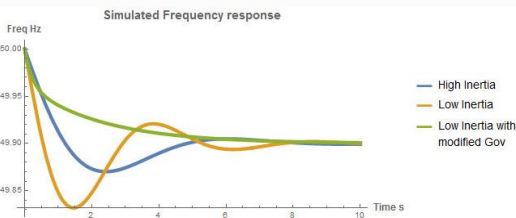


Smart Energy Systems Lab

We focus on developing models and algorithms to control, operate, and plan sustainable electrical power networks by advancing cutting-edge research in generation, transmission, distribution, and energy storage systems.

Operation and control of high renewable energy grid

- Power system inertia estimation.
- Power system flexibility.
- Virtual inertia and adaptive controls.



Sustainable Power Systems

Power system planning

- High renewable energy grids.
- Combined heat and power systems.
- Plug-in EV and energy storage integration.

Power electronics and controls for wind turbines

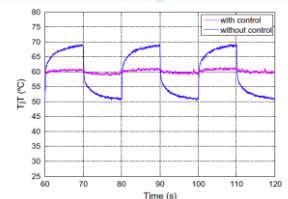
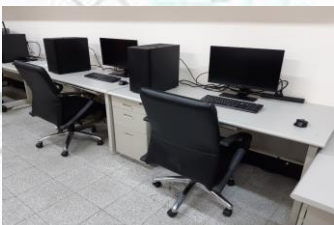
- Inverter thermal management.
- Efficient reliable grid-code compliant controls.

Power system transients and dynamics

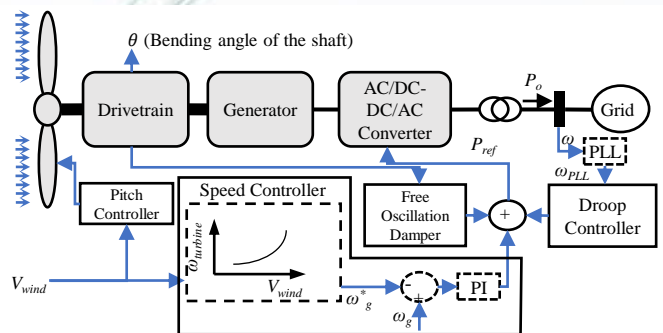
- Dynamic modeling of converter-connected energy resources.
- Numerical simulations.

Inside the lab...

- PSCAD V5.
- XTAP Ver.22.



Surface temperature of IGBT chip with and without thermal management.



Block diagram of typical Type-4 wind energy conversion system components and control blocks.