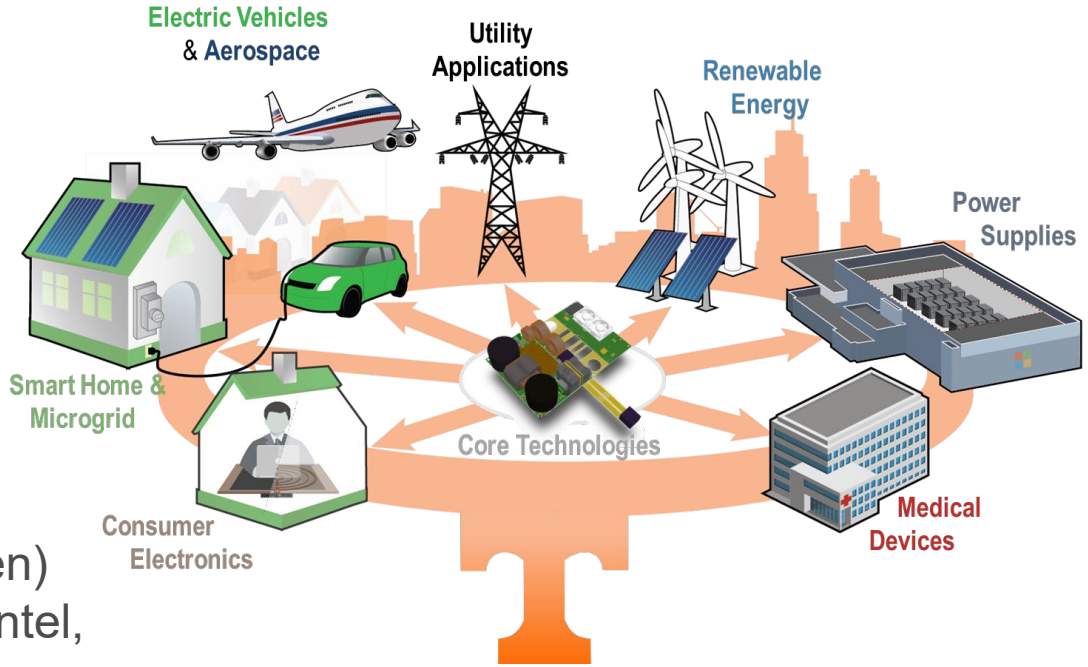
Daniel Costinett Personal Info

- UTK Associate Professor in power electronics
- CURENT Education and Diversity Co-Director
- Research Interests: Advanced design and control technique for Resonant and soft-switching power supplies, wireless power transfer, PMIC, medical devices, electric vehicles
- Daniel.costinett@utk.edu



2020-2021 Research Projects

1. Unified Design Framework for Advanced Power Electronics (NSF CAREER)
2. High Frequency 6.6 kW Wireless Charging for EVs (II-VI Foundation)
3. High-Power 120 kW Wireless Charging for EVs (Volkswagen)
4. Multi-Receiver Wireless Power for Consumer Electronics (Intel, Power America)
5. Reducing Levelized Cost of Energy of Residential PV Inverters Through Dynamic Hardware Allocation (DOE)
6. Ultra High-Efficiency PFC Rectifier for Data Centers (Intel)
7. Integrated High-Current Battery Chargers for Mobile Electronics (Texas Instruments)

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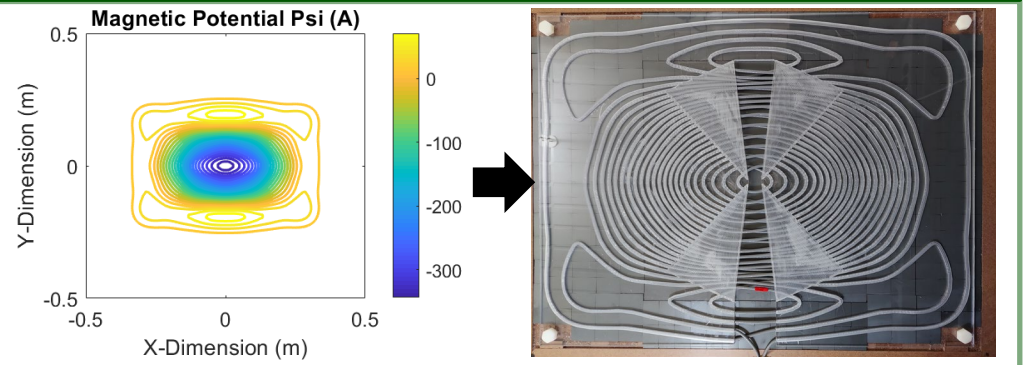
Wireless Power Transfer

Recent Achievements

- Successfully demonstrated two different 6.6 kW Level-II wireless chargers for EVs with over 95% efficiency
- Showcased new control and synchronization design for wireless receivers
- Named one of Power America annual “success stories” for high-efficiency, high-density wireless charging desk

High Power Wireless EV Charger

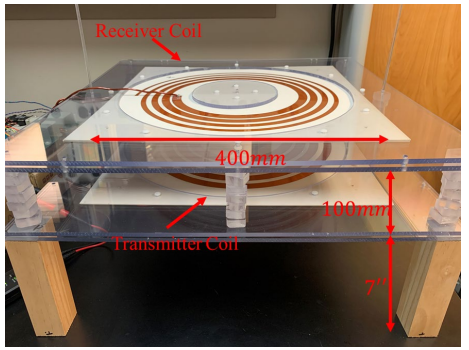


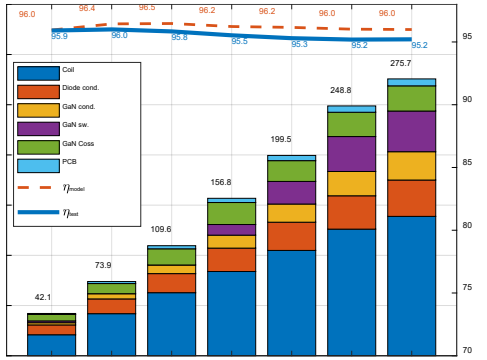
Low stray-field coil design and optimization

Multi-Receiver Wireless Workstation

Multi-receiver 100 W workstation with 92% end-to-end efficiency

High Frequency Wireless EV Charger





Low-profile, self-resonant 3 MHz coils.
95.2% efficiency at 6.6 kW

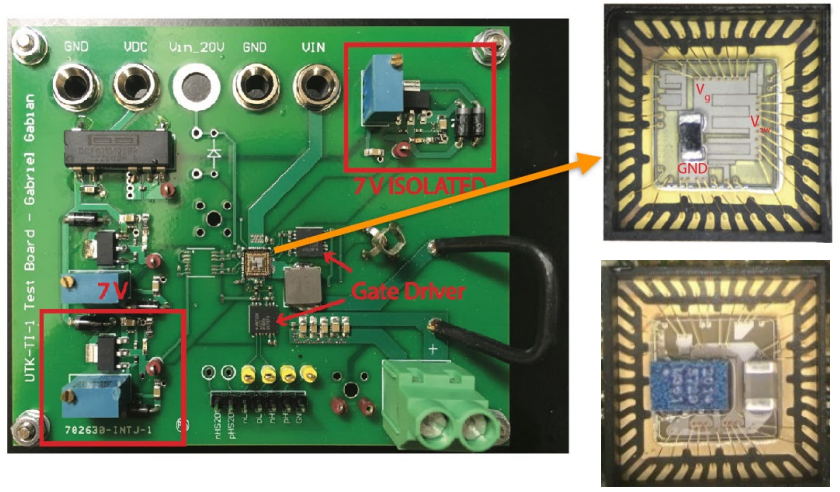
High Current Battery Charger Integrated Circuits

Project Objectives

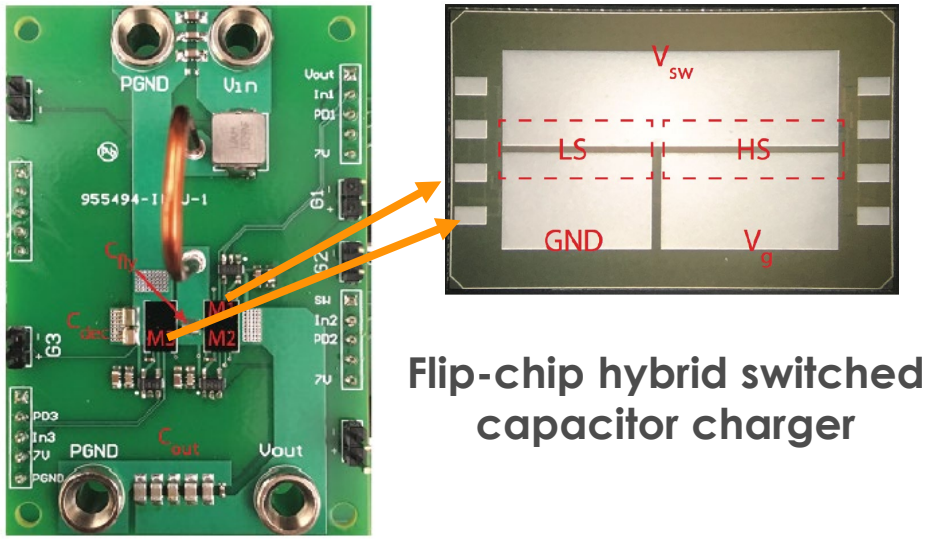
- Increase continuous charging power of monolithic solution to 40W (2x increase over existing parts)
- Develop integrated charging and balancing for multi-cell packs
- Achieve high density using inductorless topology

Recent Achievements

- Optimized novel hybrid switched capacitor topology for high-current charging
- Demonstrated 40W charging using silicon integrated circuit
- Demonstrated new topology with independent control of charging and balancing currents for multi-cell packs



Co-packaged high-current chargers



Flip-chip hybrid switched capacitor charger

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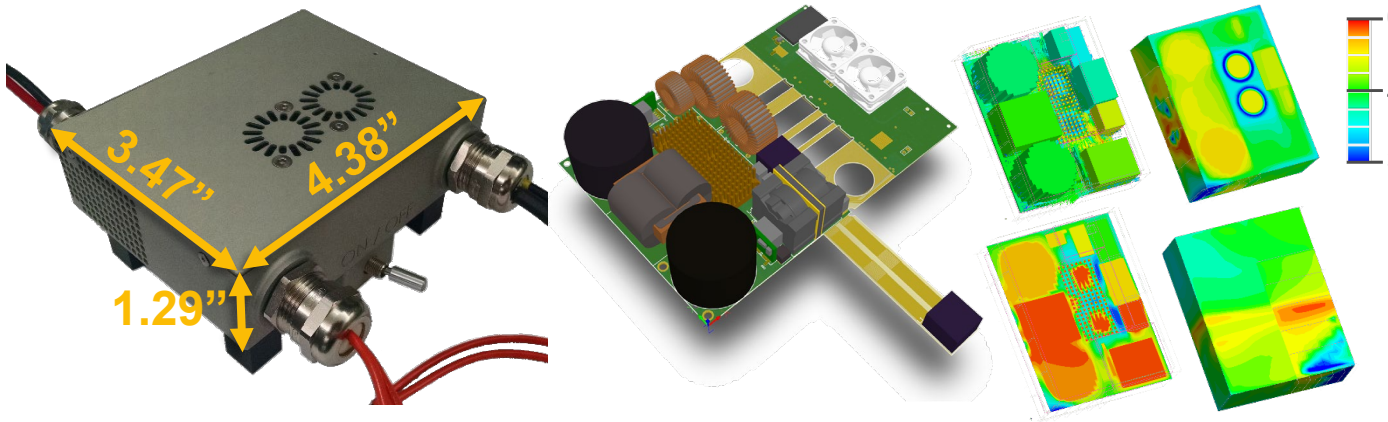
Texas Instruments

LCOE-Optimized Solar Inverter

Project Objectives

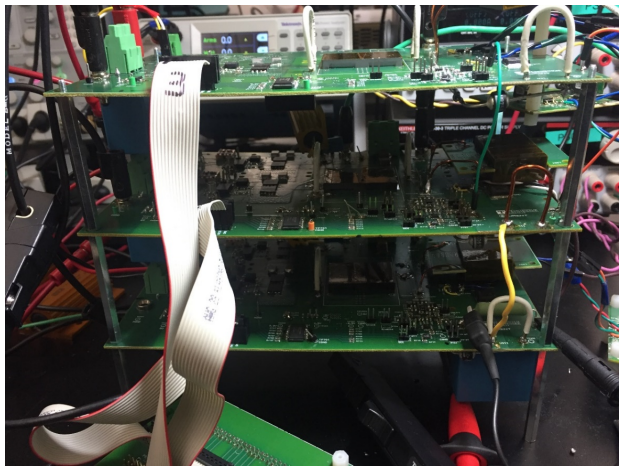
- Develop a Lifetime Cost of Energy optimization for residential single-phase inverter
- Showcase optimal tradeoff between cost, lifetime, and efficiency

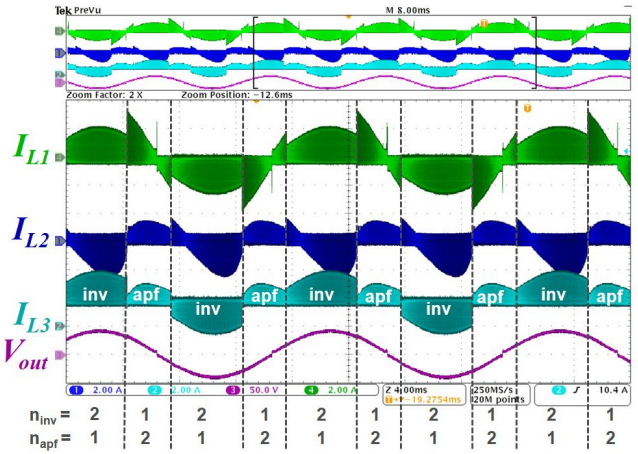


Google Little Box finalist 2kVA single-phase inverter

Recent Achievements

- Demonstrated modular topology using Dynamic Hardware Allocation (DHA)
- DHA allows functional hardware to be repurposed after a module failure to extend life
- Designed prototype based on LCOE optimization





LCOE-optimized inverter employing dynamic hardware allocation

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