Kevin Tomsovic Personal Info

- **UTK Professor in power systems, CURENT Director**
- **Research Interests: Power system operations and control, active distribution systems, and optimization applications.**
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2020-2021 Research – Recent Projects

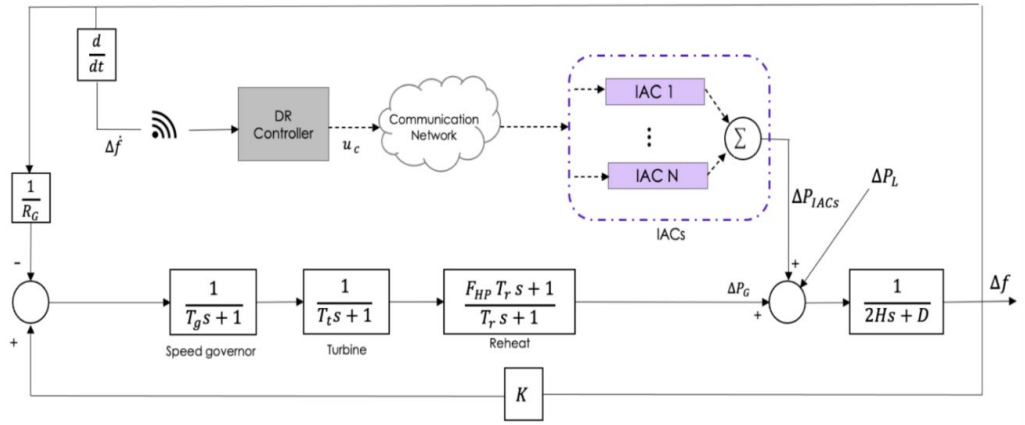
1. Continuously variable series reactor for managing network flows in a distribution system (with F. Wang, UCF, ORNL and ConEd).
2. Stability analysis and performance guarantees of systems with a) high levels of inverter-interfaced resources; and b) distributed communications (with S. Djouadi, F. Taousser, and ORNL).
3. Studies on power system resilience (with S. Djouadi).
4. Cyber security of machine learning systems; applications to load forecasting and other data driven power system applications (with J. Sun, H. Qi and L. Han).
5. WISP – cybersecurity issues in power system markets and other state estimation (with F. Li and J. Sun)

Inertia Emulation Control using Demand Response via 5G Communications

Background and motivation:

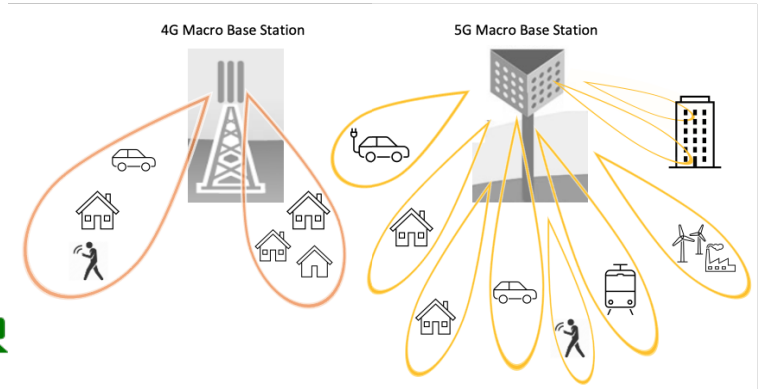
- High penetration of DERs results in unacceptable frequency excursions due to the deterioration of inertial response.
- Rapid movement in building energy equipment towards Internet of Things (IoT)-driven devices provides device management.
- Device- level interfaces along with 5G communications can be leveraged to develop control architectures to control devices and provide reliable energy services.

General structure of the power system with IACs:



5G Technology for demand response:

- The 5G massive multiple-input multiple-output (MIMO) antennas provide a significantly higher frequency and beam-steering and beam-forming technologies.



Achievements:

- Time delays and packet losses in the transmission of data, even when needed for high speed response, such as, the RoCoF signal for inertia emulation, can be compensated for in 5G technology.