Purdue Center for Operations and Optimization in Process Systems (COOPS)

The Center for Operations and Optimization in Process Systems (COOPS) at Purdue University's Davidson School of Chemical Engineering is at the forefront of transforming the field of process systems engineering. By leveraging cutting-edge research and fostering innovation, COOPS aims to enhance the efficiency, sustainability, and safety of various industries.

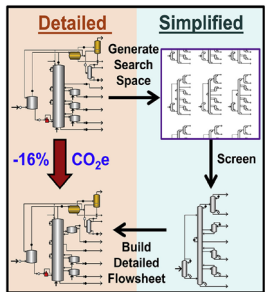
COOPS plays a pivotal role in fostering cutting-edge research, equipping students with the skills needed for industry success, and providing expertise for industry partners. The center focuses on:

- Conducting state-of-the-art research combining modeling and theoretical studies to solve complex systems engineering problems.
- Engaging undergraduate, MS, and PhD students in hands-on research and specialized courses to prepare the next generation of leaders in process systems engineering.
- Providing expert consultation and innovative solutions for industry challenges, ensuring that our research has practical, real-world impact.
- Collaborating with other departments at Purdue to promote interdisciplinary research and education.

CONSIDER PARTNERING WITH US TODAY!

Sponsors Receive:

- Access to top-tier graduate students for internships and full-time employment.
- Networking opportunities with representatives from a diverse array of industries.
- Chances to collaborate on NSF GOALI and DOE grants to enhance research capabilities and funding prospects.
- Early access to technical papers, reports, and software developed at COOPS.
- Tailored research and development efforts to address specific company challenges and goals.
- Ability to participate in seminars, workshops, and courses for ongoing professional development.



Optimized crude oil separation distillation sequences with 16% CO2 reduction (Agrawal group)

FURTHER INFORMATION

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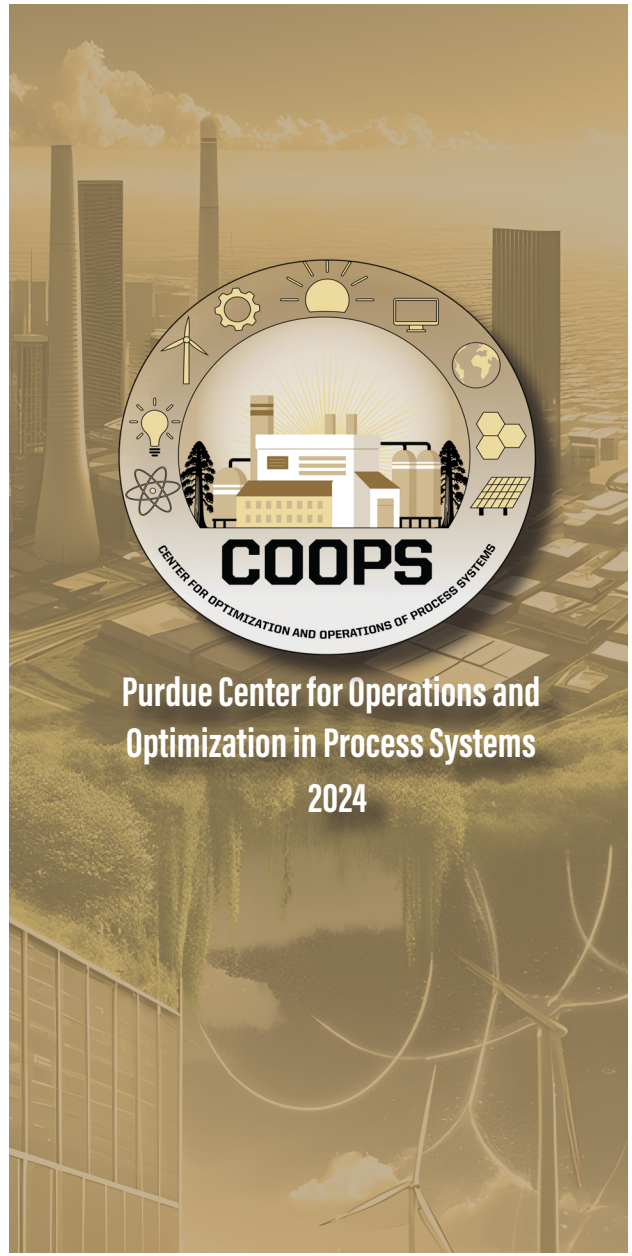
Visit the COOPS website:
https://engineering.purdue.edu/COOPS



PURDUE UNIVERSITY | Davidson School of Chemical Engineering

FACULTY

The faculty at COOPS are experts in their fields, deeply engaged in research that enhances the educational experience of Purdue Chemical Engineering students and contributes to the advancement of global process systems engineering practices.

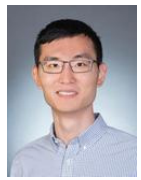
Rakesh Agrawal

- Chemical Process Synthesis and process intensification
- Separation process analysis and efficiency improvement
- Electrification of chemical processes and unit operations for sustainable economy

Zoltan Nagy

- Process intensification, optimization and advanced control of particulate systems
- Process synthesis and distributed control of modular integrated manufacturing systems and networks
- Process analytical technologies, uncertainty analysis and robust control
- Model identification and model-based experimental design

Can Li



- Privacy-preserved data sharing for decarbonizing the chemical industry
- Explain supply chain optimization problems using large language models
- Physics-informed machine learning for chemical process design

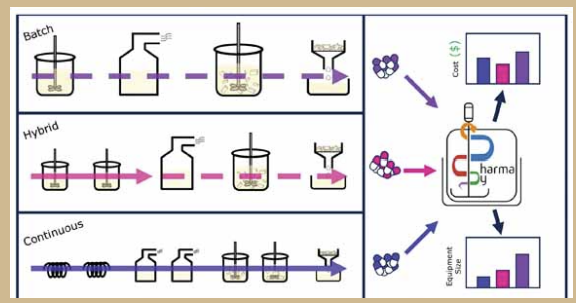
Rex Reklaitis

- Application of real time sensing and digital twins to monitoring and multi-level control of batch and continuous processes
- Condition-based monitoring and maintenance scheduling strategies employing AI/ML diagnosis methods and real time scheduling
- Treatment of uncertainty in design space development and its utilization for risk management in operations

OUR MISSION

Our mission is to drive innovation and excellence in various critical areas, including:

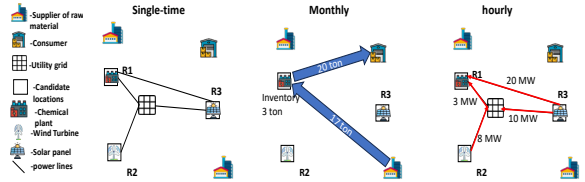
- Process operation and control
- Process scheduling
- Smart manufacturing
- Crystallization
- Predictive maintenance and fault diagnosis
- Energy systems optimization
- Life cycle analysis (LCA) and sustainability
- Process design
- Supply chain optimization
- Optimization Algorithms, Software, and Theory
- Computational methods for process systems engineering
- Quantum computing
- Artificial intelligence (AI)



Optimal pharmaceutical campaign manufacturing using PharmaPy (Nagy and Reklaitis groups)

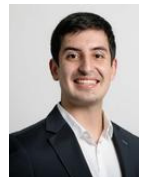
For more information about COOPS, visit

https://engineering.purdue.edu/COOPS



Multi-timescale optimization of electrified chemical supply chain (Li group)

David Bernal Neira



- Advanced algorithms for process operation and optimization
- Novel computational tools for computational process simulation and optimization
- Integrated multi-scale modeling for process systems

Joe Pekny

- Knowledge acquisition frameworks and algorithm engineering for large scale combinatorial optimization
- Novel sensors for nuclear phenomena (e.g. neutron emission)
- Tool and techniques for supporting a manufacturing modeling culture

Cornelius Masuku

- Decarbonization by Renewable Electrification
- Synthesis and design of electrically driven process units
- Modeling and optimization of chemical processes with electricity as a major energy source

Shweta Singh

- Material Flow Analysis and Life Cycle Analysis for Manufacturing Networks: Automation of Process to Network Scale
- Design of Circular Economy in Manufacturing Networks
- Dynamics of Material Flows in Manufacturing Networks using ML based surrogate models