

Researchers offer novel approach for computing microgrid stability

August 22 2023, by Rachel Rose



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Microgrids are self-sufficient power systems that can connect and disconnect from the grid for various purposes. Distributed energy resources such as these are crucial in decarbonizing the energy sector and enhancing the grid's resilience.

Dr. Le Xie, professor in the Department of Electrical and Computer

Engineering at Texas A&M University, and his research team are working to provide a stability framework for microgrids to avoid unplanned outages and maintain consistent power generation.

The researchers recently received one of the Institute of Electrical and Electronics Engineers (IEEE) Power and Energy Society Prize Paper Awards for their paper on this topic, titled "A Neural Lyapunov Approach to Transient Stability Assessment of Power Electronics-Interfaced Networked Microgrids," which appeared in the January 2022 issue of *IEEE Transactions on Smart Grid*.

Up to this point the only way to create assured stability for microgrids has involved several offline studies and simulations, which consume a significant amount of time and, even then, amount to a guessing game that could prove unfruitful.

This paper proposes using a novel mathematical method—the Neural Lyapunov approach—to present a specific area that will be reliably stable for the microgrid to operate. One caveat to this approach is it requires a prior understanding of the [microgrid](#) model. To bypass this, Xie and his team leverage the power of machine learning methods to construct a deep neural network to learn the region, which avoids requiring a complete prior understanding of the model to use the approach.

"This is a brand new approach enabled by [artificial intelligence](#)," Xie said. "We were proud to be among the first ones to tailor it into the context of energy systems."

Xie's collaborators and co-authors on the paper include Dr. Tong Huang, a graduate of Texas A&M and an assistant professor at San Diego State University, and Dr. Sicun Gao, an associate professor at the University of California San Diego.

More information: Tong Huang et al, A Neural Lyapunov Approach to Transient Stability Assessment of Power Electronics-Interfaced Networked Microgrids, *IEEE Transactions on Smart Grid* (2022). [DOI: 10.1109/TSG.2021.3117889](https://doi.org/10.1109/TSG.2021.3117889).

Provided by Texas A&M University College of Engineering

Citation: Researchers offer novel approach for computing microgrid stability (2023, August 22) retrieved 27 April 2024 from

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