

OPTIMIZATION & CONTROL GROUP

The Optimization and Control Group (OCG) provides theory and tools to enhance the reliability, resilience, and efficiency of energy systems; this includes everything from the electric power grid, buildings, transportation, and manufacturing systems, which are central to the nation's economy, security, and quality of [life](#). OCG staff

have technical core capabilities at the intersection of controls, learning, and computing. Their work emphasizes data-driven control methods and distributed optimization algorithms with scalable software tools to enable implementation, verification, and validation of control systems.

Teams Built on Core Capabilities



Resilient Control Methods

The Resilient Control Methods team develops theory, methods and algorithms to ensure the cyber-physical resilience of critical infrastructure systems. Specific capabilities include developing proactive, autonomic and self-aware adaptive control solutions using principles from networked, non-linear, robust and safety-critical control theory, optimization and data science.



Control Design

The Control Design team focuses on developing and applying advanced control solutions and automated fault detection, diagnostics, and self-correction algorithms for high performing buildings and energy systems. Specific capabilities include resilient control, control and system co-design, energy modeling and simulation, system integration, and auto-commissioning.



System Optimization

The System Optimization team focuses on applying and developing optimization principles, models, methods, and tools for planning and operational decision making to enhance the reliability, resilience, and efficiency of energy systems. Specific capabilities include robust optimization, distributed/parallel approaches, stochastic, and large-scale optimization.



Control Assessment

The Control Assessment Team takes control and optimization research from theory to practice through architecting, implementing, securing, and deploying technical solutions for various energy system applications. Specific capabilities include software system architecture, simulation, hardware-in-the loop based evaluation, and real world deployment of solutions in energy systems.



Analytics and Learning

The Analytics and Learning team develops data-driven decision support strategies based on integrating data analytics and machine learning into control methods and system optimization. Specific capabilities include physics-informed machine learning, safe learning, distributed intelligence and visual analytics.

Collaborations



Technical Products



About PNNL

Pacific Northwest National Laboratory draws on signature capabilities in chemistry, Earth sciences, and data analytics to advance scientific discovery and create solutions to the nation's toughest challenges in energy resiliency and national security.

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