

GEORGIA TECH

AUTONOMOUS, DECENTRALIZED GRID ARCHITECTURE

PROJECT TITLE:	Prosumer-Based Distributed Autonomous Cyber-Physical Architecture for Ultra-Reliable Green Electricity Networks		
ORGANIZATION:	Georgia Tech Research Corporation (Georgia Tech)	LOCATION:	Atlanta, GA
PROGRAM:	GENI	ARPA-E AWARD:	\$2,000,000
TECH TOPIC:	Electricity Transmission & Distribution	PROJECT TERM:	1/11/12 – 1/10/15
WEBSITE:	www.ece.gatech.edu/research/labs/aces/pages/home.html		

CRITICAL NEED

The U.S. electric grid is outdated and inefficient. There is a critical need to modernize the way electricity is delivered from suppliers to consumers. Modernizing the grid's hardware and software could help reduce peak power demand, increase the use of renewable energy, save consumers money on their power bills, and reduce total energy consumption—among many other notable benefits.

PROJECT INNOVATION + ADVANTAGES

Georgia Tech is developing a decentralized, autonomous, internet-like control architecture and control software system for the electric power grid. Georgia Tech's new architecture is based on the emerging concept of electricity prosumers—economically motivated actors that can produce, consume, or store electricity. Under Georgia Tech's architecture, all of the actors in an energy system are empowered to offer associated energy services based on their capabilities. The actors achieve their sustainability, efficiency, reliability, and economic objectives, while contributing to system-wide reliability and efficiency goals. This is in marked contrast to the current one-way, centralized control paradigm.

IMPACT

If successful, Georgia Tech's distributed control architecture would help integrate significantly more renewable energy into the grid.

- **SECURITY:** A more efficient, reliable grid would be more resilient to potential disruptions from failure, natural disasters, or attack.
- **ENVIRONMENT:** Enabling increased use of wind and solar power would result in a substantial decrease in carbon dioxide (CO₂) emissions in the U.S.—40% of which are produced by electricity generation.
- **ECONOMY:** This technology will enable more renewable generation to enter the market and meet growing demand. It will also enable consumers to receive payment for the electricity they generate.
- **JOBS:** Advances in grid software could result in new high-paying jobs in supporting sectors such as engineering and information technology.

CONTACTS

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