



**UNSW**  
SYDNEY



## Cooperative Distributed Energy Storage Systems

**Massive penetration of energy storage systems presents new opportunities for power network operators and individual customers. Innovative cooperation of distributed energy storage systems can improve power quality while bringing additional capacity, flexibility and redundancy into power networks. It can also avoid costly power network upgrades and increase power-supply security.**

### Competitive advantage

- Expertise in developing distributed multi-agent control strategies for energy storage systems. Distributed multi-agent control strategies provide improved performance compared with decentralised control strategies and have advantages in terms of robustness, scalability, security and flexibility over centralised control strategies.

### Impact

- The best approach to brain/machine interfaces suffers from serious limitations, in that their signal/noise degrades as the density of electrodes increases. An embeddable, conformal optics chip will provide a step-change in both clinical and research environments and enable the control of machines through the brain or the enhancement of human abilities.

### Successful outcomes

- Development of multi-agent control strategies for both homogeneous and heterogeneous distributed energy storage systems that allow:
  - cooperative state-of-charge balancing with no circulating currents
  - plug-and-play capability
  - monotonic charging/discharging, and
  - network topology independent dynamic optimal power flow.

### Capabilities and facilities

- UNSW houses one of the largest Real Time Digital Simulators (RTDS) in academic and research institutions globally.
- RTDS allows hardware-in-the-loop simulation, which is the final step before field verification.
- This presents the opportunity for rapid research, development and verification necessary for translating theoretical advances in multi-agent cooperative control into new strategies suitable for deployment in power system networks.

### Our partners

- ABB Corporate Research, Sweden

### More Information

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