

Research to better manage renewable energy

EurekaAlert!

Assistant professor plans to design devices that will control energy used for everything from electric cars to industrial machinery

RIVERSIDE, Calif. (www.ucr.edu [1]) — A new faculty member at the University of California, Riverside's Bourns College of Engineering has recently received a grant to develop an energy management system that can adapt to changes in electricity prices, renewable energy availability and risks to electric system reliability, with minimal cost to utility companies.

Hamed Mohsenian-Rad, an assistant professor of electrical engineering, received a five-year, \$400,000 grant from the National Science Foundation. His plan is to design plug-and-play energy consumption scheduling devices that control the amount of energy used by consumers, whether to charge electric cars for residential users or to operation various equipment for industrial users.

Then, Mohsenian-Rad will build mathematical tools to investigate and optimally shape the operation of such energy consumption scheduling devices to encourage consumer cooperation, support renewable energy integration, minimize generation cost and maintain electrical power quality.

The research will be performed in UC Riverside's Smart Grid Research Lab using a real-time digital power system simulator, a major piece of equipment that will allow Mohsenian-Rad to perform real-time tests of grid-connected electrical devices.

This research on smart grid power management is one of the four areas of focus in Mohsenian-Rad's Smart Grid Research Lab.

The other areas are:

Energy Efficient Computing: This focuses on coordinating large computing data centers with the smart grid. Larger data centers, such as those running Google and Amazon servers, consume a significant amount of electricity at a high cost. He aims to figure out how do make those large data centers and also smaller ones, such as those operated by a university or a city, more energy efficient.

Smart Grid Cyber Security: Looking at privacy concerns relating to smart meters, an electrical meter that records consumption of electric energy in intervals of an hour or less and sends the data to the utility company. Also, looking at the potential impact of load-altering and false data injection cyber attacks against smart grid power management systems.

Market Challenges: As the penetration rate of renewable energy increases, how do you manage it? Is it beneficial to build large storage plants? Who should operate

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them? How can we make them profitable to encourage private investment? Also, looking at issues related to market monitoring and market power and price manipulation in the electricity market with the presence of emerging smart grid phenomena such as demand response, renewable and distributed generation, and electricity storage.

Original release:

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