



THE SOCIETY FOR  
**MODELING & SIMULATION**  
INTERNATIONAL

# SPRINGSIM

Spring Simulation Conference 2019

**APRIL 29-MAY 2, 2019**

University of Arizona, Tucson, Arizona, USA



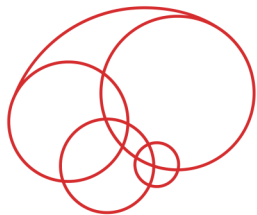
# *2019 SpringSim Technical Sponsors*

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# Organization Committee

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Tutorial Chair: Krzysztof Rechowicz

Student M&S Demo Session: Salim Chemlal and Mohammad  
Moallemi and Christopher J. Lynch

## *Welcome from the SpringSim '19 Conference Chairs*

On behalf of the Organizing Committee, it is our pleasure to welcome you to Tucson, Arizona, for SpringSim'19, the 2019 Spring Simulation Conference, organized by the Society for Modeling and Simulation International (SCS), which is the World's first-born international M&S society. SCS, from its foundation in 1952, has effectively engaged our community and continues to play a significant role in advancing research and its contribution to practice. SpringSim'19 is held at the University of Arizona, established in 1885, ranked in the top 25 among all public US universities and member of the Association of American Universities, the 62 leading public and private research universities.

A significant change introduced in SpringSim'19 is the shift from a multi-conference setup to a single conference consisting of tracks covering state-of-the-art developments in M&S theory, methodology, technology, and application in disciplines as diverse as advanced telecommunication, computer systems, cyber-physical systems, medicine and service systems, aviation and aerospace, environment, energy, cybersecurity and other industries.

We have an exciting program to offer our attendees this year. This includes a keynote speech, presentations of peer-reviewed original research papers, expert panel discussions, tutorials delivered by international experts that provide their knowledge to our community, and student demos and posters. This year's conference consists of the following five tracks: Annual Simulation Symposium (chaired by Saurabh Mittal and José Luis Risco), Theory and Foundations of Modeling and Simulation (chaired by Gregory Zacharewicz, Joachim Denil, Hessam Sarjoughian, and Mamadou Seck), High Performance Computing (chaired by Masha Sosonkina, Dongyoon Lee, David Easterling, Will Thacker, and Wirawan Purwanto), Communications and Networking Simulation (chaired by Abdolreza Abhari and Hala ElAarag) and Modeling and Simulation in Medicine (chaired by Jerzy W. Rozenblit and Johannes Sametinger)

We would like to express our sincere gratitude to track chairs, as well as to the technical program committee and reviewers for their time and expertise, and for the effort spent during the rigorous peer reviews process, which made it possible to setup a program of selected and high-quality presentations. We also express our gratitude to authors and tutorial presenters for submitting their relevant work to SpringSim'19.

We have an exciting distinguished keynote speaker this year again. We would like to thank Dr. Wendy J. Nilsen, Program Director for the Smart and Connected Health Program in the computer and Information Science and Engineering Directorate of the National Science Foundation, for graciously accepting to share her vast knowledge and experiences with us. Her talk will cover some current advances and a vision for a future of smart health.

# Welcome from the SpringSim '19 Conference Chairs

A remarkable news for SpringSim'19 is the technical co-sponsorship from both the Association of Computing Machinery (ACM) the Computer Society of the Institute of Electrical and Electronic Engineers (IEEE Computer Society). ACM is the world's largest educational and scientific computing society, delivering resources that advance computing as a science and a profession. IEEE is the world's largest technical and professional organization dedicated to advancing technology for the benefit of humanity. SCS co-sponsorship agreements with both ACM and IEEE allows the SpringSim'19 conference papers to be archived in both the ACM Digital Library and the IEEE Xplore digital library.

This year we are also continuing an initiative launched in recent years, the M&S Demo Session and Student Colloquium (led by Salim Chemlal, Mohammad Moallemi and Christopher J. Lynch), through which students are encouraged to showcase running simulations that they have authored in contributed papers.

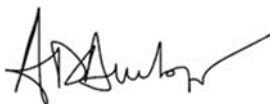
We would like to thank our sponsors that provided an essential contribution for offering an enhanced conference experience to our delegates. We sincerely thank the Virginia Modeling, Analysis & Simulation Center (VMASC) and VMASC Industry Association, the University of Agder with MODRN, CMSS, and CMAC, Prime Solution Group (PSG) Inc., Lockheed Martin and MOSIMTEC. We really appreciate their contribution.

Our sincere gratitude goes to the members of the Organization Committee, for their dedicated and tireless effort. The committee consists of Umut Durak (Publicity Chair), Alberto Del Barrio Garcia and Christopher J. Lynch (Proceedings Chairs), Krzysztof Rechowicz (Tutorial Chair), Saikou Y. Diallo (Sponsorship Chair), Gregory Zacharewicz (Awards Chair), and Kaleen Lawsure and Menion Croll (Proceedings Copy Editing Team). It was truly a team effort.

Special thanks go to the SCS Executive Director, Oletha Darensburg, and to Carmen Ramirez, for the expert and smooth running of conference coordination activities. Our profound gratitude goes finally to Saikou Y. Diallo, Vice President for SCS Conferences, and to Jerzy W. Rozenblit, SpringSim'19 Honorary Chair, for their exceptional support in shaping various aspects for SpringSim'19 over the organization process.

Once again welcome to Tucson, we wish you a great time during SpringSim'19, and we look forward to your continued participation in future SCS events.

*Andrea D'Ambrogio*  
General Chair  
University of Rome Tor  
Vergata, Italy



*Fernando Barros*  
Vice-General Chair  
University of Coimbra,  
Portugal



*Xiaolin Hu*  
Program Chair  
Georgia State University  
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## The Virginia Modeling, Analysis and Simulation Center (VMASC)

The Virginia Modeling Analysis and Simulation Center (VMASC), as an Interdisciplinary research center of Old Dominion University, consists of a high diverse group of Research Professors with professional linkages throughout the national and international network of like research interests. Additionally VMASC has developed a research methodology of building collegial teams with an architecture of diverse intellectual categories to research a common phenomenon. This has required the development of an intricate web of experts upon which to call together for a common effort. Additionally VMASC, in conjunction with the Old Dominion University Research Foundation (ODURF), has a flexible, responsive and effective set of contractual tools to enable construction of our teams and rapidly access needed research resources that extend beyond the normal university network into governmental and commercial research entities.

## VMASC Industry Association (VIA)

The VMASC Industry Association enjoys the partnership with ODU's VMASC to further the application of research and development and increase awareness of how modeling, simulation, analysis can be applied to some of our nation's most difficult challenges. This year we continued initiatives like scholarships, education support, sponsorships, and entrepreneurial contests, while expanding initiatives that increase the visibility of ODU MSVE and enhance collaborative R&D in modeling, simulation, and analysis. We also embarked on a robust strategic planning effort that is culminating in a strategy to enable the VMASC industry association to help ODU VMASC achieve its objectives while growing the local modeling and simulation industry

## Prime Solutions Group, Inc.

PSG develops systems and software solutions for increasingly complex systems in defense, energy and other domains challenged by Big Data environments where the transform from data to knowledge is the imperative. Our focus is on the control, archive, management and analysis of the digital tapestry that makes up current and future systems. We research new systems methods and techniques for applying latest Information Technology to assist with software modeling, simulation and analysis in scalable environments.



# Spring Sim'19 Sponsors

## Mosimtec

The Founders of MOSIMTEC met at The McDonough School of Business at Georgetown University. The team's background in engineering, technology, finance, and business lends itself well to support solutions providing company. We focus on just providing modeling & simulation services. This business model allows us to effectively partner with and complement clients, engineering firms, and management consultants. As an experienced team we are able to handle large projects building on techniques, tools and lessons learned from work done in various industries. The continuity of service we provide supports our clients today and into the future. We have key strategic alliances with software vendors, research institutions, and industry associations. We view these alliances as a key success factor in being able to provide our clients with best practice offerings and latest simulation solutions.

## Lockheed Martin

Lockheed Martin is a worldwide global security, aerospace and information technology company that is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services.

## MODRN (With University of Agder)

The Modeling Religion in Norway (MODRN) project is funded by The Research Council of Norway and supported by the University of Agder in Kristiansand, Norway. It is one of several research projects run by a consortium of international scholars in social science and computer modeling. The main collaborators in this consortium are the Center for Modeling Social Systems (CMSS) in Kristiansand, Norway, the Center for Mind and Culture (CMAC) in Boston, Massachusetts, and the Virginia Modeling Analysis and Simulation Center (VMASC) in Suffolk, Virginia. CMSS is part of the NORCE Norwegian Research Centre, which delivers innovative research in society, climate, energy, health care, technology and the environment. Researchers at CMSS use philosophical and computational modeling methodologies to analyze, simulate, and predict the conditions under which – and the mechanisms by which – psychological and political change occurs in human populations.

MODRN uses advanced strategies in computer simulation to develop “artificial

# SpringSim'19 Sponsors

## MODRN (With University of Agder) (Continued)

societies” in which scientists can evaluate the plausibility of theoretical hypotheses about the role of religion (and secularization) in social systems. These simulation tools can also help policy professionals perform “virtual experiments” that test the feasibility and explore the potential outcomes of practical proposals for social policy. The research teams associated with MODRN, CMSS, and its international partners are using these tools to understand and address social challenges such as the integration of immigrants in Europe, radicalization and conflict between religious groups, and the impact of education and existential security in secular, democratic countries.

## CMAC (With University of Agder)

The Center for Mind and Culture, Inc. (CMAC) is a non-profit organization in Boston, Massachusetts dedicated to non-partisan research. The network of expert researchers at CMAC tackles complex social problems such as illegal child trafficking, religious self-radicalization, proliferation of weapons of mass destruction, social integration of immigrants and refugees, and many other critical issues arising within what we refer to as the “mind-culture nexus.”

Many aspects of human life come together in the mind-culture nexus: thinking and emotion in brains, personality and identity, entanglement in environments, distinctive cultures, socio-economic conditions, and historic processes of change. Many fields of research generate insights into the mind-culture nexus, from neuroscience to sociology, biochemistry to public health, and engineering to philosophy. At CMAC, we gather experts from all these fields into problem-focused teams, discovering how to make headway on the previously intractable, extraordinarily complex, and deeply frustrating problems we face today.

These teams employ computational models, data analytics, historical interpretation, philosophical analysis of concepts and other methods to generate practical answers to the host of challenges confronting us. CMAC researchers rely on extensive collaboration to implement this leading-edge research, training, and public education.

# **KEYNOTE**

# Keynotes Information

**Title:** On the Road to Smart Health

**Author:** Wendy J. Nilsen, PhD

**Location:** University of Arizona, Ballroom North

**Day/Time:** April 30, 2019 08:30-10:00



**Abstract:**

Science is changing rapidly and new transdisciplinary approaches are resulting in transformative change across domains. Health and medicine have slowly begun to embrace convergent approaches that involve expertise from non-traditional disciplines, such as computing and engineering, which has resulted in new methods and findings that could not have happened a decade earlier. That said, the confluence of the adoption of electronic health records by the medical community, mobile technology, the Internet of Things and data science have created opportunities for health and medicine that have not yet been realized. Computing and engineering research fields are especially poised to contribute to these changes by bringing sophisticated techniques to partnerships in the biomedical realm. This talk will cover some current advances and a vision for a future of smart health.

**Short Biography:**

Wendy Nilsen, Ph.D. is the Program Director for the Smart and Connected Health Program in the computer and Information Science and Engineering Directorate of the National Science Foundation. Her work focuses on the intersection of 21st century computing, engineering and medicine/health. Her focus includes the supporting research, multidisciplinary dialogue and convergence training to encourage the development of a wide range of methods for data collection, advanced analytics and the creation of effective cyber-human systems. Her interests span the areas of sensing, analytics, cyber-physical systems, information systems, big data and robotics. More specifically, her efforts include: serving as co-chair of the Health Information Technology Research and Development working group of the Networking and Information Technology Research and Development Program; the lead for the NSF/NIH Smart and Connected Health announcement; convening workshops to address methodology in technology in health research; serving on numerous federal technology initiatives; and, leading training institutes. Prior to joining NSF, Wendy was at the National Institutes of Health.

# **Conference Committees**



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Kristin Rozier, Iowa State University, USA

Kaan Gorur, Roketsan, Turkey

Bharvi Chhaya, Embry-Riddle Aeronautical University, USA

## Sub-Track: Humans, Societies and Artificial Agents (HSA)

Alex Nielsen, Old Dominion University, USA

Alican Kucukozyigit, Old Dominion University, USA

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Levent Yilmaz, Auburn University, USA

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Akshay Rajhans, MathWorks, USA

Srikanth Yoginath, Oak Ridge National Laboratory, USA

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Jyotirmoy Deshmukh, University of Southern California, USA  
Tommaso Dreossi, University of California, Berkeley, USA  
Georgios Fainekos, Arizona State University, USA  
Dejan Nickovic, Austrian Institute of Technology, Austria  
Ivan Ruchkin, Carnegie Mellon University, USA

## Sub-Track: Cyber Security Engineering (CSE)

Biswajit Biswal, South Carolina State University, USA  
Charles Kamhoua, Army Research Lab, USA  
Uttam Ghosh, Vanderbilt University, USA  
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# GENERAL INFORMATION

# General Information

## Registration

Your registration for SCS's 2019 Spring Simulation Multi-conference (SpringSim'19) includes morning and afternoon breaks each day, the Monday evening reception and access to all sessions, tutorials and offsite events (unless otherwise noted).

- **Registration Hours (The University of Arizona, Student Union, Grand Ballroom Foyer, Level 3)**

- ◇ **Monday, April 29, 2019** 07:00 –17:00\* \*\*
- ◇ **Tuesday, April 30, 2019** 07:00–17:00
- ◇ **Wednesday, May 1, 2019** 07:00–17:00
- ◇ **Thursday, May 2, 2019** 07:00–12:00

*Please note that the Registration Desk will be closed for lunch Mon-Wed from 1200-1330*

- **Breakfast (The University of Arizona, Student Union, Atrium, Level 3)**

- ◇ **Tuesday and Wednesday April 30 and May 1, 2019** 07:00–08:00

- **Coffee Breaks (The University of Arizona, Student Union, Atrium, Level 3)**

- ◇ **Monday, April 29, 2019** 10:00–1030 | 15:00-15:30 \*\*\*
- ◇ **Tuesday and Wednesday, April 30 and May 1, 2019** 10:00 -10:30 | 15:00-15:30
- ◇ **Thursday, May 2, 2019** 10:00 - 10:30

- **Plenary Session and Keynotes (The University of Arizona, Student Union, Grand Ballroom North, Level 3)**

- ◇ **Tuesday 08:30-10:00** - SCS Keynote: Dr. Wendy J. Nilsen, PhD
- ◇ (See Keynote pages for more information on the speakers)

\*\*\* Tucson Marriott University Park-880 E 2nd St, Tucson, AZ 85719

# General Information

## Conference Meetings & Events

- • **Sunday:**            SCS Board Meeting (09:00); Tucson Marriott University Park  
                              880 E 2nd St, Tucson, AZ 85719  
                              \*SCS Board Members
  
- • **Monday:**            Tutorials (08:45–18:00); Tucson Marriott University Park  
                              880 E 2nd St, Tucson, AZ 85719
  
- • **Tuesday**            Plenary Session and Keynote Address: (08:30-10:00)  
  
                              SpringSim 2020 Organization Meeting (12:00-13:30)  
                              \*By invitation only  
  
                              Social (17:30-19:00); The University of Arizona, Student Union,  
                              Grand Ballroom Foyer and Atrium, Level 3  
                              \*All conference attendees invited
  
- • **Thursday**            Demo Session and Student Colloquium (09:00-11:30)  
  
                              University of Arizona Mirror Lab Tour– 527 National  
                              Championship Drive (12:45-14:15)

# General Information

## **Best Paper Award**

The Overall Best Paper Award for SpringSim'19 will be presented at Tuesday's Plenary Session.

## **Posters**

The posters will be on display throughout the week to be viewed near the break area.

## **Demo Session**

The purpose of the M&S Demo Session is to engage students in simulation development, implementing M&S theories in the simulation application. The simulation environment can be as simple as a desktop M&S application or remote M&S interface on a tablet device, to as complicated as M&S tool running on a distributed platform. The demo will include execution of at least a single simulation scenario on desktop or mobile platform and displaying the results of the simulation. Use of open-source tools and libraries can be incorporated into the system, however, the use of commercial simulation tools is not allowed in the demo. Allotted time for each demo is 15mins with 5mins of Q&A.

## **Tuesday Reception**

There will be a Welcome Reception located The University of Arizona, Student Union, Grand Ballroom Foyer and Atrium, Level 3, open to all SpringSim'19 attendees, on Tuesday, April 30, 2019, from 1730-1900. Hors d'oeuvres served.



# Upcoming SCS Events

## Upcoming SCS Conference

2019 Summer Simulation Conference (SummerSim'19)

July 22–July 24, 2019

Technical University of Berlin, Berlin, Germany

The Summer Simulation Conference 2019 (SummerSim'19) is a combination of the 51th Summer Computer Simulation (SCSC), and the 22st International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS). SummerSim is SCS's premier international conference in cooperation with ACM SIGSIM. The conference focuses on modeling and simulation, tools, theory, methodologies and applications and provides a forum for the latest R&D results in academia and industry. We encourage you to take the opportunity to experience the tutorials, tracks, and workshops that will be available.

The conference includes keynote speeches presented by technology and industry leaders, technical sessions, professional development courses and seminars, as well as vendor exhibits. Scientists, engineers, managers, educators, and business professionals who develop or use simulation tools are invited to participate and present original papers. Proposals are solicited for papers, panels, tutorials, workshops, seminars, exhibits, social activities and for other presentation, discussion and sponsorship formats. People are always welcome to benefit by taking an organizing role. SummerSim'19 offers many ways to promote simulation products and to enhance corporate images. You are invited to use the Summer Simulation Conference in ways that best serve your interests.

The following symposia are scheduled:

- International Symposium on Performance Evaluation of Computer and Telecommunication Systems 2019 (SPECTS'19)
- Summer Computer Simulation 2019 (SCSC'19) - See website for a full list of sub-tracks.

Please visit [www.scs.org](http://www.scs.org) for key dates and deadlines, or call the SCS office at (858) 277-3888

# Tutorials Information

Session Chair: Rhys Goldstein

Date: Monday, April 29, 2019

Location: Marriott Tucson University Park Hotel

1. Title: Integrating Hardware and Software in Simulation Development: a Flight Simulator Example

TIME: 10:30 – 12:00

**SPEAKER:** John Sokolowski

2. Title: Information and Process Modeling for Simulation: How to Model an Economy

TIME: 08:45 – 10:15

**SPEAKER:** Gerd Wagner

3. Title: From Mental Models to Computational Models: Theory, Software, and Applications of Fuzzy Cognitive Maps

TIME: 13:00 – 14:30

**SPEAKER:** Philippe Giabbanelli

4. Title: Agent-Based Modeling with Symmetric DEVS

TIME: 14:45 – 16:15

**SPEAKER:** Rhys Goldstein

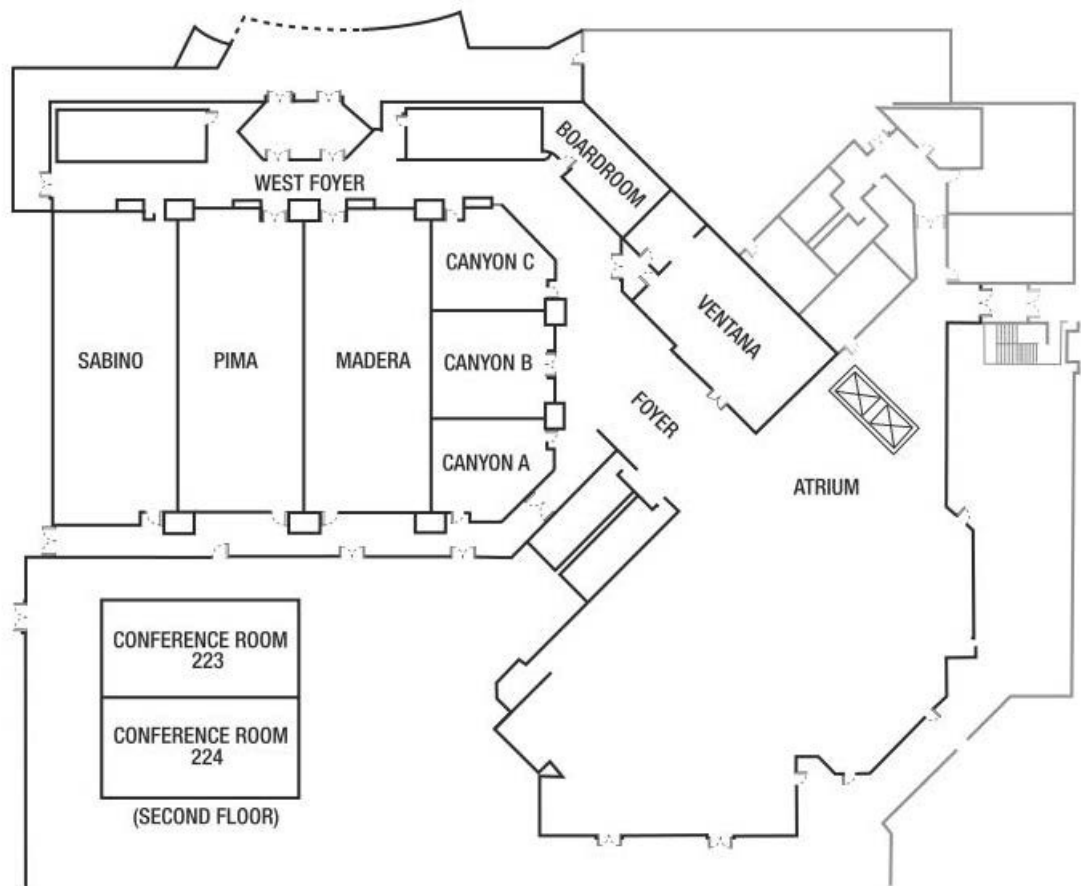
5. Title: Introduction to Strategic Engineering: A New Discipline Combining Simulation, Big Data, AI/IA to Support Strategic Decision Making

TIME: 16:30 – 18:00

**SPEAKERS:** Agostino Bruzzone and Kirill Sinelshchikov

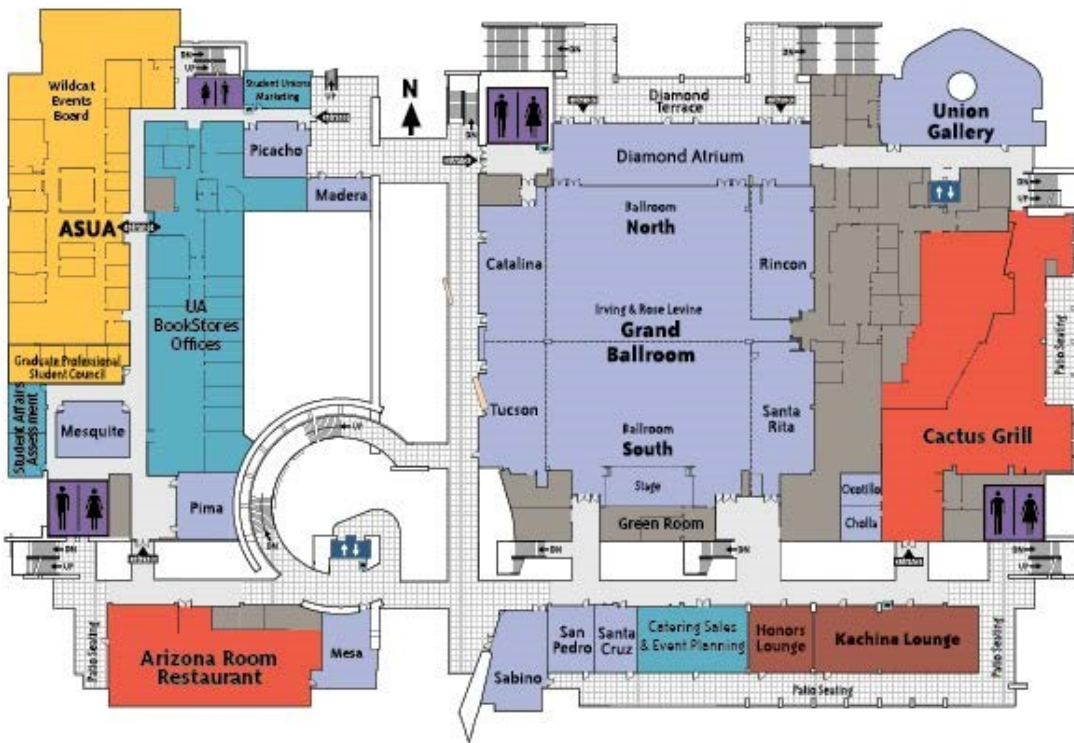
# **MAPS**

*Marriott Tucson*  
*University Park Hotel*

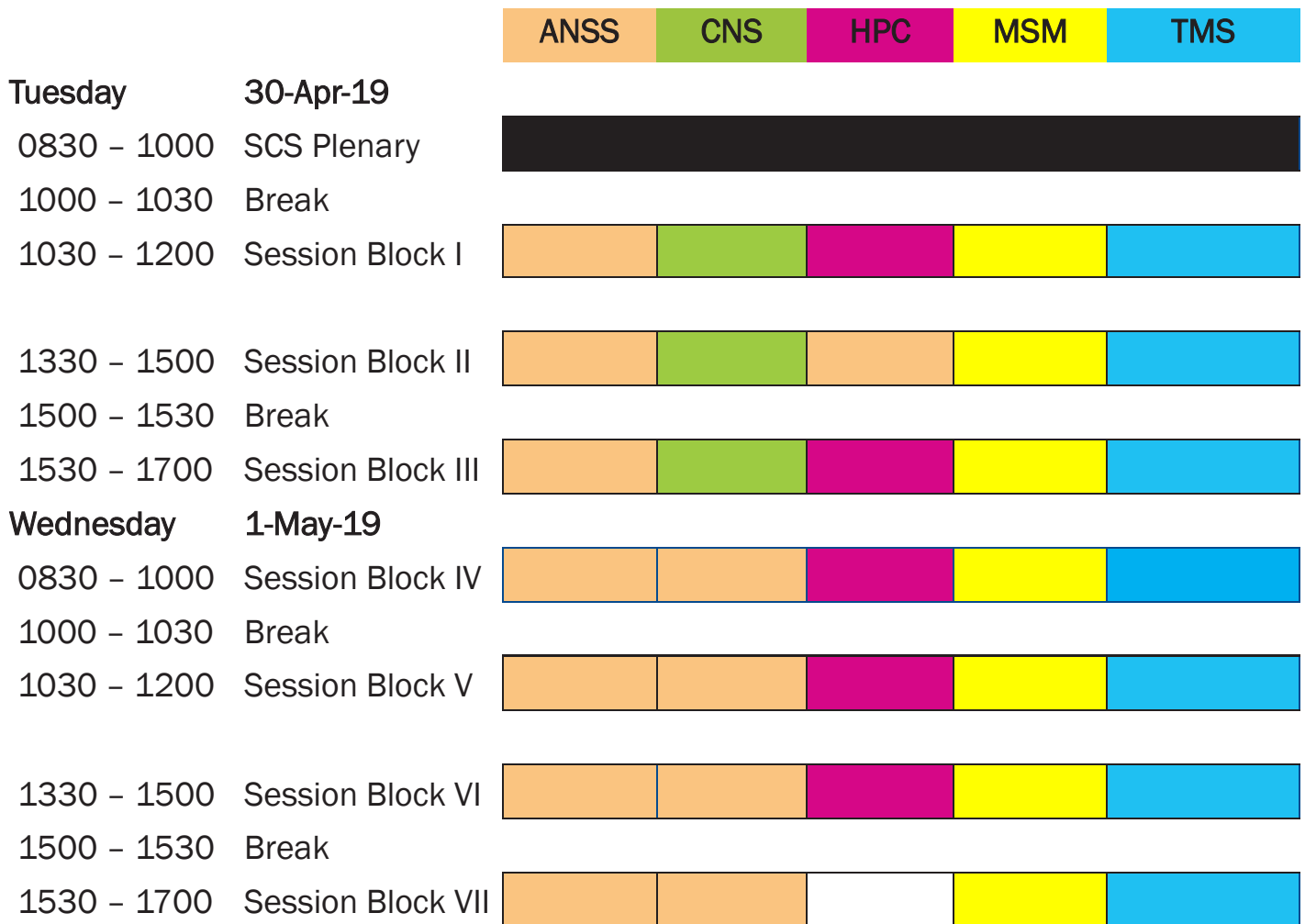


# University of Arizona Student Union

## Memorial Center Level 3



# SpringSim'19 Sessions at a Glance



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# **Agendas**



# 51th Annual Simulation Symposium (ANSS)

## Agenda

**Tuesday, April 30, 2019**

**Session I 10:30–12:00 Room: Catalina**

Panel I: Best Practices in Developing Artificial Societies

Moderator: Wesley Wildman (Boston University)

Panelists: Kathleen Carley (Carnegie Mellon), Samarth Swarup (Virginia Tech), Philippe Giabbannelli (Furman)

**Session II 13:30–15:00 Room: Catalina Chair: Phillippe Giabbannelli**

Philosophy of Science and Artificial Society Simulations

Modeling Metaphysics: the Rise of Simulation and the Reversal of Platonism (F. LeRon Shults)

Modeling Ethics: Reflections at the Intersection of Ethics and Simulation (Wesley Wildman)

Modeling Epistemology: Examples and Analysis in Computational Philosophy of Science (Patrick Grim)

**Session III 15:30-17:00 Room: Catalina**

Panel II: Philosophy of Science and Artificial Society Simulation

Moderator: Andreas Tolk (MITRE)

Panelists: Wesley Wildman (Boston University), Patrick Grim (Stony Brook), F. LeRon Shults (University of Agder)

**Tuesday, April 30, 2019**

**Session II 13:30-15:00 Room: Tucson Chair: Saurabh Mittal**

Behavior Modeling and Multi-agent Systems

A Behavior Annex for AADL Using the DEVS Formalism (Ehsan Ahmad and Hessam Sarjoughian)

Heterogeneous Crowd Simulation (Srivastav R. Janapalli, Omar Hesham and Gabriel Wainer)

ART-GCS: an Adaptive Real-Time Multi-Agent Ground Control Station (Juan A. Bonache-Seco, José A. López-Orozco, Eva Besada-Portas and José L. Risco-Martín)

# 51th Annual Simulation Symposium (ANSS)

## Agenda

**Wednesday, May 1, 2019**

**Session IV 08:30–10:00 Room: Catalina Chair: Hamdi Kavak**

Best Practices to Develop Artificial Societies

Adequacy: What Makes a Simulation Good Enough?( Samarth Swarup)

Ideal, Best, and Emerging Practices in Creating Artificial Societies (Philippe Giabbanelli, Alexey A. Voinov, Brian Castellani and Petter Törnberg)

Simulating Complex Social-behavioral Systems (Kathleen Carley)

**Session V 10:30-12:00 Room: Catalina Chair: Jose Luis Risco Martin**

Urban Growth

A Cell-DEVS Model for Logistic Urban Growth (Bruno St-Aubin and Gabriel Wainer)

DSLEUTH: a Distributed Version of SLEUTH Urban Growth Model (Gargi Chaudhuri and Samantha Foley)

Co-Designing Social Simulation Models for Policy Advise: Lessons Learned from the INFSO-SKIN Study (Petra Ahrweiler, Nigel Gilbert and Demian Frank)

**Session VI 13:30-15:00 Room: Catalina Chair: Khadijeh Salimi**

New Practices in Human Simulations

Advancing Simulation Experimentation Capabilities with Runtime Interventions (Joonseok Kim, Hamdi Kavak, Umar Manzoor and Andreas Zufle)

Interacting with Human Simulations: A User Experience Approach (Ivan Puga-Gonzalez and Saikou Diallo)

Drafting Agent-based Modeling into Basketball Analytics (Matthew Oldham and Andrew Crooks)

# 51th Annual Simulation Symposium (ANSS)

## Agenda

**Session VII 15:30-17:00 Room: Catalina Chair: Joonseok Kim**

### Artificial Societies in Policy-Making

A Value Sensitive ABM of the Refugee Crisis in the Netherlands (Ross Gore, Phillip Wozny, Frank Dignum, LeRon Shults, Christine Boshuijzen - Van Burken and Lamber Royakkers)

The Role of Elites in the Diffusion of Social Norms of Humanitarianism (Khadijeh Salimi, Erika Frydenlund, Jose Padilla, Hanne Haaland and Hege Wallevik)

Park and Parcel: An Agent-based Exploration of Last-Mile Freight Delivery Behavior as it Relates to Parking (Sarah Wise, Kostas Cheliotis, Oliver Bates, Fraser McLeod, Tom Cherrett, Julian Allen, Maja Piecyk and Tolga Bektas)

## Wednesday, May 1, 2019

**Session IV 08:30-10:00 Room: San Pedro Chair: Akshay Rajhans**

### Novel Applications

A Real-time Mechanical Structures Monitoring System Based on Digital Twin, IoT and Augmented Reality (Roberto Revetria, Flavio Tonelli, Lorenzo Damiani, Melissa Demartini, Federico Bisio and Nicola Peruzzo)

Bond Graph Model of a Pivoting Axle Concept Vehicle (Alex Beckerman, Donald Margolis and Jordan McCrone)

**Session V 10:30-12:00 Room: San Pedro Chair: Akshay Rajhans**

### Industrial Applications

Scenario-based V&V in a Maritime Co-simulation Framework (Arnold Akkermann and Bjørn Åge Hjøllo)

A Bond Graph Approach to Analysis and Simulation of a Coupled Torsion Beam Axle (D. Jordan McCrone, Donald Margolis and Namho Kim)

# 51th Annual Simulation Symposium (ANSS)

## Agenda

Wednesday, May 1, 2019

**Session VI 13:30-15:00 Room: San Pedro Chair: Bharvi Chhaya**

AviSim

Multi-resolution Modeling for Adaptive UAV Service Systems (Bernard Zeigler and Doohwan Kim)

From Simulation to Runtime Verification and Back: Connecting Single-Run Verification Techniques (Kristin Yvonne Rozier)

Multi-domain Flight Simulation with the DLR Robotic Motion Simulator (Andreas Seefried, Alexander Pollok, Richard Kuchar, Matthias Hellerer, Martin Leitner, Daniel Milz, Christian Schallert, Thiemo Kier, Gertjan Looye and Tobias Bellmann)

**Session VII 15:30–17:00 Room: San Pedro Chair: Sachin Shetty**

Cyber Attack Analysis

Security Analysis of Multiple SDN Controllers Based on Stochastic Petri Nets (Laila Almutairi, Sachin Shetty and Liang Hong)

Multimodal Graph Analysis of Cyber Attacks (Nirnimesh Ghose, Loukas Lazos, Jerzy Rozenblit and Ronald Breiger)

Pledge: a Private Ledger Based Decentralized Data Sharing Framework (Ronald Doku and Danda Rawat)

# 22nd Communications and Networking (CNS)

## Agenda

**Tuesday, April 30, 2019**

**Session I 10:30-12:00 Room: San Pedro Chair: Susan Lincke**

Security

Unequally Powered Cryptography with Physical Unclonable Functions for Networks of Internet of Things Terminals (Bertrand Cambou)

Modeling Security Risk with Three Views (Susan Lincke and Madhavi Adavi)

Robustness of Recovery in Locating Array-based Screening Experiments (Stephen Seidel, Charles Colbourn and Violet Syrotiuk)

**Session II 13:30-15:00 Room: San Pedro Chair: Hala Alarag**

Paper and Panel

Panel: Algorithmic Foundations of Programmable Matter

Moderator: Andrea Richa

Paper: Analysis of Pacing Algorithms for Proactive Chat Campaigns (Nikolay Korolev and Herbert Ristock)

**Session III 15:30-17:00 Room: San Pedro Chair: Abdolreza Abhari and Yelena Rykalava**

Network Applications/Simulation

Simulation Study of Interconnection Networks with Virtual Cut-Through Routing (Yelena Rykalova and Lev Levitin)

Scalable Machine Learning Algorithms for a Twitter Followee Recommender System (Sepideh Banihashemi, Jason Li and Abdolreza Abhari)

Scalable Pattern Recognition and Real Time Tracking of Moving Objects (Dipak Pudasaini and Abdolreza Abhari)

# 27th High Performance Computing (HPC)

## Agenda

**Tuesday, April 30, 2019**

**Session I 10:30-12:00 Room: Tucson Chair: Masha Sosonkina**

Algorithms I

Hardware Acceleration of Reaction-diffusion Systems: a Guide to Optimization of Pattern Formation Algorithms Using OpenACC (Ruth Falconer, Alasdair Houston, Xavier Portell and Wilfred Otten)

Adaptive Particle Sampling and Resampling in Parallel/Distributed Particle Filters (Xudong Zhang and Feng Gu)

High Performance Erasure Coding for Very Large Stripe Sizes (Walker Haddock, Matthew Curry, Purushotham Bangalore and Anthony Skjellum)

**Session III 15:30-17:00 Room: Tucson Chair: Ruth Falconer**

Algorithms II-Matrix Operations

Systolic Sparse Matrix Vector Multiply in the Age of TPUs and Accelerators (Euripides Montagne and Rina Suros)

Layer Based Partition for Matrix Multiplication on Heterogeneous Mesh Networks (Yang Liu, Li Shi, Jason Zhang and Thomas Robertazzi)

Enhancing Asynchronous Linear Solvers through Randomization (Evan Coleman, Erik Jensen and Masha Sosonkina)

**Wednesday, May 1, 2019**

**Session IV 08:30-10:00 Room: Tucson Chair: Masha Sosonkina**

Database and Network Scheduling

A Simulation Tool for a Large-scale NoSQL Database (Gabriel Ovando-Leon, Luis Veas-Castillo, Mauricio Marin and Veronica Gil Costa)

Data Center Network Flow Scheduling Mechanism Based on HGSAFS Algorithm (Peng Li, Baozhou Luo, He Xu and Ruchuan Wang)

Gem5-X: a Gem5-Based System Level Simulation Framework to Optimize Many-Core Platforms (Yasir Mahmood Qureshi, William Andrew Simon, Marina Zapater, Katzalin Olcoz and David Atienza)

# 27th High Performance Computing (HPC)

## Agenda

Wednesday, May 1, 2019

**Session V 10:30-12:00 Room: Tucson Chair: David Easterling**

Machine Learning and Power Management

ML Guided Energy-performance Trade-off Estimation for Uncore Frequency Scaling (Solomon Abera Bekele, M Balakrishnan and Anshul Kumar)

Graph Neural Network Analysis of Layered Material Phases (Kuang Liu, Ken-ichi Nomura, Pankaj Rajak, Rajiv K. Kalia, Aiichiro Nakano and Priya Vashishta)

Recurrent Neural Network for Classifying of HPC Applications (Trong-Ton Pham, Mathieu Pister and Philippe Couvée)

**Session VI 13:30-15:00 Room: Tucson Chair: Dongyoon Lee**

I/O and Memory Management

More Exploration to Composable Infrastructure: the Application and Analysis of Composable Memory (Wo-Hao Ruan, Cheng-Yueh Liu, Matt Hsiao, Andy Liang, Kng-Yu Lin, Kong-Yu Shiu and Shih-Hao Hung)

Comparing Frequency Scaling Efficacy on Different Memory Technologies (Vaibhav Sundriyal, Bryce Westheimer and Masha Sosonkina)

LASSi: Metric Based I/O Analytics for HPC (Karthee Sivalingam, Harvey Richardson, Adrian Tate and Martin Lafferty)

# Modeling and Simulation in Medicine (MSM)

## Agenda

**Tuesday, April 30, 2019**

**Session I 10:30-12:00 Room: Sabino Chair: Jerzy Rozenblit**

### Analysis and Design I

An Analysis on the Research Orientations in Healthcare Simulation Modeling (Junqiao Chen, Mónica Duarte Oliveira, Alexandra Fernandes and David Chun)

Window-based Statistical Analysis of Timing Subcomponents for Efficient Detection of Malware in Life-critical Systems (Nadir Carreon Rascon, Allison Gilbreath and Roman Lysecky)

Towards Musculoskeletal Simulation-Aware Fall Injury Mitigation: Transfer Learning with Deep CNN for Fall Detection (Haben Yhdego, Jiang Li, Christopher Paolini, Mahasweta Sarkar, Steven Morrison, Hamid Okhravi and Michel Audette)

**Session II 13:30-15:00 Room: Sabino Chair: Johannes**

**Sametinger**

### Surgical Training I

Single Shot State Detection in Simulation-based Laparoscopy Training (Kuo Shiuang Peng, Minsik Hong, Jerzy Rozenblit and Allan Hamilton)

Evaluation of Learning Curve and Peripheral Awareness Using a Novel Multiresolution Foveated Laparoscope (Marissa Lovett, Jeremy Katz, Sangyoon Lee, David Biffar, Mike Nguyen and Allan Hamilton)

Enhancing a Laparoscopy Training System with Augmented Reality Visualization (Hao Jiang, Siqing Xu, Minsik Hong, Andrei State, Fan Feng, Jerzy Rozenblit and Henry Fuchs)

**Session III 15:30-17:00 Room: Sabino Chair: Michel Audette**

### Surgical Training II

Proficiency Based Planner for Safe Path Planning and Applications in Surgical Training (Shubham Jain, Minsik Hong and Jerzy Rozenblit)

DDDAS-based Adaptive Surgical Simulation Using Mixed Reality (Saurabh Jain, Seunghan Lee, Samuel Barber, Eugene Chang and Young-Jun Son)



# Modeling and Simulation in Medicine (MSM)

## Agenda

**Wednesday, May 1, 2019**

**Session IV 08:30-10:00 Room: Sabino Chair: Roman Lysecky**

### Medical Simulation

When Hollywood Inspires Medicine: New Concepts in the Design and Architecture of Medical Simulation Facilities to Support Inter-Professional Healthcare Education and Training (Allan Hamilton, Marissa Lovett, Jonathan Kanda, David Biffar and Ronald Weinstein)

The Use of Remote and Traditional Facilitation to Evaluate Telesimulation to Support Inter-professional Education and Processing in Healthcare Simulation Training (Coy Collins, Marissa Lovett, David Biffar, Karen Holder, Mike Holcomb, Peter Yonsetto, Ronald Weinstein and Allan Hamilton)

Predictive Diagnosis of Fatal Heart Rhythms Using Wearables (Jeno Szep, Zain Khalpey and Salim Hariri)

**Session V 10:30-12:00 Room: Sabino Chair: Minsink Hong**

### Deep Learning

Comparison of Different Machine Learning Approaches to Model Stroke Subtype Classification and Risk Prediction (Luis García Terriza, José L. Risco-Martín, Jose L. Ayala, Gemma Reig Roselló and Juan Miguel Camarasaltas)

Cell Nuclei Detection and Segmentation for Computational Pathology Using Deep Learning (Kemeng Chen, Ning Zhang, Linda Powers and Janet Roveda)

A Machine Learning Model to Predict Seizure Susceptibility from Resting-State fMRI Connectivity (Rachael Garner, Marianna La Rocca, Giuseppe Barisano, Paul Vespa, Arthur W Toga and Dominique Duncan)

# Modeling and Simulation in Medicine (MSM)

## Agenda

Wednesday, May 1, 2019

Session VI 13:30-15:00 Room: Sabino

Panel: Challenges in Healthcare Simulation—Clinical and Research Perspectives

Moderator: Jerzy Rozenblit

Panelist: Ronald Weinstein, MD, Roman Lysecky, PhD, Allan Hamilton, PhD., Dominique Duncan, Ph.D.

Section VII 15:30-17:00 Room: Sabino Chair: Janet Roveda

Analysis and Design II

Simulation Model of the Control System of Portable Boxes for Blood Bags Transport (Lorenzo Damiani, Roberto Revetria and Stefano Arecco)

Applying Support Vector Machine to Electronic Health Records for Cancer Classification (Xudong Zhang, Jiehao Xiao and Feng Gu)

On Autistic Behavior Model (Przemysław Śliwiński)

# 12th Theory and Foundations of Modeling & Simulation (TMS)

## Agenda

Tuesday, April 30, 2019

Session I 10:30-12:00 Room: Rincon Chair: Gregory Zacharewicz

### Modeling Methodology I

A Library of Embedded Platform Components for the Simulation of Real-Time Embedded Systems (Joost Mertens, Ken Vanherpen, Joachim Denil and Paul De Meulenaere)

Valid (Re-)Use of Models-of-the-Physics in Cyber-Physical Systems Using Validity Frames (Bert Van Acker, Yuri Durodie, Alexander Van Bellinghen, Kris Vanstechelman, Paul De Meulenaere and Joachim Denil)

A Web-service Framework for the Water Evaluation and Planning System (Hessam Sarjoughian and Mostafa Fard)

Session II 13:30-15:00 Room: Rincon Chair: James Nutaro

### Distributed Simulation

Reducing Computational Cost of Large-scale Simulations Using Opportunistic Model Approximation (Stig Bosmans, Siegfried Mercelis, Peter Hellinckx and Joachim Denil)

Distributed Simulation for a Modeling and Simulation Tool: Papyrus (Simon Gorecki, Judicael Ribault, Greg Zacharewicz, Nicolas Perry and Yves Ducq)

Automated Generation of FOM Modules for HLA-based Distributed Simulations (Paolo Bocciarelli, Andrea D'Ambrogio, Andrea Giglio and Emiliano Paglia)

# 12th Theory and Foundations of Modeling & Simulation (TMS)

## Agenda

**Tuesday, April 30, 2019**

**Session III 15:30-17:00 Room: Rincon Chair: Gabriel Wainer**

Modeling Methodology II

Metamodeling Activities for Hierarchical Component-based Models (Abdurrahman Alshareef and Hessam Sarjoughian)

Distinguishing Resource Type in BPMN Workflows at Simulation Phase (Kawtar Ougaabal, Grégory Zacharewicz, Yves Ducq and Said Tazi)

A Sequential Neighbor Exploratory Experimental Design Method for Complex Simulation Metamodeling (Yonglin Lei, Wei Dong, Zhi Zhu and Hessam Sarjoughian)

**Wednesday, May 1, 2019**

**Session IV 08:30-10:00 Room: Rincon Chair: Gary Mayer**

DEVS Modeling

A New Modeling Interface for Simulators Implementing the Discrete Event System Specification (James Nutaro)

Definition of a Transparent Constraint-based Modeling and Simulation Layer for the Management of Complex Systems (Kevin Henares, José Luis Risco Martín and Marina Zapater)

Analyzing the Impact of Quantum Size on the Accuracy and Performance of Cell-DEVS Fire Models (Ala'a Al-Habashna, Cristina Ruiz Martin and Gabriel Wainer)

**Session V 10:30-12:00 Room: Rincon Chair: Claudia Frydman**

DEVS PhD Award

An Integrative Process Mining Approach to Mine Discrete Event Simulation Model from Event Data (Yan Wang)

Quality of Experience-aware Progressive Video Caching and Adaptive Device-to-Device Video Streaming for Cellular Networks with High User Density (Ala'a Al-Habashna)

A Framework to Study the Resilience of Organizations: A Case Study of a Nuclear Emergency Plan (Cristina Ruiz Martin)

# **12th Theory and Foundations of Modeling & Simulation (TMS)**

## **Agenda**

**Session VI 13:30-15:00 Room: Rincon Chair: Jose Luis Risco Martin**

### DEVS Applications

Design and Implementation of a Building Control System in Real-time DEVS (Kyle Bjornson, Benjamin Earle, Joseph Boi-Ukeme and Gabriel Wainer)

Data Assimilation Using Spatial Partition-based Particle Filtering for Freeway Traffic Simulation (Yuan Long, Peisheng Wu and Xiaolin Hu)

Control of a Quadcopter Application with DEVS (Cristina Ruiz-Martin, Ala'a Al-Habashna, Gabriel Wainer and Laouen Belloli)

**Session VII 15:30-17:00 Room: Rincon Chair: Doohwan Kim**

### Industry M&S

A Modular Stabilization Approach for Chattering-free Simulation (Fernando Barros)

Modeling & Simulation of Software Architectures of Systems-of-Systems: an Industrial Report on the Brazilian Space System (Valdemar Graciano Neto, Carlos Paes, Adair Rohling, Wallace Manzano and Elisa Nakagawa)

Trace-driven Simulation of a Software Development Process Using Fine-grained Repository Data (Michael Van Hilst and Marella Big Mountain)

# Student M&S Demo/Student Colloquium/Poster

## Agenda

Thursday May 2, 2019

Location: Student Union Gallery

Session I 09:00-11:30

Chair: Salim Chemlal

### M&S Demo

DEVS Controller of a Quadcopter (Cristina Ruiz Martin, Gurveen Kaur, Mandeep Singh Bal and Gabriel Wainer)

Augmented Reality Overlay for Computer-guided Surgical Training (Andre Schreiber, Misik Hong and Jerzy Rozenblit)

A Cell-DEVS Model for Logistic Urban Growth (Bruno St-Aubin and Gabriel Wainer)

A Software Security Framework for Medical Cyber-physical Systems (Aakarsh Rao, Roman Lysecky and Jerzy Rozenblit)

O-train Controller Using Discreet Event Methodology for Embedded Systems (Navneet Kaushal, vithika Joshi, Joseph Boi-Ukeme and Gabriel Wainer)

Scenario-based V&V in a Maritime Co-Simulation Framework (Arnold Akkermann)

Cell-Devs Modeling and Simulation of Pedestrian Behavior (Ala'a Al-Habashna and Gabriel Wainer)

### Student Colloquium

Aircraft Survivability Modeling and Simulation (Ian Lunsford and Thomas Bradley)

Machine Learning Electrical Energy Load Prediction Using Historical Load and Weather Data (Erik Kleine, John Cadigan, Christopher Chen, Yichao Feng, Seong-kyung Lim and Cassidy Yoshiyama)

DDDAS-based Adaptive Surgical Simulation Using Mixed Realty (Saurabh Jain, Seunghan Lee, Samuel Barber, Eugene Chang and Young-Jun Son)

### Short Papers

Trace-driven Simulation of a Software Development Process Using Fine-grained Repository Data (Michael Van Hilst and Marella Big Mountain)

# Things to do in Tucson

# Things to Do in Tucson

## Arizona-Sonora Desert Museum

2021 N Kinney Rd, Tucson, AZ 85743

Phone: (520) 883-1380

Website: <https://www.desertmuseum.org/>

The Arizona-Sonora Desert Museum is a 98-acre zoo, aquarium, botanical garden, natural history museum, publisher, and art gallery founded in 1952. Located just west of Tucson, Arizona, it features two miles of walking paths traversing 21 acres of desert landscape.

## Pima Air & Space Museum

6000 E Valencia Rd, Tucson, AZ 85756

Phone: (520) 574-0462

Website: <http://www.pimaair.org/>

The Pima Air & Space Museum, located in Tucson, Arizona, is one of the world's largest non-government funded aerospace museums. The museum features a display of nearly 300 aircraft spread out over 80 acres on a campus occupying 127 acres. It has also been the home to the Arizona Aviation Hall of Fame since 1991.

## Old Tucson

201 Kinney Rd, Tucson, AZ 85735

Phone: (520) 883-0100

Website: <http://oldtucson.com/>

Old Tucson is one of Arizona's top Wild West attractions, featuring live action stunt shows, musicals and live entertainment, vintage rides for the kids, genuine southwest BBQ and special events throughout the season. Step back in time as you make your way through town, walking the same streets made famous by movie legends such as John Wayne, Clint Eastwood, Elizabeth Taylor, Steve Martin, Sharon Stone and Martin Short. Immortalized in more than 400 films and commercial productions, Old Tucson remains the region's premiere film location.

## Reid Park Zoo

3400 E Zoo Ct, Tucson, AZ 85716

Phone: (520) 791-3204

Website: <https://reidparkzoo.org/>

The Reid Park Zoo, founded in 1967, is a 24-acre city-owned and operated non-profit zoo located within Reid Park in Tucson, Arizona. The zoo features more than 500 animals. It was unofficially established in 1965 by Gene Reid, the parks and recreation director at the time.

## Tucson Botanical Gardens

2150 N Alvernon Way, Tucson, AZ 85712

Phone: (520) 326-9686

Website: <https://tucsonbotanical.org/>

The Tucson Botanical Gardens is a five-and-a-half-acre collection of sixteen residentially scaled urban gardens in Tucson, Arizona, United States. Paths connect these gardens, which include a Zen Garden, a Prehistoric Garden, a Barrio Garden, a Butterfly Garden, a Xeriscape Garden, and a Children's Garden.



# Things to Do in Tucson

## University of Arizona Museum of Art

1031 Olive Rd, Tucson, AZ 85721

Phone: (520) 621-7567

Website: <https://artmuseum.arizona.edu/>

The University of Arizona's Museum of Art is an art museum in Tucson, Arizona, operated by the University of Arizona. The museum's permanent collection includes more than 6,000 works of art, including paintings, sculptures, prints and drawings with an emphasis on European and American fine art from the Renaissance to the present.

## The Gaslight Theatre

7010 E Broadway Blvd, Tucson, AZ 85710-2805

Phone: (520) 886-9428

Website: <https://thegaslighttheatre.com/>

Theater with a Western vibe features casual food & concessions along with comedies 6 nights a week.

## La Encantada

2905 E Skyline Dr, Tucson, AZ 85718

Phone: (520) 299-3566

Website: <https://www.laencantadashoppingcenter.com>

La Encantada provides a luxury shopping experience with exclusive retailers – like Apple, Michael Kors, Anthropologie and more – in a tranquil setting offering breathtaking views of the Catalina Mountains. Along with being the hot spot for fashion mavens, La Encantada is the Foothill's premier dining and social destination.

## Old Town Artisans

201 N Court Ave, Tucson, AZ 85701

Phone: (520) 620-1725

Website: <https://oldtownartisanstucson.com/>

19th-century adobe building offering shops & galleries stocked with local crafts, plus a courtyard. Old Town Artisans is located on the site of El Presidio San Augustin del Tucson, the fort built by the Spanish in 1775 to stake claim to the northern frontier of New Spain. The 1882 Tucson Directory lists a variety of early residents, including assayers, clerks, a ladies' nurse and a grocery store. Stroll through the shops and you will see original ceilings made of saguaro cactus ribs, packing crates, and whiskey barrel staves with remnants of imported wallpaper and gold-leaf mouldings.

# Restaurants in Tucson

## Vivace Restaurant

6440 N Campbell Ave, Tucson, AZ 85718-1302

Phone: +1 520-795-7221

Website: <http://vivacetucson.com/index.html>

Rated number one for food in Tucson, by Zagat Survey, this Foothills restaurant has a Tuscan decor providing northern Italian fare, thoughtfully prepared with reasonable prices and wine list. Choose from a selection of appetizers, salads, pasta and main plates such as crab filled breaded chicken breast or grilled fresh salmon and rock shrimp. Relaxed inside and patio dining.

## Gentle Ben's Brewing

865 E University Blvd, Tucson, AZ 85719

Phone: (520) 624-4177

Website: <http://www.gentlebens.com/>

Near-campus brewpub with plenty of custom beers, brew-friendly eats & outdoor seating. Serving quality food & award-winning craft beer since 1971. Find them on the corner of Tyn-dall and University Blvd.

## Noodleholics

3502 E Grant Rd, Tucson, AZ 85716

Phone: (520) 305-4262

Website: <https://www.noodleholics.com/>

Since the Qin Dynasty, the Guilin noodles are renowned across China. Having a history of more than 2,000 years, Noodleholics is bringing them to Tucson.

## The B Line

621 N 4th Ave, Tucson, AZ 85705

Phone: (520) 882-7575

Website: <http://www.theblinexyz/>

An eclectic menu including breakfast burritos & vegan fare draws a university crowd. Serves breakfast, lunch, and dinner.

## The Fix

943 E University Blvd #115, Tucson, AZ 85719

Phone: (520) 305-4493

Website: <http://www.thefixaz.com/>

Colorful counter serve specializing in macaroni & cheese, plus sandwiches, salads & craft beer. At The Fix, their goal is to give your appetite The Fix it needs. They take the highest quality pasta and cook it to perfection, then they mix fresh veggies, meats, and high quality cheeses with their house made creamy béchamel sauce, then they top it with cheese and their house crunch and bake it until the cheese is warm and melted and the topping has the perfect glaze.

# Restaurants in Tucson

## Miss Saigon

1072 N Campbell Ave, Tucson, AZ 85719

Phone: (520) 320-9511

Website: [misssaigontucson.com/](http://misssaigontucson.com/)

Modest Vietnamese cafe serving classic noodle dishes, soups & standards in a compact space. They are one of the most recognized Vietnamese restaurants in Tucson.

## Trident Grill

2033 E Speedway Blvd, Tucson, AZ 85719

Phone: (520) 795-5755

Website: <http://www.tridentgrill.com/>

Neighborhood watering hole with menu of seafood, burgers & pub grub near the University of Arizona. Available for lunch, dinner, and take out. Features include parking available, television, and is wheelchair accessible.

## Tumerico

2526 E 6th St, Tucson, AZ 85716

Phone: (520) 240-6947

Website: <https://www.tumerico.com/>

Sunlit restaurant featuring an array of vegan & vegetarian Mexican plates in a laid-back atmosphere. It is all about food, serving the community by healing through food. The food feels like home, it is like family.

## Greek House

1710 E Speedway Blvd, Tucson, AZ 85719

Phone: (520) 323-1446

Website: <http://www.azgreekhouse.com/>

Modest, quick-serve eatery offering classic Greek dishes such as pita sandwiches & fries. They embrace the authenticity of Greek culture by providing customers with delicious Greek food, using only the freshest of ingredients at an affordable price with prompt, consistent and outstanding customer service. Their food is made with traditional family recipes that will stimulate your taste buds and keep you coming back for more!



THE SOCIETY FOR  
**MODELING & SIMULATION**  
INTERNATIONAL™

# 2019 SUMMER SIMULATION CONFERENCE

[scs.org/summersim/](http://scs.org/summersim/)



**JULY 22-24, 2019**

TU Berlin, Berlin, Germany

## DESCRIPTION:

The 2019 Summer Simulation Conference (SummerSim'19) is a combination of the 51th Summer Computer Simulation Conference (SCSC) and the 22st International Symposium on Performance Evaluation of Computer and Telecommunication Systems (SPECTS). SummerSim is SCS's premier international conference in cooperation with ACM SIGSIM. The conference focuses on modeling and simulation, tools, theory, methodologies and applications and provides a forum for the latest R&D results in academia and industry. We encourage you to take the opportunity to experience the tutorials, tracks, and workshops that will be available.

## TRACKS:

Summer Computer Simulation (SCSC)

International Symposium on Performance Evaluation  
of Computer and Telecommunication Systems (SPECTS)

Tutorials

M&S Demo Session and Student Colloquium

Work in Progress (WIP)

Industry

## KEYNOTE SPEAKER:

Prof. Dr. Dr. h. c. Sahin Albayrak  
Distributed Artificial Intelligence  
Laboratory (DAI-Labor)

## Register and Submit a Paper Today

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