Florida microgrids quito

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At Florida International University (FIU), researchers are utilizing artificial intelligence (AI) as an important tool that creates new ways for microgrids to provides resilience, cut carbon emissions, and aid the grid when it"s stressed.

At the university, a microgrid that serves the engineering campus is also enabling long-term research utilizing a 1MW system that mimics the buildings on the engineering campus that have a peak load profile of roughly 1 MW.

In ongoing research, the system uses AI to determine when the grid may be faltering. Then - ahead of an outage - the AI islands the microgrid and creates a smart city in which the buildings on the engineering campus continue to be powered.

"The whole engineering campus operates like an independent city, complete by itself with its own generation and storage continuing to deliver electricity to 10,000 students and faculty members on the university"s engineering campus," said Alexander Stevenson, graduate research assistant and lab coordinator for FIU"s Energy, Power and Sustainability Group.

This type of resilience can be especially helpful in Florida, which experiences high heat, occasional hurricanes and frequent thunderstorms that can destabilize the grid.

The microgrid is a joint project between FIU and Florida Power & Light Company (FPL), which invested $15.5 million to build the lab at the FIU-FPL Solar Research Center where the microgrid research is taking place.

FPL installed the microgrid to conduct research at FIU in 2020, and is continuing to make modifications to it to provide additional benefits to the research buildings and learn about the technology.

The research has generated much interest, especially from federal agencies, said Arif Sarwat, a professor in FIU"s department of electrical and computer engineering and the director of the FIU-FPL Solar Research Center.

"Our control room is visited almost every week by agencies. The government is very high on microgrids," he said. What"s most unique about this "next-generation microgrid" is how it utilizes AI, Sarwat said.

"This is the first microgrid that has used AI for control and operations," said Sarwat. "Others use it for secondary processes, not in the main line of operations. The others use basic logic: if-then scenarios."

As part of its work in the microgrid, AI forecasts weather and load conditions, as well as power costs, and then tells the microgrid how to function - both in the short term - and long term, he said.

For example, AI can predict whether the region will be cloudy a few days ahead to ensure the batteries are filled with solar power before the clouds arrive. Another microgrid innovation at FIU: The main inverter is a grid-forming inverter. "Most microgrids don"t have this technology," said Sarwat. "We are the first to use a grid-forming inverter at this level."

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