



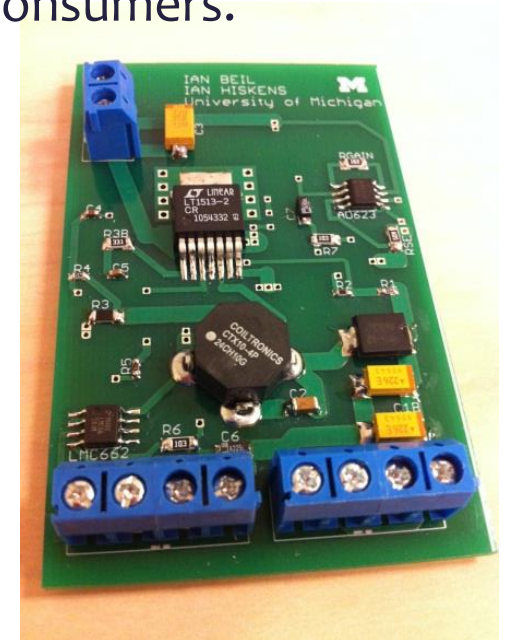
# Power System Testbeds

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# Physical testbeds

- \* Numerous cases of individual buildings and campuses.
  - \* We have some collaboration with Los Alamos National Lab.
- \* Hard to obtain utility agreement to interact/experiment with large numbers of customer installations.
  - \* CSIRO in Australia has agreements with around 100 consumers.
- \* We have developed a lab-based testbed for evaluating control strategies for coordinating the charging of electric vehicles.



# Distribution simulation

- \* GridLAB-D™ :
  - \* <http://www.gridlabd.org/>
  - \* Developed by Pacific Northwest National Laboratory (PNNL).
  - \* “GridLAB-D™ is a flexible simulation environment that can be integrated with a variety of third-party data management and analysis tools. The core of GridLAB-D™ has an advanced algorithm that simultaneously coordinates the state of millions of independent devices, each of which is described by multiple differential equations.”
- \* PNNL has also developed a taxonomy of distribution feeders.

# Power flow testbeds

- \* University of Washington:
  - \* <http://www.ee.washington.edu/research/pstca/>
  - \* Cases include: 14 bus, 30 bus, 57 bus, 118 bus, 300 bus.
- \* Matpower:
  - \* <http://www.pserc.cornell.edu/matpower/>
  - \* Cases include: 9 bus, 30 bus, 118 bus, Polish system (6000 buses).
- \* IEEE PES Distribution System Analysis Subcommittee:
  - \* <http://ewh.ieee.org/soc/pes/dsacom/testfeeders.html>
  - \* Cases include: 13 bus, 34 bus, 37 bus, ...

# Dynamics testbeds

- \* Angle stability, damping:
  - \* IEEE Task Force on Benchmark Systems for Stability Controls.
  - \* Cases include: 9 bus, IEEE 39 bus, 14 generator case.
  - \* Final report due in November 2013.
- \* Voltage stability/collapse:
  - \* IEEE Task Force on Test Systems for Voltage Stability and Security.
  - \* Cases include: Nordic-32 test system, RTS-96 test system.
  - \* Final report due soon.

# Economic testbeds

- \* FERC is funding an effort to generate cases that are based on actual systems, but with identifying characteristics masked.
- \* A PJM-based case is available from FERC through a freedom-of-information request.