, Cambridge University Press, 2023

B5. **Babak Heydari**, Paulien Herder, "Social and Technical Complexity", in Handbook of Engineering System Design, Nature-Springer, 2022

B6. Gharavi, Sam, and **Babak Heydari**, "Ultra High-Speed CMOS Circuits: Beyond 100 GHz", *Springer Science and Business Media*, 2011.

B7. Niknejad, Ali M., Sohrab Emami, **Babak Heydari**, Ehsan Adabi, Bagher Afshar, and Brian A. Floyd. "Amplifiers and Mixers", *mm-Wave Silicon Technology*, 2008.

B8. Niknejad, Ali M., Sohrab Emami, Chinh Doan, **Babak Heydari**, Mounir Bohsali, "Design and modeling of active and passive devices", *mm-Wave Silicon Technology*, 2008.

Preprints and Under Review Journal Papers

J1. Hongan Zhu, **Babak Heydari**, "Cognitive Heuristics Are Necessary for Human-Like Multi-Agent Dynamics in Large Language Models," Revise and Resubmit *Nature Computational Science*. Preprint available at SSRN.

J2. **Babak Heydari**, Negin Maddah*, "The Shifting Dynamics of Online Knowledge Platforms and the Implications for Generative AI Sustainability," Revise and Resubmit *Technological Forecasting and Social Change*, Preprint available at SSRN 5117087.

J3. Qingtao Cao*, Qiliang Chen*, **Babak Heydari**, "Competing for User Attention in Multi-Sided Platforms: Explainable Reinforcement Learning for Strategic Recommendations," Revise and Resubmit at IEEE Transactions on Engineering Management, Preprint available at SSRN 5284387.

J4. **Babak Heyadri**, "The Direction of Value Flow: A Theory of Platform Fragility under AI Substitution", Submitted to Management Science, Preprint available at SSRN 6881961.

J5. Sepehr Ilami*, Margherita Comola, Silvia Prina, **Babak Heydari**, "Networked Risk Perception and Behavioral Bubbles: The Case of a Pandemic," Preprint available at https://arxiv.org/abs/2606.22599

J6. Soumyakant Padhee*, **Babak Heydari**, "The Echo Chambers of Complexity: How Task Complexity Influences Team Groupthink and Individual Exploration," Preparing for submission to Proceedings of the National Academy of Sciences. Preprint available at SSRN 4892421.

J7. Hazhir Rahmandad, **Babak Heydari**, Batman Joseph Feldman, "How Valuable is a Vaccine? Integrating health and economic impacts of COVID-19 vaccine," Reject and Resubmit, Production & Operations Management (POMS) [Plenary Talk at the System Dynamics Conference, 2023].

J8. Babak Heydari, Pedram Heydari, "When Do Coalitions Survive Over Time? Stationary Stability in Dynamic Cooperative Games," Preprint available at SSRN 3909107.

J9. Soumyakant Padhee*, **Babak Heydari**, "Evolution of Innovation in Technology Life Cycle: Isolating Innovation Legacy from Quality," Preparing for submission to *Research Policy*. Preprint available at SSRN 5283897.

J10. Sepehr Ilami*, Qingtao Cao*, **Babak Heydari**, "When Mobility Network Structure Helps (and When It Doesn't) in Epidemic Forecasting" , Under Review at PNAS Nexus.

Accepted and Published Papers

J11. Qiliang Chen*, Sepehr Ilami*, Nunzio Lore*, **Babak Heydari**, "Adaptive Information Modulation: Designing Governance Mechanisms for Multi-Agent AI Systems" *ASME Journal of Mechanical Design*, (2026) https://doi.org/10.1115/1.4070755

J12. Nunzio Lore*, Sepehr Ilami*, **Babak Heydari**, "From Scale to Skill: Transferring Strategic Thinking from Large to Small Language Models" In Press, textitASME Open J. Engineering, Preprint available at arXiv:2408.05241.

J13. Qiliang Chen *, **Babak Heydari**, "Architecting Adaptive Networks: Reinforcement Learning with Generative Policies for Multi-Agent Governance" *ASME Journal of Mechanical Design* 148 (2026) https://doi.org/10.1115/1.4068796

J14. Qiliang Chen *, **Babak Heydari** "Adaptive Network Intervention for Complex Systems: A Hierarchical Graph Reinforcement Learning Approach." *ASME Journal of Computing and Information Science* 26 (2025) https://doi.org/10.1115/1.4068483.

J15. **Babak Heydari**, Shinjinee Chattopadhyay, Soumyakant Padhee*, Samina Karim. "Core or Periphery: Examining where to allocate heterogeneous inventors and the impact on firms' innovation", *Strategic Management Journal*, (2025)

- SMJ is #1 strategy journal, included in UTD24 and FT50 lists of top Management Science Journals. [IF = 7.2, acceptance rate ≈ 7%]

J16. Negin Maddah*, **Babak Heydari**, "Platform-Driven Collaboration Patterns: Structural Evolution Over Time and Scale", *in press* at *IEEE Transactions on Computational Social Systems*, (11)6, (2024). [IF = 4.9]

J17. Lorè, Nunzio*, and **Babak Heydari**. "Strategic Behavior of Large Language Models: Game Structure vs. Contextual Framing." *Scientific Reports*, (2024).

J18. Negin Maddah*, **Babak Heydari**, "Decentralized Recovery of Resilient Network Systems", *Reliability Engineering and System Safety*, Elsevier, (2024) [IF = 11.6, acceptance rate ≈ 17%].

J19. Qiliang Chen*, **Babak Heydari**, "The SoS conductor: Orchestrating resources with iterative agent-based reinforcement learning." *Systems Engineering*, Wiley, (2024).

J20. Soumyakant Padhee*, Nunzio Lore*, **Babak Heydari**, "Design teams and industry life cycles: The interplay of innovation and complexity", *Systems Engineering*, Wiley (2023).

J21. Qingtao Cao*, **Babak Heydari**, "Micro-level Social Contact Patterns and the Success of COVID-19 Policies", *Nature Computational Science*, 2.9 (2022): 595-604. [IF = 18.6, acceptance rate < 10%]

J22. Qiliang Chen*, **Babak Heydari**, "Dynamic Resource Allocation in System of Systems using Explainable Deep Reinforcement Learning", *ASME Journal of Mechanical Design*, 144.9 (2022): 091711

J23. Alina Ristea, Riley Tucker, Shunan You, Mehrnaz Amiri, Nick Beauchamp, Edgar Castro, **Qiliang Chen***, Alexandra Ciomek, Bidisha Das, Justin de Benedictis-Kessner, Sage Gibbons, Forrest Hangen, Barrett Montgomery, Petros Papadopoulos, Cordula Robinson, Saina Sheini, Michael Shields, Xin Shu, Michael Wood, **Babak Heydari**, Dan O'Brien, "A Multisource Database Tracking the Experience of COVID in Boston, Massachusetts, USA", *Nature Scientific Data*, 2022 [IF = 8.7]

J24. Laiyang Ke, Dan O'Brien, **Babak Heydari**, "Airbnb and Neighborhood Crime: The Incursion of Tourists or the Erosion of Local Social Dynamics", *PLOS ONE*, 2021. [**Media Coverage**: NPR, WIRED, EuroNews, Boston Globe]

J25. Rahi Abouk, **Babak Heydari**, "The Immediate Effect of COVID-19 Policies on Social Distancing Behavior in the United States", *Public Health Reports*, 2021. [**Press Coverage**: Featured by Surgeon General of the US, New York Times, National Review; Stat News; Boston.com]

J26. Qiliang Chen*, **Babak Heydari**, Mohsen Moghaddam, "Leveraging Task Modularity in Reinforcement Learning for Adaptable Industry 4.0 Automation", *ASME Journal of Mechanical Design*, 2021.

J27. **Babak Heydari**, Pedram Heydari, Mohsen Mosleh*, "Not all bridges connect: integration in multi-community networks", *The Journal of Mathematical Sociology*, (2020) Dec 12:1-22. [acceptance rate ≈ 17%]

J28. **Babak Heydari**, Zoe Szajnfarber, Jitesh Panchal, Michel-Alexandre Cardin, Katja Holtta-Otto, Gül E. Kremer, and Wei Chen. "Editorial: Analysis and Design of Sociotechnical Systems." *Journal of Mechanical Design* 141, no. 11 (2019).

J29. **Babak Heydari**, Michael Pennock, "Guiding the Behavior of Socio-Technical Systems: The role of Agent-Based Modeling", *Systems Engineering*, 21 (2018).

J30. David A. Gianetto*, Mohsen Mosleh*, **Babak Heydari**, "Dynamic of Competition Structure in Insurance Market after ACA", *IEEE ACCESS*, 6 (2018).

J31. Chen, Wei, **Babak Heydari**, Anja M. Maier, and Jitesh H. Panchal. "Editorial:Network-based Modeling and Analysis in Design - Guest Editorial", *Design Science*, 4 (2018).

J32. Abbas Ehsanfar*, **Babak Heydari**, "An Incentive Compatible Scheme for Electricity Cooperatives: Axiomatic Approach", *IEEE Transactions on Smart Grids*, 9 (2018).

J33. Mohsen Mosleh*, **Babak Heydari**, "Distributed or Monolithic? A Computational Architecture Decision Framework", *IEEE Systems Journal*, 12 (2018).

J34. Mohsen Mosleh, **Babak Heydari**, "Fair Topologies: Community Structure and Network Hubs Drive Emergence of Fairness Norms", *Scientific Reports*, 7 (2017).

J35. **Babak Heydari**, Mohsen Mosleh*, Kia Dalili*, "From Modular to Distributed Open Architectures: A Unified Decision Framework", *Systems Engineering*, 19 (2016).

J36. Mohsen Mosleh*, Peter Ludlow*, **Babak Heydari**, "Distributed Resource Management in Systems of Systems: An Architecture Perspective", *Systems Engineering*, 19 (2016).

J37. **Babak Heydari**, Shared Sachdev, "Peer Pressure, A new Analytical Model" *Best's Review*, (July 2016). [*Invited article,* ***Non-refereed****, Best's Review is the Insurance Industry de facto Professional Journal.*]

J38. David A. Gianetto*, **Babak Heydari**, "Sparse Cliques Trump Scale-free Networks in Coordination and Competition", *Scientific Reports*, 6 (2016).

J39. **Babak Heydari**, Mohsen Mosleh*, Kia Dalili*, "Efficient Network Structures with Separable Heterogeneous Connection Costs", *Economics Letters*, 134 (2015).

J40. David A. Gianetto*, **Babak Heydari**, "Network Modularity is Essential for Evolution of Cooperation under Uncertainty", *Scientific Reports*, 5 (2015).

J41. **Babak Heydari**, Kia Dalili*, "Emergence of Modularity in Systems of Systems: Complex Networks in Heterogeneous Environments", *IEEE Systems Journal*, 9 (2015).

J42. David A. Gianetto*, **Babak Heydari**, "Catalysts of Cooperation in Systems of Systems: The Role of Diversity and Network Structure", *IEEE Systems Journal*, 9 (2015).

J43. Peter Ludlow*, **Babak Heydari**, "The Scalpel or the Shotgun? A Study of Strategies for Boosting New Technology Adoption in Social Network Environments", *Procedia Computer Science* 36 (2014).

J44. Mosleh, Mohsen*, Kia Dalili*, **Babak Heydari**, "Optimal Modularity for Fractionated Spacecraft: The case of System F6", *Procedia Computer Science*, 28 (2014).

J45. Mostashari, Ali, Roshanak Nilchiani, Mayada Omer, Nazanin Andalibi, **Babak Heydari**, "A Cognitive Process Architecture Framework for Secure and Resilient Seaport Operations", *Marine Technology Society Journal*, 45 (2012).

J46. Ali M. Niknejad, Ehsan Adabi, **Babak Heydari**, Mounir Bohsali, Bagher Afshar, Debopriyo Chowdhury, Patrick Reynaert, "Device, Circuit, and System Considerations for 60 GHz CMOS", *IEICE Transactions on Fundamentals of Electronics, Communications and Computer Sciences*, 92 (2009).

J47. **Babak Heydari**, Mounir Bohsali, Ehsan Adabi, Ali M. Niknejad, "Millimeter-wave Devices and Circuit Blocks up to 104 GHz in 90 nm CMOS", *IEEE Journal of Solid-State Circuits*, 42 (2007).

J48. Ali M. Niknejad, Mounir Bohsali, Ehsan Adabi, **Babak Heydari**, "Integrated Circuit Transmission line Transformer Power Combiner for Millimeter-wave Applications", *Electronics Letters*, 43 (2007).

Peer Reviewed Conference Papers and Presentations

Conferences in Computational and Computer Science

C1. Nunzio Lorè*, **Babak Heydari**, "Communication Enhances LLMs' Stability in Strategic Thinking,". Preprint: arXiv:2602.06081.

C2. Sepehr Ilami*, Qingtao Cao*, **Babak Heydari**, "When Does Dynamic Behavioral Information Improve Sociotechnical Modeling? Evidence from Epidemic Mobility Networks", Accepted for Oral Presentation at the International Conference on Computational Social Science (IC2S2 2026). [oral acceptance rate $\approx$ 27%]

C3. **Babak Heydari**, Negin Maddah*, "Reconfiguring Knowledge Networks: How GenAI Reshapes Interactions on Digital Platforms and the Implications for AI Sustainability", Accepted for Oral presentation to the International Conference on Computational Social Science (IC2S2), 2025 [oral acceptance rate $\approx$ 27%]

C4. John Meluso, H. Oliver Gao, **Babak Heydari**, Christoph Riedl, and Laurent Hébert-Dufresne, "Collective Artificial Intelligence: Specialist-Generalist Network Structures & Task Performance", Oral Presentation to the ACM Collective Intelligence Conference (CI'25), San Diego, 2025. [acceptance rate $\approx$ 33%]

C5. Negin Maddah*, **Babak Heydari**, "Platform-Driven Collaboration Patterns: Structural Evolution Over Time and Scale", International Conference on Computational Social Science (IC2S2), Plenary Talks (**plenary acceptance rate $\approx$ 3%**), Philadelphia, 2024.

C6. Soumyakant Padhee*, **Babak Heydari**, The Echo Chamber of Complexity: An Experimental Study on the Influence of Design Complexity on Groupthink and Innovation, Oral Presentation to the ACM Collective Intelligence Conference (CI'24), Boston, 2024. [acceptance rate $\approx$ 33%]

C7. Qingtao Cao, and **Babak Heydari**. "Mobility Networks and Pandemic Analytics: How much can we gain by using complex network models?" International Conference on Computational Social Science (IC2S2), July 2023, [Oral acceptance rate $<$ 20%].

C8. Qingtao Cao*, and **Babak Heydari**. "Structural drivers of COVID-19 national policy success." International Conference on Computational Social Science, 2022, [Oral Presentation acceptance rate $<$ 20%].

C9. Hong Qu, Min Gong, Qingtao Cao*, **Babak Heydari**, "Platform Jumping: Network Analysis of How Political Memes Seeded on Reddit Diffuse to Twitter", International Conference on Computational Social Science, 2022.

C10. Laiyang Ke, Dan O'Brien, **Babak Heydari**, "Does Airbnb Encourage Crime? Evidence from Boston neighborhoods", Accepted for Oral Presentation at the 6th International Conference on Computational Social Sciences (IC2S2 2021), July 2021.

C11. David Gianetto*, Mohsen Mosleh*, **Babak Heydari**, "*The Dark Side of Resilience:* Evolution of Market Competition under Affordable Care Act", Oral Presentation at the 4th International Conference on Computational Social Sciences (IC2S2 2018), July 2018. [oral presentation acceptance rate $\approx 36\%$]

C12. Pouria Babvey*, **Babak Heydari**, "Improving Coordination in Human-Agent Networks of Distributed Complex Tasks", Poster Presentation at the 4th International Conference on Computational Social Sciences (IC2S2 2018), July 2018.

C13. Mohsen Mosleh*, **Babak Heydari**, "Market Evolution of Sharing Economy vs. Traditional Platforms: A Natural Language Processing Approach", NLP+CSS: Workshop on Natural Language Processing and Computational Social Sciences at **ACL 2017**, Vancouver, August 2017.

C14. Mohsen Mosleh*, **Babak Heydari**, "Why Groups Show Different Fairness Norms? The Interaction Topology Might Explain", International Conference on Social Informatics, Oxford, UK, September 2017. [oral presentation acceptance rate $\approx 28\%$]

C15. Mohsen Mosleh*, **Babak Heydari**, "Co-evolution of Consumer Preferences in Sharing Economy and Traditional Platforms", 3rd International Conference on Computational Social Sciences (IC2S2), Cologne, Germany, July 2017.

C16. Mohsen Mosleh*, **Babak Heydari**, "Fair Topologies: Structural Drivers of Evolution of Fairness in Social Networks", 2nd International Conference on Computational Social Sciences (IC2S2), Kellogg School of Management, July 2016. [oral presentation acceptance rate $\approx 37\%$]

C17. Abbas Ehsanfar*, and **Babak Heydari**. "Interactive Multi-Consumer Power Cooperatives with Learning and Axiomatic Cost and Risk Disaggregation." In Workshops at the Twenty-Ninth Conference on Artificial Intelligence, AAAI, January 2015.

Conferences in Systems Engineering, Design and Network Science

C18. Qiliang Chen*, **Babak Heydari**. "Resource Governance in Networked Systems via Integrated Variational Autoencoders and Reinforcement Learning." 10th International Engineering Systems Conference (CESUN 2025), George Mason University — accepted for oral presentation.

C19. Qiliang Chen*, Sepehr Ilami*, Nunzio Lorè*, **Babak Heydari**. "Instigating Cooperation among LLM Agents Using Adaptive Information Modulation." CESUN 2025, George Mason University — accepted for oral presentation.

C20. Negin Maddah*, **Babak Heydari**. "Building Back Better: Modeling Decentralized Recovery in Sociotechnical Systems Using Strategic Network Dynamics." CESUN 2025, George Mason University — accepted for oral presentation.

C21. Negin Maddah*, **Babak Heydari**, "Structural Evolution of Platform Collaboration", Conference on Complex Systems (CCS), Oral Presentation, Exeter, 2024.

C22. Soumyakant Padhee*, **Babak Heydari**, The Echo Chamber of Complexity: An Experimental Study on the Influence of Design Complexity on Groupthink and Innovation, Oral Presentation CESUN 2023, Northwestern University,

C23. Soumyakant Padhee*, and **Babak Heydari**. "Evolution of Innovation in Industry Life Cycles: A Complex Network Perspective" International Conference on Engineering Design (ICED), Oral Presentation; Proceedings of the Design Society 3 (2023): 1705-1714.

C24. Negin Maddah*, **Babak Heydari**, Platform-Driven Collaboration Patterns: Structural Evolution Over Time and Scale, CESUN 2023, Northwestern University, [Oral Presentation].

C25. Soumyakant Padhee*, and **Babak Heydari**. Uncovering Hidden Innovation Quality Through Patent-Citation Network Analysis, IDETC 2023, Boston, MA [Oral Presentation].

C26. Qiliang Chen*, **Babak Heydari**, AI Driven Governance of Complex Systems Through Network Intervention: A Hierarchical RL Approach with Graph Neural Network, CESUN 2023, Northwestern University, [Oral Presentation].

C27. Soumyakant Padhee*, and **Babak Heydari**. Collaborating Under Complexity: Experimental Study on Agents' Reliance to Team Collaboration Under Design Complexity, IDETC 2023, Boston, MA [Oral Presentation].

C28. **Babak Heydari**, Shinjinee Chattopadhyay, Soumyakant Padhee*, Samina Karim, "Core or Periphery: Where Should Firms Locate Exploring Innovators? Exploring With an NK Model", Strategic Management Society Meeting (SMS 2022), Oral Presentation, [oral acceptance rate $< 20\%$].

C29. Pouria Babvey*, **Babak Heydari**, "Balancing Transaction Surpluses in Two-sided Platforms by Controlling Network Information Transparency", CompleNet, Boston, March 2018.

C30. Pouria Babvey*, **Babak Heydari**, "Improving Coordination in Heterogeneous Human-Agent Complex Networks: The case of Vertex-Covering Problem", Complex Networks 2017, November 2017. [oral presentation acceptance rate $\approx 30\%$]

C31. **Babak Heydari**, "Resilience in Homogeneous Networks: A Strategic Network Formation Approach", IEEE International Workshop on Cyber Resilience Economics, QRS 2017, Prague, July 2017.

C32. **Babak Heydari**, "Architecting Resilient Systems through Reconfigurability", Complex Systems, Wessex, UK, 2017.

C33. **Babak Heydari**, "Toward a Data-Driven Agent-Based Design for Socio-Technical Systems", ISERC 2016, Anaheim, CA, 2016.

C34. Peter Ludlow, **Babak Heydari**, "Identifying Desirable Profit-Sharing Contracts for the Medicare Bundled Payment Initiative Using Cooperative Game Theory", 5th International Engineering Systems Symposium (CESUN2016), Washington DC, July 2016. [oral presentation acceptance rate $\approx 38\%$]

C35. Mohsen Mosleh*, **Babak Heydari**, "Spatial Diffusion of Risk: The Case of Risky Teenage Drivers", 5th International Engineering Systems Symposium (CESUN2016), Washington DC, July 2016. [oral presentation acceptance rate $\approx 38\%$]

C36. Mohsen Mosleh*, Peter Ludlow*, **Babak Heydari**, "Resource Allocation through Network Architecture in Systems of Systems: A complex networks framework", Annual IEEE Systems Conference, April 2016.

C37. David Gianetto*, **Babak Heydari**, "Assessing Federal Insurance Exchange Competition Through Network Structure Properties", INFORMS Healthcare, Nashville, TN, 2015.

C38. Mohsen Mosleh*, Kia Dalili*, and **Babak Heydari**, "Efficient Structure for Networks with Heterogeneous Connection Model", in 6th Workshop on Complex Networks (CompleNet 2015), New York City, New York, March 2015.

C39. Jon Wade, **Babak Heydari**, "Complexity: Definition and Reduction Techniques", International Conference on Complex Systems Design and Management, Paris, 2014.

C40. David Gianetto*, **Babak Heydari**, "Fear Not, Be Modular: How Network Structure Impacts Pro-social Norm Emergence?", 4th International Engineering Systems Symposium, CESUN2014, Hoboken, NJ. 2014.

C41. Mohsen Mosleh*, Peter Ludlow*, **Babak Heydari**, "Resource Sharing Mechanisms in Autonomous Systems", 4th International Engineering Systems Symposium, CESUN2014, Hoboken, NJ. 2014.

C42. **Babak Heydari**, Kia Dalili*, "Dynamic Modularity: A Distributed Decision Mechanism in Systems of Systems", 7th IEEE International Conference on System of Systems Engineering, 2012.

C43. **Babak Heydari**, "Bridging the Gap Between Complexity Sciences and Engineering Systems using Network Sciences", 4th International Engineering Systems Symposium, CESUN2014, Hoboken, NJ. 2015.

C44. Mohsen Mosleh*, **Babak Heydari**, "Optimal Allocation of Excess Generation in Microgrid Networks", Center of Excellence Wireless and Technology (CEWIT), Melville, New York, 2013.

C45. **Babak Heydari**, Ali Mostashari, "A Two Dimensional Formulation of Collective Intentionality", Workshop on Cognitive Social Sciences, pp. 67-68, Annual Conference on Cognitive Social Sciences, 2012.

C46. Efatmaneshnik, Mahmoud, Roshanak Nilchiani, **Babak Heydari**, "From Complicated to Complex Uncertainties in System of Systems", IEEE International Systems Conference, pp. 1-6. IEEE, 2012.

C47. **Babak Heydari**, Kia Dalili, "Modularity and Fractionation in Complex Systems: A Value-Centric Approach", In INCOSE International Symposium, vol. 22, no. 1, pp. 2279-2293. 2012.

C48. **Babak Heydari**, Matthias Finger. "Enterprise Governance and Boundary Decisions: The case of wireless technology", IEEE International Systems Conference (SysCon), pp. 315-318. 2011.

C49. **Babak Heydari**, Joseph Mitola, Ali Mostashari, "Cognitive Context Modeling in the Socio-Technical Systems." IEEE International Systems Conference (SysCon), pp. 272-277. 2011.

C50. Darabi, Hamid R., Mo Mansouri, Ali Mostashari, **Babak Heydari**. "Enterprise Systems Governance using Transaction-cost Analysis: An Agent-Based Framework", IEEE International Systems Conference (SysCon), pp. 109-114. 2011.

C51. **Babak Heydari**, Mo Mansouri, "Ultra-high Speed Wireless Technology from a System of Systems Perspective", IEEE International Congress on Ultra Modern Telecommunications and Control Systems (ICUMT), 2010.

C52. Lashkarian, Navid, **Babak Heydari**, Payman Jula, "Statistical Characterization of Power Amplifier Nonlinearity at 60 GHz: MIMO Beam-forming Analysis." In Proceedings of the 28th IEEE conference on Global telecommunications, pp. 6089-6094, 2009.

C53. **Babak Heydari**, Mounir Bohsali, Ehsan Adabi, and Ali M. Niknejad, "Low-Power mm-Wave Components up to 104GHz in 90nm CMOS", In 2007 IEEE International Solid-State Circuits Conference. Digest of Technical Papers. 2007. [**Top Conference in Electrical Engineering**]

C54. **Babak Heydari**, Ehsan Adabi, Mounir Bohsali, Bagher Afshar, Amin Arbabian, and Ali M. Niknejad, "Internal Unilateralization Technique for CMOS mm-Wave Amplifiers", In 2007 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 463-466. IEEE, 2007. [**Top Conference in Electrical Engineering**]

C55. Adabi, Ehsan, **Babak Heydari**, Mounir Bohsali, and Ali M. Niknejad, "30 GHz CMOS Low Noise Amplifier", In 2007 IEEE Radio Frequency Integrated Circuits (RFIC) Symposium, pp. 625-628. IEEE, 2007. [**Top Conference in Electrical Engineering**]

C56. **Babak Heydari**, Mounir Bohsali, Ehsan Adabi, and Ali M. Niknejad, "A 60 GHz Power Amplifier in 90nm CMOS Technology", In 2007 IEEE Custom Integrated Circuits Conference, pp. 769-772. IEEE, 2007. [**Top Conference in Electrical Engineering**]

C57. **Babak Heydari**, P. Reynaert, E. Adabi, M. Bohsali, B. Afshar, M. A. Arbabian, and A. M. Niknejad, "A 60-GHz 90-nm CMOS Cascode Amplifier with Interstage Matching", Microwave Integrated Circuit Conference, 2007. EuMIC 2007. European, pp. 88-91. IEEE, 2007.

C58. Niknejad, Ali M., S. Emami, **Babak Heydari**, M. Bohsali, and E. Adabi, "Nanoscale CMOS for mm-wave Applications", 2007 IEEE Compound Semiconductor Integrated Circuits Symposium, pp. 1-4. IEEE, 2007.

C59. He, Jin, Jane Xi, Mansun Chan, Hui Wan, Mohan Dunga, **Babak Heydari**, Ali M. Niknejad, and Chenming Hu, "Charge-based Core and the Model Architecture of BSIM5", Sixth international symposium on quality electronic design (isqed'05), pp. 96-101. IEEE, 2005.

C60. Niknejad, Ali M., M. Dunga, **Babak Heydari**, H. Wan, C. H. Lin, S. Emami, C. Doan, X. Xi, J. He, and C. Hu, "Challenges in Compact Modeling for RF and Microwave Applications", NSTI 2005, pp. 75-80, 2005.

C61. Xi, Xuemei Jane, Jin He, Mohan Dunga, Hui Wan, Mansun Chan, Chung-Hsun Lin, **Babak Heydari**, Ali M. Niknejad, and Chenming Hu, "BSIM5 MOSFET Model", In Solid-State and Integrated Circuits Technology, 2004. Proceedings. 7th International Conference on, vol. 2, pp. 920-923. IEEE, 2004.

C62. Chan, Mansun, Xuemei Xi, Jin He, Chung Hsun Lin, Tzs Yin Man, Mohan Dunga, **Babak Heydari**, Hui Wan, Ali Niknejad, and Chenming Hu, "The Next Generation BSIM Model Extending from Conventional to Double-Gate MOSFETs", In The 1st International Workshop on Compact Modeling (IWCM'04). 2004.

C63. Xi, Xuemei, Jin He, Mohan Dunga, Chung-Hsun Lin, **Babak Heydari**, Hui Wan, Mansun Chan, Ali M. Niknejad, and Chenming Hu, "The Next Generation BSIM for Sub-100nm Mixed-signal Circuit Simulation", In Custom Integrated Circuits Conference (CICC), pp. 13-16. 2004.

RESEARCH GRANTS **(Total Share of External Grants = $2.7M)**

External Grants

- NSF: IHBEM: No One Lives in a Bubble: Incorporating Group Dynamics into Epidemic Models, **Role: PI** (50% effort), Co-PIs: Silvia Prina (economics), Gabor Lippner (mathematics), Dan O'Brien (urban affairs), September 2024 - 2027, (Total Budget = $1M).
- NSF: Research Traineeship (NRT): Platforms for Exchange and Allocation of Resources (PEAR), **Role: Core Faculty** (10% of total effort), PI: Ozlem Ergun, 2023 (Total Budget = $3M)
- IARPA: Geo-spatio-temporal monitoring and mapping for predictive analytics, **Role: Co-PI** (33% effort), PI: Dan O'Brien, 2021-2023 (Total Budget = $973,000)
- NSF CAREER: Architecting Products to Balance Innovation and Competition in Business Ecosystems, **Role: PI**, CMMI-Systems Science, 2016-2022 (Total Budget = $500,000; Share of Budget Spent at Northeastern = $490,000)
- NSF Hybrid Socio-Technical Teams: A Theoretical Framework for Modeling and Design of Hybrid Networks of Human and Autonomous Agents, **Role: PI** (100% effort), 2016-2019 (Total Budget = $230,000)
- Accenture Co.: Modeling Spatial Diffusion of Risk for Insurance Analytics: **Role: PI** (100% effort) 2015-2016 (Total Budget =$30,000)
- DARPA: New Paradigms in Systems Design of Future Fractionated Spacecraft, **Role: PI** (50% effort) 2011-2014 (Total Budget = $1.68M)
- Lockheed Martin Co.: Cognitive Systems Engineering. **Role: Co-PI** (30% effort) 2011-2012 (Total Budget = $250K)

Internal Grants

- Northeastern Provost Office: COVID in Boston: A Database for Research and Teaching, **Role: Co-PI**, PI: Dan O'Brien (CSSH), 2020-2021, (Total Budget = $40,000)
- Northeastern Tier-1: Modeling and Evaluation of Interdependencies in Platform-based Systems, **Role: PI**, 2019-2021, Co-PIs: Yakov Bart (Business), Dan O'Brien (CSSH), Rashmi Dyal-Chand (Law) (Total Budget = $50,000)
- Stevens Provost Office Ignition Grant: Multi-layer Modeling of Complex Systems, **Role: PI**, Summer 2014, ($20,000)

Doctoral Students and Postdoc Advisees

Former Lab Members

- Dave Gianetto (2012-2016). Current Position: Senior Engineering Fellow at Raytheon, CA, USA
- Mohsen Mosleh (2012-2017): Current Position: Associate Professor at Oxford University, UK
- Kia Dalili (Postdoc 2012-2014): Current Position: Data Science and Engineering Leader, Shopify, New York, USA

- Peter Ludlow (2012-2016): Current Position: Associate Director, NYU Langone Health, New York, USA
- Qingtao Cao (2018-2023). Current Position: Senior Data Scientist, Saint-Gobain Co. MA, USA
- Soumyakant Padhee (2019-2023), Current Position: Assistant Professor, Business School, Lenoir-Rhyne University, NC, USA
- Qiliang Chen (2020-2025), Upcoming Position: Agentic AI Engineer, Advanced Technology Research Institute, China Merchants Group, Shenzhen, China

Current Ph.D. Students

- Nunzio Lore (expected graduation: December 2025)
- Negin Maddah, (expected graduation: May 2027)
- Sepehr Ilami (expected graduation: May 2028)

HONORS, AWARDS AND RECOGNITION

- **Best Conference Presentation Award** for the paper "Building Back Better: Modeling Decentralized Recovery in. Sociotechnical Systems", with Neign Maddah*, CESUN 2025, June 2025.
- National Science Foundation **CAREER Award**, 2016.
- College of Engineering **Faculty Fellow**, Northeastern University (2022-2025)
- **Invited Plenary Speaker**, International Conference on System Dynamics, Boston, 2025
- **Keynote Speaker**, International Conference on Resilient Systems, Mexico City, 2023
- **Chair Scientific Advisory Committee** of ETH-Singapore Future Resilient Systems (FRS), May 2020 - present
- **Best Paper Award**, Systems Engineering Journal, "Distributed Resource Management in Systems of Systems", 2018.
- **Invited Panelist**, TE 2022, MIT, Cambridge, 2022
- **Invited Speaker**, Global Resilience Research Network Summit, Freiburg, 2019
- Stevens Institute of Technology nominee for National Blavatnik Award, 2015-2016.
- First rank (Score 9/10) in Berkeley EECS Ph.D. qualifying exam, 2004.
- First Rank and Gold Medal in National Science Olympiad Competitions in Iran, 1997.

Student Awards and Recognition

- Northeastern College of Engineering Research Award, Qingtao Cao (2023); Qiliang Chen (2024)
- Northeastern MIE Research Award: Negin Maddah (2024)
- Best SSE Doctoral Dissertation Award, Mohsen Mosleh, May 2017.
- Best SSE Doctoral Dissertation Award, David A. Gianetto, May 2016.
- Best SSE Graduate Student Paper Award, Abbas Ehsanfar, 2016.

- INCOSE Foundation Doctoral Award for promising research in Systems Engineering and Integration, Mohsen Mosleh*, 2015 (This award is given to one Ph.D. student every year from all INCOSE affiliated universities in the world).
- Best SSE Graduate Student Paper Award, David A. Gianetto*, 2015.

TEACHING AND EDUCATIONAL ACTIVITIES

Courses Developed

- *IE7350: Sociotechnical Systems: Computational Models for Design and Policy* (Graduate Course)
- *IE3734: Special Topics - Platforms and Sharing Economy Systems* (Graduate Course)

Courses Delivered

Northeastern University

- Fall 2025 — IE 7350: Sociotechnical Systems: Computational Models for Design and Policy — Students: (9 PhD students from COE, Network Science, and Public Policy), in progress
- Summer II 2024 — EMGT 6225: Economic Decision Making — Students: 21; Responses: 7; Instr. Effectiveness: 4.1; Course Learning: 4.4; Extra load
- Spring 2024 — IE 7350: Sociotechnical Systems: Computational Models for Design and Policy — Students: 5; Responses: 4; Instr. Effectiveness: 5.0; Course Learning: 5.0
- Spring 2024 — EMGT 6225: Economic Decision Making — Students: 43; Responses: 15; Instr. Effectiveness: 4.4; Course Learning: 4.6
- Fall 2023 — EMGT 6225: Economic Decision Making — Students: 31; Responses: 26; Instr. Effectiveness: 4.6; Course Learning: 4.5
- Summer II 2023 — EMGT 6225: Economic Decision Making — Students: 14; Responses: 5; Instr. Effectiveness: 4.0; Course Learning: 4.4; Extra load
- Spring 2023 — EMGT 6225: Economic Decision Making — Students: 47; Responses: 22; Instr. Effectiveness: 3.9; Course Learning: 3.9
- Fall 2022 — EMGT 6225: Economic Decision Making — Students: 34; Responses: 19; Instr. Effectiveness: 4.5; Course Learning: 4.5
- Fall 2021 — EMGT 6225: Economic Decision Making — Students: 29; Responses: 17; Instr. Effectiveness: 4.5; Course Learning: 4.4
- Spring 2021 — EMGT 6225: Economic Decision Making — Students: 17; Responses: 13; Instr. Effectiveness: 4.5; Course Learning: 4.5
- Spring 2021 — IE 7374: Sociotechnical Systems: Computational Models for Design and Policy — Students: 9; Responses: 7; Instr. Effectiveness: 5.0; Course Learning: 4.9
- Fall 2020 — EMGT 6225: Economic Decision Making — Students: 17; Responses: 8; Instr. Effectiveness: 4.6; Course Learning: 4.6
- Spring 2020 — IE 7374: Platforms and Sharing Economy — Students: 9; Responses: 6; Instr. Effectiveness: 4.3; Course Learning: 4.5

- Fall 2019 — EMGT 6225: Economic Decision Making — Students: 18; Responses: 8; Instr. Effectiveness: 3.9; Course Learning: 4.3
- Spring 2019 — IE 7374: Platforms and Sharing Economy — Students: 8; Responses: 7; Instr. Effectiveness: 4.6; Course Learning: 4.4
- Fall 2018 — EMGT 6225: Economic Decision Making — Students: 41; Responses: 33; Instr. Effectiveness: 4.0; Course Learning: 4.1

Stevens Institute of Technology

- EM451: Analysis of Strategies and Networks (Senior Undergraduate Course)
- EM600: Engineering Economics and Cost Analysis (Graduate Online Course)
- ES660: Multi-Agent Socio-Technical Systems (Graduate Course)
- ES684: Systems Thinking (Graduate Course)
- EM345: Modeling and Simulation (Junior Undergraduate Course)
- EM351: Management Information Systems (Junior Undergraduate Course)
- ES810-A: Cognitive Systems Engineering (Special Topic Ph.D. Course)

PROFESSIONAL SERVICES

Journal Editorial Roles

- Associate Editor, ASME Journal of Mechanical Design (2019-Present)
- Associate Editor, Wiley Systems Engineering Journal (2015-Present)
- Guest Associate Editor, Special Issue on Networks and Graphs for Engineering System and Design, ASME Journal of Computing and Information Science in Engineering (JCISE), (2024-2025)
- Guest Associate Editor (Lead), Special Issue on Design of Sociotechnical Systems, ASME Journal of Mechanical Design (2020-2021)
- Guest Associate Editor, Design Science Journal, Special issue on Network Methods in Engineering Design (2018-2019)

Other Professional and Leadership Services

- President of the Council of Engineering Systems Universities (CESUN) 2021-2023
- Chair of the Scientific Advisory Committee (SAC) for ETH-Singapore Future Resilient Systems (2021-present)
- Track Chair, IISE Annual Conference, Systems Engineering & Design Track, Orlando, 2019
- Organizing Chair, CESUN Representatives Meeting, Boston, 2019
- Co-Lead (Together with Prof. Paul Collopy), Working group to prepare a White Paper on Theory of Systems Engineering, Sponsored by INCOSE, 2016
- Technical Chair, CESUN Symposium, Hoboken, 2014
- Track Chair, Complex Adaptive Systems Conference, SoS Track, Philadelphia, 2014
- Technical Committee member for CESUN, IDETC, AAAI, ICED, IC2S2, CAS

- NSF Review Panelist: EDSE, IHBEM
- Organizer of several interdisciplinary workshops at the intersection of engineering and social and behavioral sciences

INTERNAL SERVICES

Northeastern University (College Services)

- College of Engineering Tenure and Promotion Committee (2019-2023)

Northeastern University (Department Services)

- Associate Chair of Graduate Affairs (IE), (August 2025-present)
- Program Co-Director, Masters of Engineering Management (2021-present)
- Graduate Affairs Committee (2021-present)
- Faculty Search Committee, Mechanical and Industrial Engineering (2023-2024; 2021-2022)
- Qualifying Exam Restructuring Committee, Industrial Engineering Program, Chair (2023-2024)
- Faculty Mentorship Program, Mentor for 3 junior faculty members (Chair for two committees) (2020-Present)