FOCAPD 2019

Foundations of Computer-Aided Process Design

July 14 – July 18, 2019 ◆ Copper Mountain Resort ◆ Copper Mountain, Colorado

FINAL PROGRAM

All general sessions Monday – Thursday will be located in the Bighorn Ballroom
The opening Keynote Address & Welcome Reception will be in the Ptarmigan Ballroom & Foyer

Sunday, July 14

2:00 p.m. to	6:00 p.m.	Conference Registration (Outside Ptarmigan Ballroom)
6:00 p.m. to	**6:45 p.m.**	**Welcome Reception (Pre-function Foyer – Ptarmigan Ballroom)**
6:45 p.m. to	**7:00 p.m.**	**Welcome Address** (Ptarmigan Ballroom) Conference Chairs: *Matthew J. Realff, Georgia Institute of Technology* *Carl Laird, Sandia National Laboratories & Purdue* *Salvador García Muñoz, Eli Lilly*
7:00 p.m. to	**8:00 p.m.**	**Keynote Address** From IoT to Ephemeral Computing: Understanding Cyber-Physical Interactions for Monitoring and Control *Julie McCann, Imperial College London*

Monday, July 15

7:00 a.m. to	5:00 p.m.	Conference Registration
7:00 a.m. to	8:00 a.m.	Continental Breakfast
8:00 a.m. to	**12:10 p.m.**	**ADVANCED MANUFACTURING AND DESIGN** *Chair:* *Chair:*
8:00 a.m. to	8:15 a.m.	Conference and Session Introduction
8:15 a.m. to	9:05 a.m.	Optimization Opportunities in Product Development: Perspective from a Manufacturing Company *Larry Biegler, Carnegie Mellon University,* *Clas Jacobson, United Technologies Corporation*
9:05 a.m. to	9:45 a.m.	A New Framework for Process Design and Optimization *David Miller, National Energy Technology Laboratory*
9:45 a.m. to	**10:10 a.m.**	**Refreshment Break**
10:10 a.m. to	10:50 a.m.	Smart Manufacturing and Designing for Data Centricity *Jim Davis, University of California – Los Angeles*
10:50 a.m. to	11:30 a.m.	Data-Driven Model Development for Design and Manufacturing – Applications in Healthcare *Selen Cremaschi, Auburn University*
11:30 a.m. to	12:10 p.m.	The Unreasonable Effectiveness of Equations: Advanced Modeling for Biopharmaceutical Process Development *Pablo Rolandi, Amgen*
12:10 p.m. to	**1:30 p.m.**	**Lunch on own**
1:30 p.m. to	**5:30 p.m.**	**MACHINE LEARNING AND DESIGN** *Chair:* *Co-Chair:*
1:30 p.m. to	1:35 p.m.	Session Introduction
1:35 p.m. to	2:25 p.m.	Learning from Flowsheets *Nick Sahinidis, Carnegie Mellon University,* *Jeffrey Siirola, Purdue University*
2:25 p.m. to	3:05 p.m.	Global Optimization with Neural Networks Embedded: Theory, Applications and Future Outlook *Alexander Mitsos, RWTH Aachen*
3:05 p.m. to	**3:30 p.m.**	**Refreshment Break**
3:30 p.m. to	4:10 p.m.	Machine Learning and Its Promises: From Molecule Designs to Process Systems Engineering *Jay Lee, KAIST*

4:10 p.m. to	4:50 p.m.	Reinforcement Learning: Planning and Control through Experience *Gavin Taylor, United States Naval Academy*
4:50 p.m. to	5:30 p.m.	Machine-Learning Assisted Modeling and Optimization for Process Design Synthesis *Fani Boukouvala, Georgia Institute of Technology*
5:30 p.m. to	**8:00 p.m.**	**Dinner on own (Jack's Bar)**
8:00 p.m. to	**10:00 p.m.**	**POSTER SESSION A (Jack's Bar)** *Chair:* *Chair:*

Tuesday, July 16

7:00 a.m. to	5:00 p.m.	Conference Registration
7:00 a.m. to	8:00 a.m.	Continental Breakfast
8:00 a.m. to	**12:00 p.m.**	**MODULAR DESIGN AND PROCESS INTENSIFICATION** *Chair:* *Chair:*
8:00 a.m. to	8:05 a.m.	Session Introduction
8:05 a.m. to	8:40 a.m.	RAPID Manufacturing Institute – Computer-Aided Process Design Role in MCPI *Ignasi Palou-Rivera, RAPID/AIChE*
8:40 a.m. to	9:15 a.m.	A Novel Optimization Approach for the Integrated Design and Operation of Flexible Manufacturing Systems *Joseph Scott, Clemson University*
9:15 a.m. to	9:50 a.m.	Systemic Process Intensification: Challenges, New Perspectives and Future Directions *Faruque Hasan, Texas A&M University*
9:50 a.m. to	**10:15 a.m.**	**Refreshment Break**
10:15 a.m. to	10:50 a.m.	Scaling Relations in Modular Process Design *Michael Baldea, University of Texas at Austin*
10:50 a.m. to	11:25 a.m.	Operability in Process Intensification and Modular Design *Stratos Pistikopoulos, Texas A&M University*
11:25 a.m. to	12:00 p.m.	Space-Time Dynamics of Electricity Markets Incentivize Technology Modularization *Victor Zavala, University of Wisconsin – Madison*
12:00 p.m. to	**1:30 p.m.**	**Lunch on own**
1:30 p.m. to	**3:45 p.m.**	**HIGH-PERFORMANCE COMPUTING, DESIGN TOOLS & OPTIMIZATION** *Chair:* *Chair:*
1:30 p.m. to	1:35 p.m.	Session Introduction
1:35 p.m. to	2:25 p.m.	High Productivity High Performance Simulation and Optimisation through Code Generation in Firedrake *David Ham, Imperial College London*
2:25 p.m. to	3:05 p.m.	Surrogate-Based Modeling and Optimization for Advanced Decision Making *Marianthi Ierapetritou, Rutgers University*
3:05 p.m. to	3:45 p.m.	Nonsmooth Analysis in Process Modeling, Design and Optimization *Paul Barton, MIT*

3:45 p.m. to	**8:00 p.m.**	**Free time, Dinner on own**
8:00 p.m. to	**10:00 p.m.**	**POSTER SESSION B (Jack's Bar)** *Chair:* *Chair:*

Wednesday, July 17

7:00 a.m. to	5:00 p.m.	Conference Registration
7:00 a.m. to	8:00 a.m.	Continental Breakfast
8:00 a.m. to	**11:20 a.m.**	**SUSTAINABLE DESIGN AND ENERGY SYSTEMS** *Chair:* *Chair:*
8:00 a.m. to	8:05 a.m.	Session Introduction
8:05 a.m. to	8:55 a.m.	Process Synthesis in the Era of Renewable Energy: New Approaches for New Problems *Christos Maravelias, University of Wisconsin – Madison*
8:55 a.m. to	9:35 a.m.	From Molecules to Sustainable Life Cycles: Integrated Design of CO2 Conversion Processes *Andre Bardow, RWTH Aachen*
9:35 a.m. to	**10:00 a.m.**	**Refreshment Break**
10:00 a.m. to	10:40 a.m.	Maximizing Our Impact: A Call for the Standardization of Techno-economic Analysis for Sustainable Energy Systems Design Research *Thomas Adams, McMaster University*
10:40 a.m. to	11:20 a.m.	Recent Advances in Life Cycle Optimization for Sustainable Process Design *Fengqi You, Cornell University*
11:20 a.m. to	**1:00 p.m.**	**Lunch on own**
1:00 p.m. to	**7:30 p.m.**	**PRODUCT AND MATERIAL DESIGN** *Chair:* *Chair:*
1:00 p.m. to	1:05 p.m.	Session Introduction
1:05 p.m. to	1:55 p.m.	Next Generation Software Tools for Chemical Process and Product Design *Mario Eden, Auburn University*
1:55 p.m. to	2:35 p.m.	Mathematical Optimization for the Design of Nanostructured Materials *Chrysanthos Gounaris, Carnegie Mellon University*
3:00 p.m. to	7:00 p.m.	Workshop: Institute for the Design of Advanced Energy Systems
7:00 p.m. to	**8:00 p.m.**	**Dinner on own**
8:00 p.m. to	**10:00 p.m.**	**POSTER SESSION C (Jack's Bar)** *Chair:* *Co-Chair:*

Thursday, July 18

7:00 a.m. to	8:00 a.m.	Continental Breakfast
8:00 a.m. to	**11:45 a.m.**	**SESSION IN HONOR OF PROFESSOR ROGER SARGENT** *Chair:* *Chair:*
8:00 a.m. to	8:05 a.m.	Session Introduction
8:05 a.m. to	8:30 a.m.	Roger Sargent: Intellectual Leader and Pioneer of Process Systems Engineering *Ignacio Grossmann, Carnegie Mellon University*
8:30 a.m. to	9:15 a.m.	Process Modeling: From Sargent's Vision to its Current Directions *Costas Pantelides, Imperial College London*
9:15 a.m. to	9:40 a.m.	Major Contributions by Roger Sargent on Nonlinear Optimization and its Applications to PSE *Ignacio Grossmann, Carnegie Mellon University*
9:40 a.m. to	**10:05 a.m.**	**Refreshment Break**
10:05 a.m. to	10:30 a.m.	Distillation & Hybrid Separation: Modelling, Synthesis, Design & Operation *Rafiqul Gani, PSE for SPEED*
10:30 a.m. to	10:55 a.m.	Scheduling in PSE: Before and After the State-Task Network *Pedro Castro, University of Lisbon*
10:55 a.m. to	11:20 a.m.	Initial Steps into the Field of Machine Learning *Erik Ydstie, Carnegie Mellon University*
11:20 a.m. to	11:45 a.m.	The Centre for Process Systems Engineering: Interactions and Integration *Claire Adjiman, Imperial College London*
11:45 a.m. to	**1:30 p.m.**	**Lunch on own**
1:30 p.m. to	**4:00 p.m.**	**HIGH-PERFORMANCE COMPUTING, DESIGN TOOLS AND OPTIMIZATION** *Chair:* *Chair:*
1:30 p.m. to	1:35 p.m.	Session Introduction
1:35 p.m. to	2:25 p.m.	Multi-scale Simulation of Multiphase Systems: Towards Exa-scale Supercomputing And Virtual Process Engineering *Wei Ge, Chinese Academy of Sciences*
2:25 p.m. to	3:00 p.m.	Approximation Algorithms for Process Systems Engineering *Ruth Misener, Imperial College London*
3:00 p.m. to	3:35 p.m.	Asset Optimization Software Suites to Drive Digitalization – From Process Modeling to Optimization to Asset Optimization *Ajay Lakshmanan, Aspen Technology*
3:35 p.m. to	**4:00 p.m.**	**Refreshment Break**

4:00 p.m. to	**6:00 p.m.**	**COMPUTER-AIDED PROCESS DESIGN EDUCATION IN THE 21ST CENTURY – ACADEMIC CHALLENGES IN REALIZING INDUSTRY NEEDS** Panel Discussion *Moderated by Eva Sorensen, University College London*
6:00 p.m. to	6:30 p.m.	Free Time
6:30 p.m. to	**8:00 p.m.**	**Reception and Banquet (Grand Hall)**
8:00 p.m. to	**9:00 p.m.**	**Closing Plenary Address** *Doug Kothe, Oak Ridge National Laboratory*
9:00 p.m. to	10:30 p.m.	Closing Reception