SCC: Empowering Smart and Connected Communities through Programmable Community Microgrids

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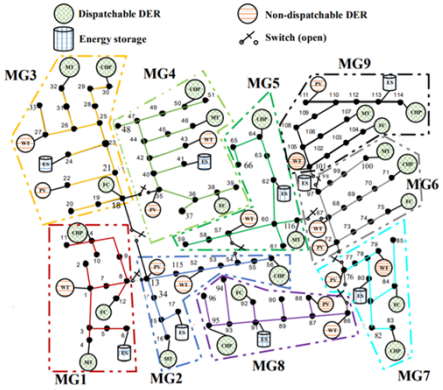
Community-identified problems

- Improve electricity resilience and reduce power outages
- Increase hardware independence and scalability in computing
- Ensure stability, cyber-security and privacy

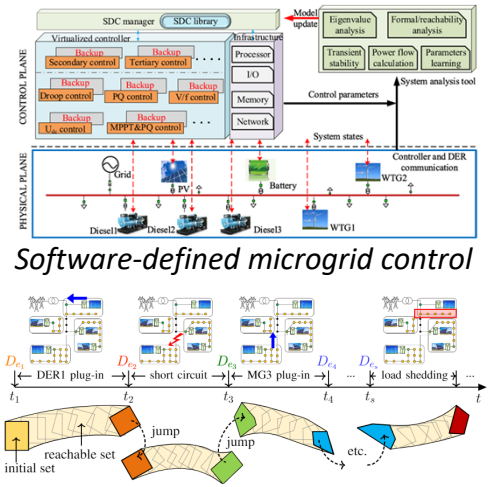
Intellectual merits

- Architect a Programmable Microgrid
- Pioneer a concept of "Software-Defined Operation Optimization"
- Devise Software-Defined stability, security and privacy

Project activities

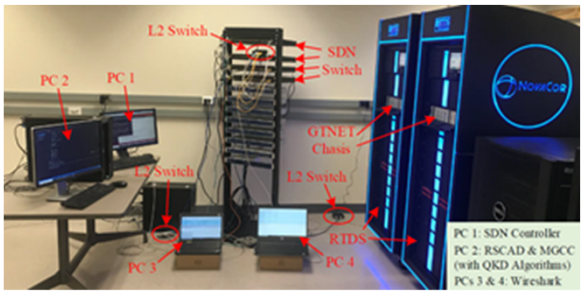


Power flow and operational optimization for meshed grids

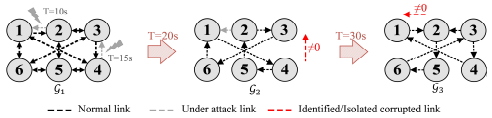


Software-defined microgrid control

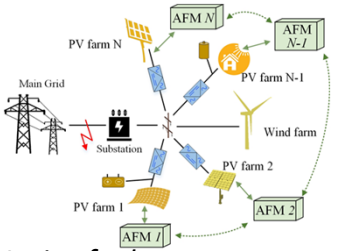
Reachable dynamics



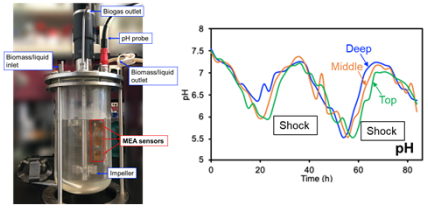
Smart programmable microgrid platform



Push-sum-enabled resilience



Active fault management



Anaerobic biomass digesters

Immediate Impact

- Power flow and operational optimization for meshed community microgrids
- Fault ride through of renewable energy
- Elimination of botnets attacks
- Decoupled cyber-physical microgrids
- Reachable analytics for stability guarantee

Lasting Impact

- Coordination of distributed entities
- Large integration of renewable energy
- Adaptive security scanning
- Programmable microgrid controller
- Formally verify the fast and strongly-nonlinear dynamics

Next steps

- Build Programmable Microgrid prototype on large real-time testbed
- Incorporate our new networked grids technology in the cyber-layer of our resilient programmable networked microgrids
- Work with community partner to discuss technology transfer

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