Sebastian F. Ruf

Boston, MA   Email: s.ruf@northeastern.edu   T: +1 (858) 752 3571 (Mobile)

RESEARCH INTERESTS: Analysis of and interaction with complex systems. Areas of interest include dynamical systems and control theory; social, ecological, brain and climate networks; machine learning, network and data science

EMPLOYMENT

Experiential AI Postdoctoral Fellow   **August 2018-Present**
Northeastern University
Sustainability and Data Sciences Lab (July 2021-Present)
Department of Civil and Environmental Engineering
PI: Prof. Auroop Ganguly
PEN Lab, Department of Psychology (October 2018-June 2021)
PI: Prof. Susan Whitfield-Gabrieli
Cognitive Systems Lab, Department of Electrical and Computer Engineering
PI: Prof. Deniz Erdogmus (January 2020-June 2021)
Center for Complex Networks Research
PI: Prof. Albert László Barbási (August 2018-2019)

EDUCATION

Georgia Institute of Technology   Atlanta, GA
Ph.D. Electrical & Computer Engineering   Spring 2018
Advisors: Prof. M. Egerstedt and Prof. J.S. Shamma
Thesis Title: "A Control Theoretic Perspective on Social Networks"
Research Projects: Analysis and Control of Complex Networks. Epidemics-Based Product Spread Models. Sustainability of Socio-Ecological Systems

King Abdullah Uni. of Science and Technology   Thuwal, Kingdom of Saudi Arabia
Visiting Student   2015
Performed research on controllability of networks under Prof. Jeff Shamma.

University of California, Berkeley   Berkeley, CA
M.S. in Mechanical Engineering   May 2012
B.S. in Mechanical Engineering, Graduated with Honors   May 2011

Manuscripts under review and in preparation

1. **S. F. Ruf**, Marianna La Rocca, Rachael Garner, Alfonso Nieto-Castanon, Martin Monti, Paul Vespa, Deniz Erdoğmuş, and Dominique Duncan. "Structural Foundations of fMRI Preprocessing in Traumatic Brain Injury", submitted to *NeuroImage:Clinical*.

2. **S. F. Ruf***, Sarah M. Brown*, Misha Pavel, Deniz Erdoğmuş, Dana Brooks, Lisa Feldman-Barrett, the PEN group at Northeastern. (*these authors contributed equally) "Quantified Embodied Mind I: A Dynamical Systems Approach to Brain and Mind", in preparation.

PUBLICATIONS

3. Md Navid Akbar, **S. F. Ruf**, Marianna La Rocca, Rachael Garner, Giuseppe Barisano, Ruskin Cua, Paul Vespa, Deniz Erdoğmuş, Dominique Duncan. "Machine Learning Classification of Post-Traumatic Seizures using Different Diffusion MRI Preprocessing Pipelines", *MICCAI 2021 International Workshop on Computational Diffusion MRI* (accepted).

4. **S. F. Ruf**, Md Navid Akbar, Susan Whitfield-Gabrieli, Deniz Erdoğmuş. "Comparing Autoregressive and Network Features for Classification of Depression and Anxiety", *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (accepted).

5. Razieh Faghihpirayesh, **S. F. Ruf**, Marianna La Rocca, Rachael Garner, Paul Vespa, Deniz Erdoğmuş, and Dominique Duncan. "Automatic Detection of EEG Epileptiform Abnormalities in Traumatic Brain Injury using Deep Learning", *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (accepted).

6. **S. F. Ruf**[*], Qasim Bukhari[*], Xavier Guell, Susan Whitfield-Gabrieli, Sheeba Anteraper. ([*]these authors contributed equally) "Interaction between Cerebellum and Cerebral Cortex, Evidence from Dynamic Causal Modeling", *The Cerebellum* 2021.

7. W. Xuan, R. Ren, P. E. Paré, M. Ye, **S.F. Ruf**, and J. Liu. "On a Network SIS Model with Opinion Dynamics", *21st IFAC World Congress, 2020.*

8. M. T. Hale, **S. F. Ruf**, T. Manzoor, A. Muhammed, "Stability and Sustainability of Resource Consumption Networks", *IEEE Transactions on Network Science and Engineering* 2019.

9. **S. F. Ruf**, K. Paarporn, P. E. Paré "Going Viral: Stability of Consensus-Driven Adoptive Spread", *IEEE Transactions on Network Science and Engineering* 2019.

10. **S. F. Ruf**, M. T. Hale, T. Manzoor, A. Muhammed, "Design of Sustainable Resource Consumption Networks", *IEEE Conference on Decision and Control 2019.*

11. **S. F. Ruf**, P. E. Paré, J. Liu, C. L. Beck, Tamer Başar "A Viral Model of Product Adoption with Antagonistic Interactions", *American Control Conference 2019.*

12. **S. F. Ruf**, M. T. Hale, T. Manzoor, A. Muhammed, "Stability of Leaderless Resource Consumption Networks", *IEEE Conference on Decision and Control 2018.*

13. **S. F. Ruf**, M. Egerstedt, and J. S. Shamma, "Herdable Systems over Signed, Directed Graphs", *American Control Conference 2018.*

14. G. Notomista, **S. F, Ruf**, M. Egerstedt, "Persistification of Robotic Tasks using Control Barrier Functions", *IEEE Robotics and Automation Letters*, 2017. Accepted for presentation at *2018 IEEE International Conference on Robotics and Automation.*

15. **S. F. Ruf**, K. Paarporn, P.E. Paré and M. Egerstedt, "Dynamics of Opinion Dependent Product Spread", *IEEE Conference on Decision and Control 2017.*

Preprints

16. **S. F. Ruf**, M. Egerstedt, and J. S. Shamma, "Herding Positive, Complex Networks", *https://arxiv.org/abs/1804.04449*

17. **S. F. Ruf**, M. Egerstedt, J. S. Shamma, "Herdability of Linear Systems Based on Sign Patterns and Graph Structures" *https://arxiv.org/abs/1904.08778*

FUNDING

Spearheaded the preparation of the initial submission of an R01 proposal to the funding opportunity BRAIN Initiative: Secondary Analysis and Archiving of BRAIN Initiative Data in September of 2019 and aided in the resubmission. Listed as key personnel on the grant.[†]

PRESENTATIONS

1. "Engineering Meets Complexity: A brief tour of interdisciplinary modeling", Tau Bate Talk, Tau Beta Pi National Organization, August 2021

2. NetSci 2019, Burlington, Vermont, May 2019

3. ETH Zurich, Zurich, Switzerland, June 2018

4. International Conference on Complex Networks, Boston, MA, Mar. 2018

POSTER PRESENTATIONS

1. "A New Model of Viral Product Spread", Net Sci, Burlington, Vermont, May 2019

2. "The Theory of Herdable Systems", Symposium on the Control of Networked Systems, Boston, MA. Oct. 2017

3. "Herding Complex Networks", Career, Research, Innovation, and Development Conference, Atlanta, GA. Feb. 2018

SERVICE

Diversity and Inclusion Fellow Georgia Tech. 2017

TEACHING EXPERIENCE

Co-Instructor for "Complex Networks", Northeastern University   Fall 2019
Teaching Assistant for "Nonlinear Control Systems", Georgia Tech.   Spring 2018
Teaching Assistant for "Linear Systems and Control", Georgia Tech.   Fall 2017
Teaching Assistant for "Control of Mobile Robots", Coursera   Fall 2016
Improvisational Theater Instructor   Spring 2015-Present
Grader for "Intro to Solid Mechanics", U.C. Berkeley   Spring 2012
Grader for "Fluid Dynamics", U.C. Berkeley   Fall 2011

PROFESSIONAL AFFILIATIONS AND REVIEW ACTIVITIES

IEEE Member, Tau Beta Pi Member.

Reviewer for President's Undergraduate Research Award, Georgia Tech.

Reviewer for Conferences and Journals: IEEE Transactions on Automatic Control. Automatica. Robotics and Automation Letters. American Control Conference. IEEE Conference on Decision and Control. Mediterranean Conference on Control and Automation. PLOS One. International Symposium on Mathematical Theory of Networks and Systems. International Conference on Network Science X. IEEE Transactions on Circuits and Systems. International Journal of Nonlinear and Robust Control. Nature Scientific Reports. Journal of Statistical Mechanics.

[†]At Northeastern postdoctoral researchers can not serve as PIs.

Leadership Experience

Treasurer ECE Graduate Student Org., Georgia Tech.		Spring 2016-Spring 2017
President/Founder ECE Graduate Student Org., Georgia Tech.		Fall 2013-Fall 2014
Advisor Tau Beta Pi, Eng. Honor Society, U.C. Berkeley		Sum. 2011-Sum. 2013
President Tau Beta Pi, U.C. Berkeley		Spring 2011
Vice President Tau Beta Pi, U.C. Berkeley		Fall 2010
Service Officer Tau Beta Pi, U.C. Berkeley		Spring 2010