

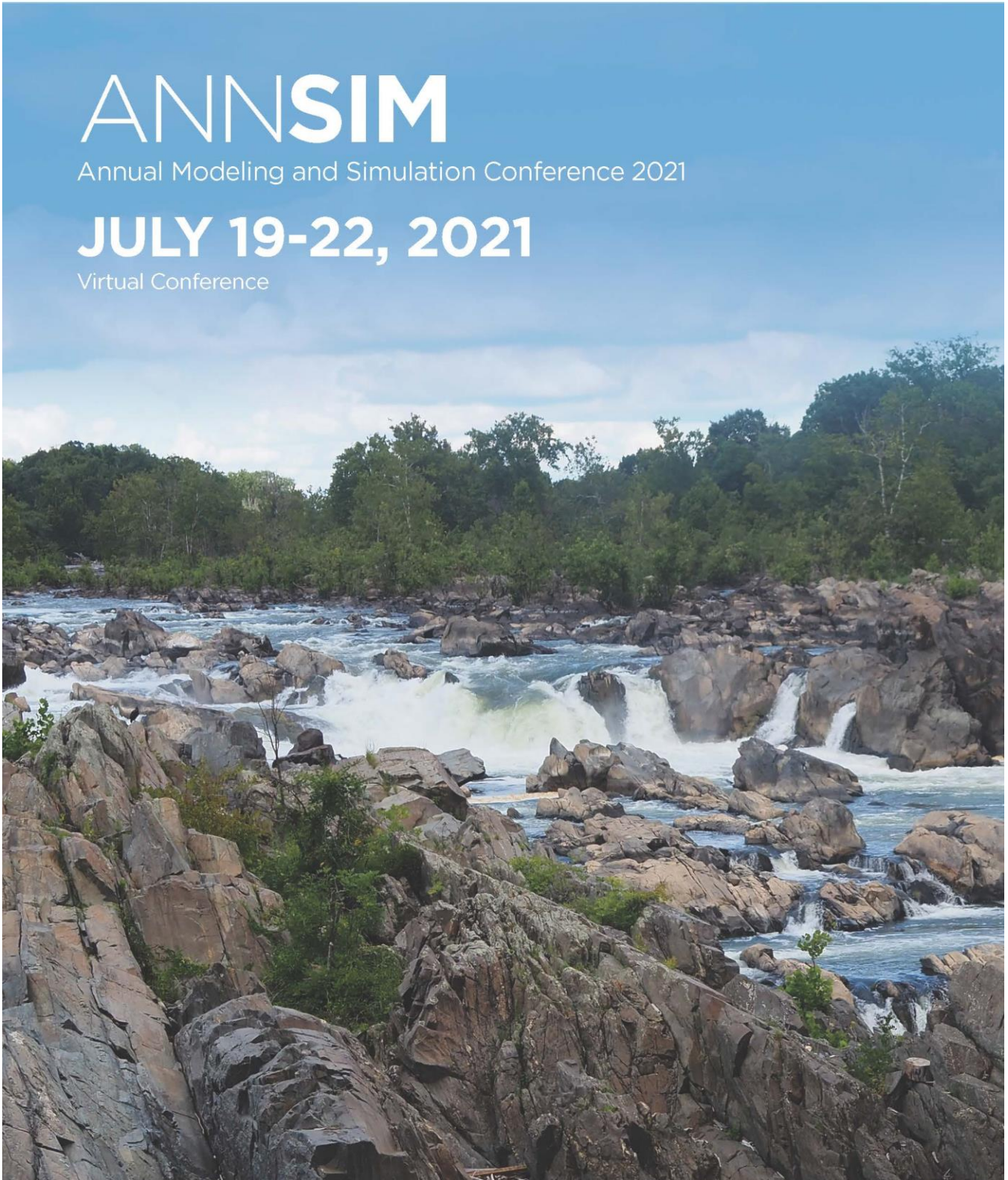


ANNSIM

Annual Modeling and Simulation Conference 2021

JULY 19-22, 2021

Virtual Conference



ANNSIM 2021

Registration

Registration is still open visit <https://scs.org/annsim/>. If you would like to sample our conference for a day and you are new to our events, please contact us at 858-277-3888 or scs@scs.org for a daily rate.

Sponsors

We would like to thank those who registered for the ANNSIM 2021 Virtual Conference, GTR™ Event Technology, which contributed the virtual platform, Chalmers University of Technology, Virginia Modeling, Analysis & Simulation Center (VMASC), VMASC Industry Association, and Springer, the ANNSIM'21 sponsors.

Conference Summary

The 2021 Annual Modeling and Simulation Conference (ANNSIM'21) Virtual Conference will take place over the course of four days from Monday, July 19, 2021 through Thursday, July 22, 2021. It will be co-located with the 2021 International Symposium on Performance Evaluation of Computer and Telecommunication Systems Conference (SPECTS'21).

ANNSIM'21 will present four tutorials, six demo sessions, and twelve track sessions. SPECTS'21 will present one Keynote Speaker, three tutorial sessions and three track sessions. Keynote Speakers will take place on Monday, July 19, 2021 and Tuesday, July 20, 2021. Tutorials, will take place on Monday, July 19 and Wednesday, July 21, 2021. Demo sessions, the social event, and awards ceremony will take place on Tuesday, July 20, 2021. Tracks CNS, HSAA, AIS, ANSS, MSM, TMS, MSSS, CPS, MSBSE, MSCS, and ET-APM will take place from Monday, July 19, 2021 to Wednesday, July 21, 2021.

Topics covered range from Gaussian Process Regression for Aggregate Baseline Load Forecasting, Towards a Categorical Semantics of DEVS, Data-Driven Simulation of Contagions in Public Venues, A Novel Hybrid Automation Framework for Multi-Phase Epidemic Modelling, and A Technique for Extracting User Specified Information from Streaming Data. The ANNSIM 2021 Virtual Conference is open to all paid attendees from July 19, 2021 to July 21, 2021 and will be available to the public beginning July 22, 2021. Session times are ET (Eastern Time, UTC-4).

Thank You!

Thank you all for coming together and participating in the ANNSIM 2021 Virtual Conference. It could not have been possible without all of you who came together. Organizers and attendees such as you are the reason we were able accomplish our goal of this virtual event announcing the cancellation of the in-person portion event at George Mason University. So, thank you all again for giving us the opportunity to have the ANNSIM 2021 Conference through this Virtual Conference. **We look forward to seeing you next year!**

ANNSIM 2021 Virtual Conference Agenda

Monday, July 19, 2021

Parallel Meeting One

Location: TBD

Welcome Address

- 10:00am-10:15am ET

Opening Keynote

- 10:15am-11:15am ET **Keynote: Reliability and Availability Modeling in Practice** by Kishor S. Trivedi

Break: 11:15am-11:30am ET

Modeling and Simulation based Systems Engineering (MSBSE) Chairs: Andrea D'Ambrogio & Fernando Barros

- 11:30am-11:48am ET: *Simulation-Based Evaluation of Model Sensitivities in Finished Vehicle Logistics* by Kerstin Herrmann, Sebastian Risse and Tilo Weller
- 11:48am-12:06pm ET: *X Language: An Integrated Intelligent Modeling and Simulation Language for Complex Products* by Lin Zhang, Fei Ye, Yuanjun Laili, Kunyu Xie, Pengfei Gu, Xiaohan Wang, Chun Zhao, Xuesong Zhang and Minjie Chen
- 12:06pm-12:24pm ET: *A Web Based Modeling and Simulation Environment to Support the DEVS Simulation Lifecycle* by Bruno St-Aubin, Jon Menard and Gabriel Wainer
- 12:24pm-12:42pm ET: *A Tutorial Introduction to Colored Petri Nets Framework for Model-Driven System Design and Engineering* by Vijay Gehlot
- 12:42pm-1:00pm ET: *A Model Based Systems Engineering Approach to Automated Music Arrangement* by Jalal Possik, Charles Yaacoub, Simon Gorecki, Greg Zacharewicz and Andrea D'Ambrogio

Break: 1:00pm-1:30pm ET

Modeling and Simulation for Smart Energy Systems (MSSES) & Modeling and Simulation in Cyber Security (MSCS) Chairs: James Nutaro & Sachin Shetty

- 1:30pm-2:48pm ET: *A Case Study in Simulation Methods for Power Electronic Circuits* by James Nutaro, Kalyan Perumalla and Suman Debnath

- 2:48pm-3:06pm ET: *CD2: A Tool for Automation of CELL-DEVS Carbon Dioxide Diffusion Models* by Hoda Khalil and Gabriel Wainer
- 2:00pm-2:50pm ET: *Gaussian Process Regression for Aggregate Baseline Load Forecasting* by Kadir Amasyali and Mohammed Olama
- 2:00pm-2:50pm ET: *Comparative Analysis of Elliptic Curve and Lattice Based Cryptography* by Amanda Davenport and Sachin Shetty
- 2:pm-3:00pm ET: *Modeling and Simulation Approaches for Cybersecurity Impact Analysis: State-of-The-Art* by Alvi Jawad and Jason Jaskolka

Break: 3:00pm-3:15pm ET

Tutorial Session A

Chair: Joachim Denil

- 3:15pm-4:45pm ET: **Tutorial:** *Model-Based Monitoring and State Estimation for Digital Twins: The Kalman Filter* by Hao Feng, Cláudio Gomes, Peter Gorm Larsen and Alexandros Iosifidis

ANNSIM 2021 Virtual Conference

Monday, July 19, 2021

Parallel Meeting Two

Location: TBD

Welcome Address

- 10:00am-10:15am ET

Opening Keynote

- 10:15am-11:15am ET **Keynote: Reliability and Availability Modeling in Practice** by Kishor S. Trivedi

Break: 11:15am-11:30am ET

Theory and Foundations for Modeling and Simulation (TMS) Chairs: Gabriel Wainer & Andrea Vandin

- 11:30am-11:48am ET: *Unified Property Evaluations of Constrained-DEVS Models for Simulation and Model Checking* by Soroosh Gholami and Hessam Sarjoughian
- 11:48am-12:06pm ET: *Towards a Universal Representation of DEVS: A Metamodel-Based Definition of DEVS Formal Specification* by Maria Blas, Silvio Gonnet and Bernard Zeigler

- 12:06pm-12:24pm ET: *Towards A Categorical Semantics of DEVS* by Jean-Pierre Müller
- 12:24pm-12:42pm ET: *Combining DEVS and Semantic Technologies for Modeling The SARS-COV-2 Replication Machinery* by Ali Ayadi, Claudia Frydman, Wissame Laddada, Lina F. Soualmia, Cecilia Zanni-Merk, India L'Hote, Emeline Grellet and Isabelle Imbert

Break: 1:00pm-1:30pm ET

Theory and Foundations for Modeling and Simulation (TMS) and Modeling and Simulation based Systems Engineering (MSBSE) Chairs: Gabriel Wainer & Andrea D'Ambrogio

- 1:30pm-2:48pm ET: *Optimal Control of A Discrete Time Stochastic Model of Epidemic Spreading in Arbitrary Networks* by Fabrizio Angaroni, Chiara Damiani, Giulia Ramunni and Marco Antoniotti
- 2:48pm-3:06pm ET: *Scenario Modeling of Landscape Change and Tele-Coupling in Socio-Ecological Systems: A Simulation of Land Use Change and Recreational Activities in Southern Idaho, United States* by Li Huang, Daniel Cronan and Andrew Kliskey
- 2:00pm-2:50pm ET: *A New Discrete-Event Simulation Based Approach for Validating Actuation Conflict Management in IOT Systems* by Laurent Capocchi, Jean-Francois SANTUCCI, Jean Yves Tigli, Thibault Gonnin, Stéphane Lavirotte and Gérald Rocher
- 2:00pm-2:50pm ET: *Extending RC4 to Construct Secure Random Number Generators* by Lih-Yuan Deng, Dale Bowman, Ching-Chi Yang and Henry Lu
- 2:pm-3:00pm ET: *Strategic Engineering Applied to Complex Systems Within Marine Environment* by Agostino Bruzzone, Marina Massei, Kirill Sinelshchikov and Antonio Giovannetti

Break: 3:00pm-3:15pm ET

Tutorial Session B Chair: Salim Chemlal

- 3:15pm-4:45pm ET: **Tutorial:** *Variability Modeling and Simulation Using Multiple Simulators* by Thorsten Pawletta, Hendrik Folkerts and Christina Deatcu

ANNSIM 2021 Virtual Conference

Tuesday, July 20, 2021

Parallel Meeting One

Location: TBD

Keynote

- 10:00am-11:00am ET **Keynote Multi-Level Models and Emergence Across Levels: Feature or Bug?** by Robert Axtell

Break: 11:00am-11:15am ET

Annual Simulation Symposium (ANSS) Chairs: José L. Risco-Martín & Erika Frydenlund

Real World Applications

- 11:15am-11:33am ET: *Exploring A Digital Shadow Design Workflow By Means of A Line Following Robot Use-Case* by Randy Paredis and Hans Vangheluwe
- 11:33am-11:51am ET: *DEVS-Based Simulation for Search and Rescue Missions Involving Multiple UAVs* by Juan Bordón Ruiz, José L. Risco-Martín, Eva Besada Portas and Jose López Orozco
- 11:51am-12:09pm ET: *A Modeling And Simulation Platform For Space-Based Compartmental Modeling Of Pandemic Spread* by Román Cárdenas, Alonso Inostrosa-Psijas and Gabriel Wainer
- 12:09pm-12:27pm ET: *Use of Shapley Additive Explanations In Interpreting Agent-Based Simulations Of Military Operational Scenarios* by Lynne Serre, Maude Amyot-Bourgeois and Brittany Astles
- 12:27pm-12:45pm ET: *Modeling And Simulating Prescribed Fire Ignition Techniques* by Xiaolin Hu and Mu Ge

Break: 12:45pm-1:15pm ET

Annual Simulation Symposium (ANSS) Chairs: Erika Frydenlund & José L. Risco-Martín

Methods and Tools

- 1:15pm-1:33pm ET: *Metamorphic Testing For Hybrid Simulation Validation* by Mohammed Farhan, Caroline Krejci, Megan Olsen and M S Raunak
- 1:33pm-1:51pm ET: *Are We Modeling The Evidence Or Our Own Biases? A Comparison Of Conceptual Models Created From Reports* by Alexander Freund and Philippe Giabbanelli

- 1:51pm-2:09pm ET: *Massive Generation Of Data With Random Variates* by Peter Maurer
- 2:09pm-2:27pm ET: *Searching For Large-Order Multiple Recursive Generators* by Kenneth Pasiah, Lih-Yuan Deng, Dale Bowman and Ching-Chi Yang
- 2:27pm-2:45pm ET: *Simulation Of Dissemination Strategies On Temporal Networks* by Luca Serena, Stefano Ferretti, Gabriele D'angelo and Mirko Zichichi

Break: 2:45pm-3:00pm ET

POSTER & DEMO Chairs: Mohammad F. Obeid & Salim Chemlal

- 3:00pm-3:18pm ET: *An Agent-Based Model Of Target2 And The European Monetary System* by Don Berndt and David Boogers
- 3:18pm-3:36pm ET: *Data Requirements For Automated Simulation Modelling Of Production Systems With Varying Resource Behaviour* by Giovanni Lugaresi, Jonas Friederich, Sanja Lazarova-Molnar and Andrea Matta
- 3:36pm-3:54pm ET: *Fast Simulation Of DEVS Models Using The Simgrid Framework* by Elías Del Pozo Puñal and Félix García Carballeira
- 3:54pm-4:12pm ET: *Adaptive Camera Motion Generation For Procedural Guidance And Understanding In Virtual Environments* by Shan Liu and Yuzhong Shen

ANNSIM 2021 Virtual Conference

Tuesday, July 20, 2021

Parallel Meeting Two

Location: TBD

Keynote

- 10:00am-11:00am ET **Keynote Multi-Level Models and Emergence Across Levels: Feature or Bug?** by Robert Axtell

Break: 11:00am-11:15am ET

Emerging Topic – Aspects of Pandemic Modeling (ET-APM) Chairs: Andreas Tolk & Jiangzhuo Chen

- 11:15am-11:33am ET: *Opportunities And Challenges In Developing COVID-19 Simulation Models: Lessons From Six Funded Projects* by Philippe Giabbanelli, Jennifer Badham, Brian Castellani, Hamdi Kavak, Vijay Mago, Ashkan Negahban and Samarth Swarup

- 11:33am-11:51am ET: *Towards A Verification And Validation Framework For COVID-19 Forecast Models* by Hamdi Kavak and Maura Lapoff
- 11:51am-12:09pm ET: *Studying The Spread Of Diseases Using Geographical Data And Irregular Topologies With CELL-DEVS* by Román Cárdenas, Cristina Ruiz Martin, Gabriel Wainer, Peter Dobias and Mark Rempel
- 12:09pm-12:27pm ET: *Data-Driven Simulation Of Contagions In Public Venues* by Stefano Guarino, Davide Torre, Massimo Bernaschi, Alessandro Celestini, Marco Cianfriglia, Enrico Mastrostefano and Lena Zastrow
- 12:27pm-12:45pm ET: *Modeling Pandemic Response For Populations Equipped With Contact-Chain Capable Wearable Devices* by Joshua Fryer and Paulo Garcia

Break: 12:45pm-1:15pm ET

Humans, Societies and Artificial Agents (HSAA) Chairs: Philippe J. Giabbanelli and Andrew Cooks

- 1:15pm-1:33pm ET: *Generation Of Reusable Synthetic Population And Social Networks For Agent-Based Modeling* by Na Jiang, Andrew Crooks, Hamdi Kavak and William Kennedy
- 1:33pm-1:51pm ET: *Scaling Up The Snap-Ed Toolkit Intervention To Improve Fruit And Vegetable Consumption Across Counties In Georgia: An Agent Based Model* by Donglan Zhang, Janani Thapa, Gang Li, Heejung Son, Zhuo Chen, Lan Mu, Yan Li, Jiuxiu Liu, Jose Pagan and Philippe J. Giabbanelli
- 1:51pm-2:09pm ET: *Why Honor Culture? Lessons Learned From An Agent-Based Simulation Model* by Kashif Zia, Alois Ferscha, Muhammad Shafi and Philippe Giabbanelli
- 2:09pm-2:27pm ET: *Multi-Attribute Queries For Stochastic Multi Agent Systems Over Short Time Horizons* by Yenda Ramesh and M V Panduranga Rao
- 2:27pm-2:45pm ET: *Panel On Agent Based Modeling*

Break: 2:45pm-3:00pm ET

POSTER & DEMO Chairs: Mohammad F. Obeid & Salim Chemlal

- 3:00pm-3:18pm ET: *An Agent-Based Model Of Target2 And The European Monetary System* by Don Berndt and David Boogers
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- 3:54pm-4:12pm ET: *Adaptive Camera Motion Generation For Procedural Guidance And Understanding In Virtual Environments* by Shan Liu and Yuzhong Shen

ANNSIM 2021 Virtual Conference

Wednesday, July 21, 2021

Parallel Meeting One

Location: TBD

Tutorial Session C Chair: Joachim Denil

- 10:00am-11:30am ET: **Tutorial:** *Computational Social Simulation With E-Cargo* by Haibin Zhu

Break: 11:30am -11:45am ET

Modeling and Simulation in Medicine (MSM) Chairs: Jerzy Rozenblit & Minsik Hong

Medical Simulation

- 11:45am-12:03pm ET: *A Novel Hybrid Automaton Framework For Multi-Phase Epidemic Modelling* by Eva Navarro and Nurdan Cabukoglu
- 12:03pm-12:21pm ET: *How Many Costly Simulations Do WE Need To Create Accurate Metamodels? A Case Study On Predicting HIV Viral Load In Response To Clinically Relevant Intervention Scenarios* by Christopher Lutz, Philippe Giabbanelli, Andrew Fisher and Vijay Mago
- 12:21pm-12:39pm ET: *A Risk Estimation System To Predict Postpartum Cigarette Smoking Relapse* by Minsik Hong, Jerzy Rozenblit, Alicia Allen, Uma Nair and Sharon Allen
- 12:39pm-12:57pm ET: *Combining Clinical And Social Determinants To Improve DOD/Veteran Well-Being: The Service Member Veteran Risk Profile* by Richard Hartman and Mark Oxley
- 12:57pm-1:15pm ET: *Application Of 3D Printing In The Development Of Lumbar Puncture And Epidural Simulators* by Lori Lioce, Kim Budisalich, Cooper Gunter, Marquis Myler, Gary Maddux, Ishella Fogle and Bernard Schroer

Break: 1:15pm-1:45pm ET

Modeling and Simulation in Medicine (MSM) Chairs: Minsik Hong & Jerzy Rozenblit

Assistive Technologies and Data Analysis

- 1:45pm-2:03pm ET: *Elastic Registration Of MRI Scans And RGB-D Images To Improve Surgical Planning Of Breast Reconstruction* by Bernhard Schenkenfelder, Wolfgang Fenz, Stefan Thumfart, Gerhard Ebenhofer, Gernot Stuebl, David Lumenta, Gernot Reishofer and Josef Scharinger

- 2:03pm-2:21pm ET: *Towards Applications Of The "Surgical GPS" On Orthopedic Spinal Procedures* by Austin Tapp, Ava Maghouli and Michel Audette
- 2:21pm-2:39pm ET: *Evaluating Azure Kinect And Structure Mark-II 3D Surface Scanners For Clinical Chest Wall Deformity Assessment* by Nahom Kidane, Yuzhong Shen and Robert Kelly
- 2:39pm-2:57pm ET: *Machine Learning Of Diffusion Weighted Imaging For Prediction Of Seizure Susceptibility Following Traumatic Brain Injury* by Akul Sharma, Rachael Garner, Marianna Rocca, Celina Alba, Yenlin Lee, Karina Yang, Maya Brawer-Cohen and Dominique Duncan
- 2:57pm-3:15pm ET: *Decision Of Learning Status Based On Modeling Of The Information Measurement Of Social Behavioral Tasks In Rhesus Monkeys* by Seunghyun Lee, Katalin Gothard and Jerzy Rozenblit

ANNSIM 2021 Virtual Conference

Wednesday, July 21, 2021

Parallel Meeting Two

Location: TBD

Tutorial Session D Chair: Mohammad F. Obeid

- 10:00am-11:30am ET: **Tutorial:** *A Tutorial Introduction To Colored Petri Nets Framework For Model-Driven System Design And Engineering* by Vijay Gehlot

Break: 11:30am -11:45am ET

AI and Simulation (AIS) & Communications and Networking Simulation (CNS) Chairs: Joon-Seok Kim & Abdolreza Abhari

- 11:45am-12:03pm ET: *Mades: A Unified Framework For Integrating Agent-Based Simulation With Multi-Agent Reinforcement Learning* by Xiaohan Wang, Lin Zhang, Chun Zhao, Yuanjun Laili, Kunyu Xie and Han Lu
- 12:03pm-12:21pm ET: *Automatically Combining Conceptual Models Using Semantic And Structural Information* by Alexander Freund and Philippe Giabbanelli
- 12:21pm-12:39pm ET: *Prediction Of 5G New Radio Wireless Channel Path Gains And Delays Using Machine Learning And CSI Feedback* by Benjamin Earle, Ala'a Al-Habashna, Gabriel Wainer, Xingliang Li and Guoqiang Xue

- 12:39am-12:57pm ET: *A Novel Routing Protocol For Wireless AD HOC Networks Based On The Behavior Of Slime Mold Physarum Polycephalum* by Hudson Devoe, Nick Gilmet and Hala ElAarag
- 12:57pm-1:15pm ET: *Modeling Real-Time Application Processor Scheduling For Fog Computing* by Mani Sharifi, Abdolreza Abhari and Sharareh Taghipour

Break: 1:15pm-1:45pm ET

Cyber Physical Systems (CPS) Chairs: Umut Durak & Claudio Gomes

- 1:45pm-2:03pm ET: *Introduction To Digital Twin Engineering* by Hao Feng, Cláudio Gomes, Casper Thule, Kenneth Lausdahl, Alexandros Iosifidis and Peter Larsen
- 2:03pm-2:21pm ET: *Validity Frame Supported Digital Twin Design Of Complex Cyber-Physical Systems* by Bert Van Acker, Joost Mertens, Paul De Meulenaere and Joachim Denil
- 2:21pm-2:39pm ET: *The Effect And Selection Of Solution Sequence In Co-Simulation* by Emin Inci, Cláudio Gomes, Casper Thule, Kenneth Lausdahl, Jan Croes, Wim Desmet and Peter Gorm Larsen
- 2:39pm-2:57pm ET: *Synthesizing Co-Simulation Algorithms With Step Negotiation And Algebraic Loop Handling* by Simon Hansen, Cláudio Gomes, Jaco van de Pol and Peter Gorm Larsen
- 2:57pm-3:15pm ET: *Modeling Spectrum Dependent Characteristics Of Triple Junction Solar Cells For Solar-Powered Aircraft* by Daniel Ackermann, Nies Reininghaus and Andreas Bierig

ANNSIM 2021 Virtual Conference

SPECTS

Monday, July 19, 2021

Parallel Meeting Three

Location: TBD

Welcome Address by Malamati Louta

- 3:00pm-3:10pm ET

Keynote

- 3:15pm-4:15pm ET **Keynote: Industry 5.0 Digital Twins: the Call for Cloud Continuum Infrastructures** by Paolo Bellavista

Break: 4:15pm-4:20pm ET

Tutorial 1

- 4:20pm–6:20pm ET: **Tutorial: Non-Orthogonal Multiple Access (NOMA) For Future Wireless Networks** by Panagiotis Dimantoulakis

Break: 6:20pm-6:30pm ET

Session I: Computer and Telecommunication Systems Security

- 6:30pm-6:50pm ET *Spoofed Networks: Exploitation Of GNSS Security Vulnerability In 4G And 5G Mobile Networks* by Matthew Lanoue, James Michael and Chad Bollmann
- 6:50pm-7:10pm ET: *A Multi-Level Security Key Management Protocol Based On Dynamic M-Tree Structures For Internet Of Vehicles* by Hua Yi Lin, Meng-Yen Hsieh and Kuan-Ching Li
- 7:10pm-7:30pm ET: *Casting A Wide Net: An Internet Of Things Testbed For Cybersecurity Education And Research* by Jay Thom, Tapadhir Das, Bibek Shrestha, Shamik Sengupta and Engin Arsian

ANNSIM 2021 Virtual Conference

SPECTS

Tuesday, July 20, 2021

Parallel Meeting Three

Location: TBD

Welcome Address by Malamati Louta

- 3:00pm-3:10pm ET

Break: 3:10pm-3:15pm ET

Tutorial 2

- 3:15pm–4:15pm ET: **Tutorial:** *Enabling Sensors-As-A-Service For Internet Of Things* by Arijit Roy

Break: 4:15pm-4:20pm ET

Tutorial 3

- 4:20pm–6:20pm ET: **Tutorial:** *Malware Analysis And Detection* by Ashu Sharma

Break: 6:20pm-6:30pm ET

Session II: Tools and Methodologies

- 6:30pm-6:50pm ET: *A Technique For Extracting User Specified Information From Streaming Data* by Bannya Chanda and Shikharesh Majumdar
- 6:50pm-7:10pm ET: *A Fluid Reservoir Model For The Age Of Information Through Energy-Harvesting Transmitters* by Ioannis Z. Koukoutsidis
- 7:10pm-7:30pm ET: *Orchestrating Bag-Of-Tasks Applications With Dynamically Spawned Tasks In A Distributed Environment* by Georgios L. Stavrinos and Helen Karatza

Session III: Networking Technologies

- 7:30pm-7:50pm ET: *Optical Control Connectivity And Access Technique Study For A Software-Defined Intra-Rack Data Center Network* by Peristera Baziana
- 7:50pm-8:10pm ET: *Enhanced Mobility Management Scheme For Next Generation 5G Vehicular Environments* by Konstantinos Dararas, Angelos Michalas, Emmanouil Skondras and Nikolaos Asimopoulos

8:10pm ET **Closing** by Malamati Louta