NERCCS 2019: 
Second Northeast Regional Conference on Complex Systems

April 3 – 5, 2019
Innovative Technologies Complex
Binghamton University, Binghamton, NY, USA

Sponsors:

Complex Systems Society US Northeast Chapter

Center for Collective Dynamics of Complex Systems (CoCo), Binghamton University
Data Science Transdisciplinary Area of Excellence, Binghamton University

Springer Nature

Hindawi

systems journal by MDPI

Thomas J. Watson School of Engineering and Applied Science, Binghamton University
Department of Systems Science and Industrial Engineering, Binghamton University

Organizing Committee:
General Chair: Hiroki Sayama (Binghamton University)
Program Chairs: Alfredo Morales (New England Complex Systems Institute / MIT Media Lab),
Esteban Moro (MIT Media Lab / Universidad Carlos III de Madrid)
Poster Session Chairs: Changqing Cheng (Binghamton University), Ashwin Vaidya (Montclair State University)
Sponsorship Chair: Andreas Pape (Binghamton University)
Logistics Chair: Shelley Dionne (Binghamton University)
Education & Career Development Chairs: Sarah Muldoon (University at Buffalo), Dane Taylor (University at Buffalo)
Publications Chairs: Georgi Georgiev (Assumption College / Worcester Polytechnic Institute),
Barney Ricca (St. John Fisher College)

Special Thanks to:
Marianne Ferry, Ximeng Chen, Lisa Gallagher, Hannah Ward, Ryan Hogoboom, Erin Hornbeck,
Sarah Kane, Monica Lavis, Caroline Pasquale, Mary Jo Kopyar, Cassie Green
NERCCS 2019 Program Overview

**Wednesday April 3**
8:30-9:00AM (RT)  
Registration

**Pre-conference school (SH)**
9:00-9:20AM  
Dane Taylor – Overview

9:20-10:10AM  
Georgi Georgiev – Self-organization

10:10-11:00AM  
Changqing Cheng – Time series

**Short break (self)**

11:20AM-12:10PM  
Sarah Muldoon – Network models

12:10-1:00PM  
Alfredo Morales – Data analytics

**Lunch break (self)**

2:30-2:40PM (SH)  
Opening remarks

**2:40-3:20PM (SH)**
Keynote talk 1: Brooke Foucault Welles

3:20-3:45PM (SH)  
Invited talk 1: Carl Lipo

3:45-4:10PM (SH)  
Invited talk 2: Tracy Hookway

Chair: Hiroki Sayama

**Coffee break (RT)**

4:30-5:50PM (SH, ES)  
Contributed talk sessions 1 & 2

6:00-7:00PM (RT)  
Reception

---

**Thursday April 4**

2:30-2:40PM (SH)  
Opening remarks

**2:40-3:20PM (SH)**
Keynote talk 2: Gino Biondini

**9:10-9:50AM (SH)**
Keynote talk 5: Elisa Omodei

**9:50-10:15AM (SH)**
Invited talk 3: Lisa Soros

**10:15-10:40AM (SH)**
Invited talk 4: J. David Schaffer

Chair: Sarah Muldoon

**Coffee break (RT)**

11:10AM-12:30PM (SH, ES)  
Contributed talk sessions 3 & 4

**Lunch break & posters (RT)**

**1:30-2:30PM (RT)**  
Poster session 1

**2:40-3:20PM (SH)**
Keynote talk 3: Germano Iannacchione

Chair: Georgi Georgiev

**Coffee break (RT)**

**3:45-5:05PM (SH, ES)**  
Contributed talk sessions 5 & 6

**5:15-5:55PM (SH)**
Keynote talk 4: Chrystopher Nehaniv

Chair: Hiroki Sayama

---

**Friday April 5**

**Main conference: Day 3**

8:30-9:00AM (RT)  
Registration & light breakfast

**9:00-9:10AM (SH)**  
Morning announcements

**9:10-9:50AM (SH)**  
Keynote talk 5: Elisa Omodei

**9:50-10:15AM (SH)**  
Invited talk 5: Asim Zia

**10:15-10:40AM (SH)**  
Invited talk 6: [Springer Complexity Talk] Catherine Cramer

Chair: James Dixon

**Coffee break (RT)**

**11:10AM-12:30PM (SH, ES)**  
Contributed talk sessions 7 & 8

**Lunch break & posters (RT)**

**1:30-2:30PM (RT)**  
Poster session 2

**2:40-3:20PM (SH)**  
Keynote talk 6: Elena Naumova

Chair: Alfredo Morales

3:20-3:45PM (SH)  
Award announcements & closing remarks

**Locations:**

(SH): Symposium Hall

(ES): Engineering Science 2008

(RT): Rotunda

See back cover for map
NERCCS 2019: Schedule of Contributed Talks
Each talk will be 20 minutes long, including Q&As and transitions.

**Wednesday April 3rd**
**4:30-5:50pm**
**Contributed Talks 1: Biological Systems (Symposium Hall) Chair: Elena Naumova**
2. István Kovács and Albert-Lásló Barabási: Complex Statistical Interaction in Biology

**4:30-5:50pm**
**Contributed Talks 2: Dynamical Systems (Engineering Science 2008) Chair: Barney Ricca**
1. Katherine Rhodes and Ashwin Vaidya: Least Action Principle Applied to a Non-Linear Damped Pendulum
2. P. Adrian Frazier: On the Cusp: Bistability and Attractor Strength Predict Reaction Time Hurst Exponents
3. Joseph Pateras, Bong Jae Chung and Ashwin Vaidya: Entropy Production and Segré-Silberberg Effect

**Thursday April 4th**
**11:10am-12:30pm**
**Contributed Talks 3: Data Science Special Session I (Symposium Hall) Chair: Xingye Qiao**
1. Kayvan Tirdad, Alex Dela Cruz, Hossein Rahnama and Alireza Sadeghian: Deep Learning Based Cancer Classification of Pathology Slides Using Cancer Cellularity Score of Pathology Patches
2. Ulgen Kilic, Michael Vaiana, Ethan M. Goldberg and Sarah F. Muldoon: Biomedical Image Analysis and Cell Localization via Persistent Homology
4. Shadan Ghaffaripour, Kayvan Tirdad, Alex Dela Cruz, Hossein Rahnama and Alireza Sadeghian: A Data-Driven Neuro-Wavelet Approach to Electric Arc Furnace Modeling

**11:10am-12:30pm**
**Contributed Talks 4: Brain & Neural Systems (Engineering Science 2008) Chair: J. David Schaffer**
1. Kanika Bansal, Javier Garcia, Sarah Muldoon, Paul Sajda and Jean Vettel: Dynamics of Large Amplitude Fluctuations in Human EEG Differentiate Individual and Task-Dependent Variability
2. Maria Virginia Ruiz-Blondet, Carlos Martinez, Jourdan Pouliot and Vladimir Miskovic: Modeling Electro-cortical Power Spectra in Major Depressive Disorder
3. Johan Nakuci, Mathew McGuire, Ferdinand Schweser, David Poulsen and Sarah F. Muldoon: Changes in Global Brain Connectivity Resulting from Traumatic Brain Injury
4. Simone Evans and Anca Rădulescu: Universality of the Configuration-Dynamics Relationship in Nonlinear Networks
3:45-5:05pm
Contributed Talks 5: Networks (Symposium Hall)  Chair: James Bagrow

1. Dane Taylor: Eigenvector-Based Centralities for Multilayer Networks Are Tuned by the Topology of Inter-layer Coupling
2. Leonid Bunimovich, David Passey, Dallas Smith and Benjamin Webb: The Specialization Model for Network Growth
3. Mitchell Sailsbery, Jacob Heiner, Connor Robertson, McKell Stauffer and Tyler Jarvis: Facility Location Using Markov Chains on Spatial Networks
4. Zhao Song and Dane Taylor: Spectrum Behavior of Laplacian for Multiplex Networks with General Coupling

3:45-5:05pm
Contributed Talks 6: Social Systems I (Engineering Science 2008)  Chair: Brooke Foucault Welles

1. Lorraine Sugar and Christopher Kennedy: Dynamics of Urban Scaling
2. Magdalena Tywoniuk: CDS Central Counterparty Clearing Liquidation: Road to Recovery or Invitation to Predation?
3. Andreas Pape and Peter DiCola: The Emergence of Monitoring

Friday April 5th
11:10am-12:30pm
Contributed Talks 7: Data Science Special Session II (Symposium Hall)  Chair: Andreas Pape

1. Yingjun Dong and Hiroki Sayama: Optimizing Facial Feature Extraction for Emotion Detection on Mobile Devices
3. Abigail Hotaling and James Bagrow: Efficient Algorithms for Crowdsourcing Problems Introduce Bias

11:10am-12:30pm
Contributed Talks 8: Social Systems II (Engineering Science 2008)  Chair: Catherine Cramer

1. Kevin Andrew: Modeling the Cooperative and Adversarial Behaviors of Farmer and Regulator Agents in Vermont’s Missisquoi Bay Area
4. Yiding Cao, Yingjun Dong, Minjun Kim, Neil MacLaren, Ankita Kulkarni, Shelley Dionne, Francis Yammarino and Hiroki Sayama: Examining the Effects of Expertise Diversity on Collective Design and Innovation Using an Online Social Network Experiment and “Idea Geography” Visualization: An Initial Report
<table>
<thead>
<tr>
<th>#</th>
<th>Authors</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Yiming Che and Changqing Cheng</td>
<td>Identification of Early-Stage Atrial Fibrillation with Intrinsic Properties of RR Intervals</td>
</tr>
<tr>
<td>2</td>
<td>Megan Chiovaro and Alexandra Paxton</td>
<td>What the Buzz Is All About: <em>Apis mellifera</em> As a Model for Collective Intelligence</td>
</tr>
<tr>
<td>3</td>
<td>Jakob Zeitler, Chilukuri Mohan, Volker Weiss and Robert Haynes</td>
<td>Exploratory Study of the Application of Anomaly Detection Methodology to the Analysis of Fatigue Data</td>
</tr>
<tr>
<td>4</td>
<td>Bong Jae Chung</td>
<td>CFD Study to Identify Risk Factors of Cerebral Aneurysm Rupture</td>
</tr>
<tr>
<td>5</td>
<td>Anwesha Choudhury, Ankita Kulkarni, Shalini Kapali Kurumathur, Savisesh Malampallyal and Srinivas Pandey</td>
<td>Leader Emergence and Collective Action During Crisis</td>
</tr>
<tr>
<td>6</td>
<td>Margaret Duris, Morgan Manganello, Cruz Torres, Megan Gauck, S. Li, D. Armstrong, T. Hopt, R. Spathis and Katherine Wander</td>
<td>Interpreting Biomarkers of Milk Immunity</td>
</tr>
<tr>
<td>7</td>
<td>Israr Bin M Ibrahim and Ramana Pidaparti</td>
<td>Inferring the Social Network of Cells from Estimation of Information Transfer and Graph Theory</td>
</tr>
<tr>
<td>8</td>
<td>Israr Bin M Ibrahim and Ramana Pidaparti</td>
<td>Network Characteristics of Bronchoconstriction in Lung Airways: A Computational Study</td>
</tr>
<tr>
<td>9</td>
<td>Todd Guilfoos and Emi Uchida</td>
<td>The Evolution of Poverty Traps: An Agent-Based Modeling Approach</td>
</tr>
<tr>
<td>10</td>
<td>Cameron Harwick</td>
<td>Cities in the Rise and Decline of Civilizations</td>
</tr>
<tr>
<td>11</td>
<td>David Gower</td>
<td>Simulating Dynamic Operations of Distributed Data Center Electricity Load for Use As Distributed Energy Resource (DER)</td>
</tr>
<tr>
<td>12</td>
<td>Bao Huynh and Dane Taylor</td>
<td>Detectability of Heterogeneous Communities in Networks Using Matrix Eigenvectors</td>
</tr>
<tr>
<td>13</td>
<td>William Chang and Libusha Kelly</td>
<td>Inferring the Dynamical Landscapes of Microbiomes Using Topological Data Analysis</td>
</tr>
<tr>
<td>14</td>
<td>Hamed Kianmehr, Nasim Sabounchi, Saeed P. Langarudi and Shabnam S.Sabounchi</td>
<td>Utility Perceptions in System Dynamics Modeling for Prescribing Decisions</td>
</tr>
<tr>
<td>15</td>
<td>Silvia Salinas-Ayaviri</td>
<td>Spatiotemporal Dynamics of Housing Prices: A Bayesian Network Approach</td>
</tr>
<tr>
<td>16</td>
<td>Python Ndeko Tandong Paul, Ndeko William Franquis and Haby Camara</td>
<td>Coupling of an Agent-Based Model of HIV Transmission Dynamics with a Mathematical Model of Intra-Host Dynamics of Viral Load</td>
</tr>
<tr>
<td>17</td>
<td>Ruimin Chen, Farhad Imani and Hui Yang</td>
<td>Heterogeneous Recurrence Analysis of Disease-Altered Spatiotemporal Patterns in Multi-Channel Cardiac Signals</td>
</tr>
<tr>
<td>18</td>
<td>Farhad Imani, Bing Yao, Ruimin Chen, Prahalada Rao and Hui Yang</td>
<td>Markov Decision Process and Multifractal Analysis for Image-Guided Additive Manufacturing</td>
</tr>
<tr>
<td>19</td>
<td>Shabnam Sabounchi, Hamed Kianmehr, Nasim S Sabounchi, Leon E.Cosler and A.Serdar Atav</td>
<td>Predicting Dental Opioid Prescribing Patterns in US Emergency Departments: A Comparison of Conventional and Machine Learning Methods</td>
</tr>
<tr>
<td>20</td>
<td>Joseph Pateras, Edward Steen and Ashwin Vaidya</td>
<td>A Game Theoretic Approach to Modeling Dynamics of Amyloid-β Aggregation along Competing Pathways</td>
</tr>
<tr>
<td>21</td>
<td>Dieudonne Ouedraogo</td>
<td>Importance of Network Metrics in Classification</td>
</tr>
<tr>
<td>22</td>
<td>Seyyedmilad Talebzadehhosseini, Chathika Gunaratute, Steven Scheinert and Ivan Garibay</td>
<td>Countries' Diversification and Transition to Green Economy</td>
</tr>
<tr>
<td>23</td>
<td>Mostafa Saeidi, Ramya Akula, Steven Scheinert, Anamaria Berea and Ivan Garibay</td>
<td>The Network of Occupation Space Needs for Economic Improvement</td>
</tr>
<tr>
<td>24</td>
<td>Nan Wang and Evangelos Katsamakas</td>
<td>A Recommendation System for Personalized Workload Assignment in People Analytics</td>
</tr>
<tr>
<td>25</td>
<td>Steven Lundgren and Anca Rădulescu</td>
<td>A Pharmacokinetic Model of Lead-Calcium Interactions</td>
</tr>
<tr>
<td>26</td>
<td>Anca Rădulescu, Brandee Williams and Kelsey Butera</td>
<td>Template Iterations of Quadratic Maps and Hybrid Mandelbrot Sets</td>
</tr>
<tr>
<td>27</td>
<td>Victoria Kim, Matthew Dunn and Emrah Akyol</td>
<td>Colonel Blotto Games for Cyber-Physical Systems Security: Cooperative Games</td>
</tr>
<tr>
<td>28</td>
<td>Lorren Kay</td>
<td>Wildfire Regimes – Research in Complex Systems Science</td>
</tr>
<tr>
<td>29</td>
<td>Oleg Pavlov and Evangelos Katsamakas</td>
<td>Dynamics of Complex Service Systems</td>
</tr>
<tr>
<td>30</td>
<td>Carlos Augusto Jiménez Zarate</td>
<td>Emotive Impact on Facebook, in the Presidential Campaign of Mexico 2018</td>
</tr>
<tr>
<td>NSH1</td>
<td>Ashwath Ashok, Afzal Shah, Carol Reynolds and Hiroki Sayama</td>
<td>Interaction Between Temperature Fluctuation and Migratory Behaviors of Marine Species</td>
</tr>
<tr>
<td>NSH2</td>
<td>Catherine Deskur, Danyal Shah, Chris Vincens, Carol Reynolds and Hiroki Sayama</td>
<td>What Factors in a Society Affect Creativity the Most?</td>
</tr>
<tr>
<td>NSH3</td>
<td>Saavan Kaneria, Jaron Cui, John Guo, Carol Reynolds and Hiroki Sayama</td>
<td>Effects of Availability of Human Resources and Financial Resources on the Performance of Schools</td>
</tr>
</tbody>
</table>
Publication Information

The abstracts/papers of accepted presentations are available from the conference website at: http://coco.binghamton.edu/nerccs/NERCCS2019-abstracts-papers.pdf

As an option for post-conference publication, authors can submit their work to the Northeast Journal of Complex Systems (NEJCS): https://orb.binghamton.edu/nejcs/

Best Paper / Best Poster Awards

NERCCS 2019 will offer the Best Paper and Best Poster Awards. The winners will be selected from accepted papers and posters by the judge panel, which will be recognized with a certificate at the end of the conference.

Our sponsor publishers, Hindawi and MDPI, will offer prizes for these awards (publication fee waiver of Complexity for the Best Paper Award, and publication fee waiver of Systems for the Best Poster Award).

Local Logistics

Registration desk – Registration will open at 8:30am on each day. Its location will be near the Rotunda. Please pick up your registration materials before going to sessions. You are required to always wear your name tag while you participate in the conference.

WiFi – You can use Binghamton University’s WiFi by connecting to Welcome2Bing and following instructions. You can also connect to eduroam if you have an account.

Social media – We encourage participants to spread their conference experience on social media. The conference’s official hashtag is #NERCCS2019.

Parking – Conference participants are required to print out and put the NERCCS 2019 parking permit to the dashboard. If you need one, please come to the registration desk. Please park your vehicle in designated areas.

Transportation – There is a free shuttle bus service that connects the Innovative Technologies Complex and the University’s main campus (about 5-minute ride). Please ride together with Binghamton University students/employees to have a guest access to the transportation.

Emergency contact information – In case of emergency (medical, fire, etc.) call the University Police at 607-777-2222 or call 911.