

Power Electronics & Electrified Automobiles

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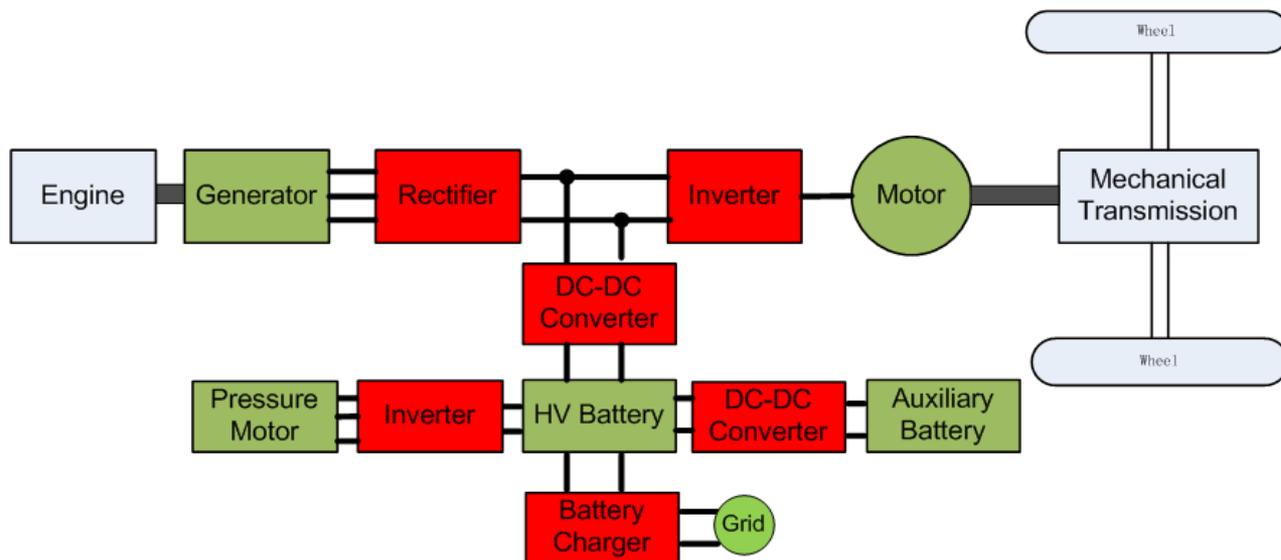
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Power Electronics in E Automobile



EV



E Scooter

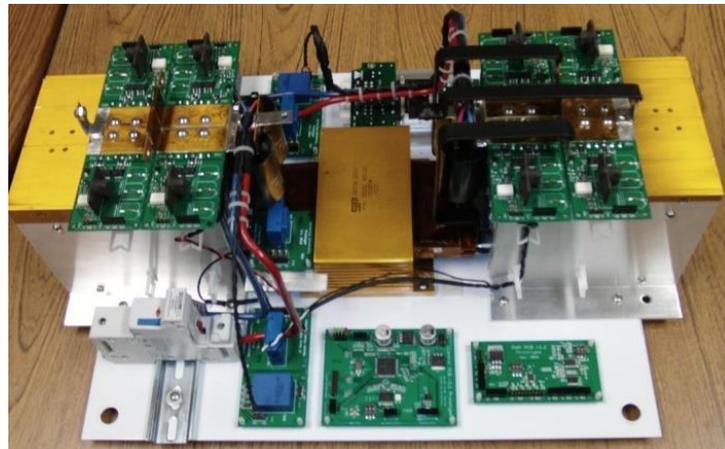


E Bicycle

APEL Sponsored Research

- Charger:** 10kW 95%-efficiency Electric Charger for EV;
- DC/DC Converter:** High-efficiency 400V→12V 2.5kW Electric Alternator;
- DC/AC Inverter:** Development of A 160kW Traction Inverter for EVs;
12V/1kW Motor Drive System for Diesel-Engine Vehicles;
Variable Switching Frequency PWM Control For EV Powertrain.
- Battery Cycling:** Impact of the Charging Algorithms on the Battery Lifetime.
- Electrified Automobile:** Electrification of the Motorcycles for US College Students.

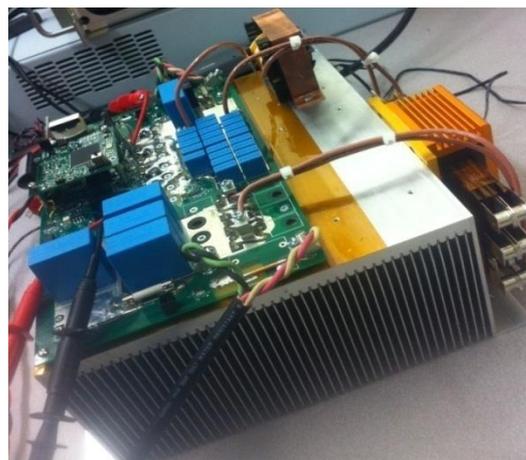
APEL Sponsored Research (1)



10kW 95%-efficiency Bidirectional DC/DC Converter

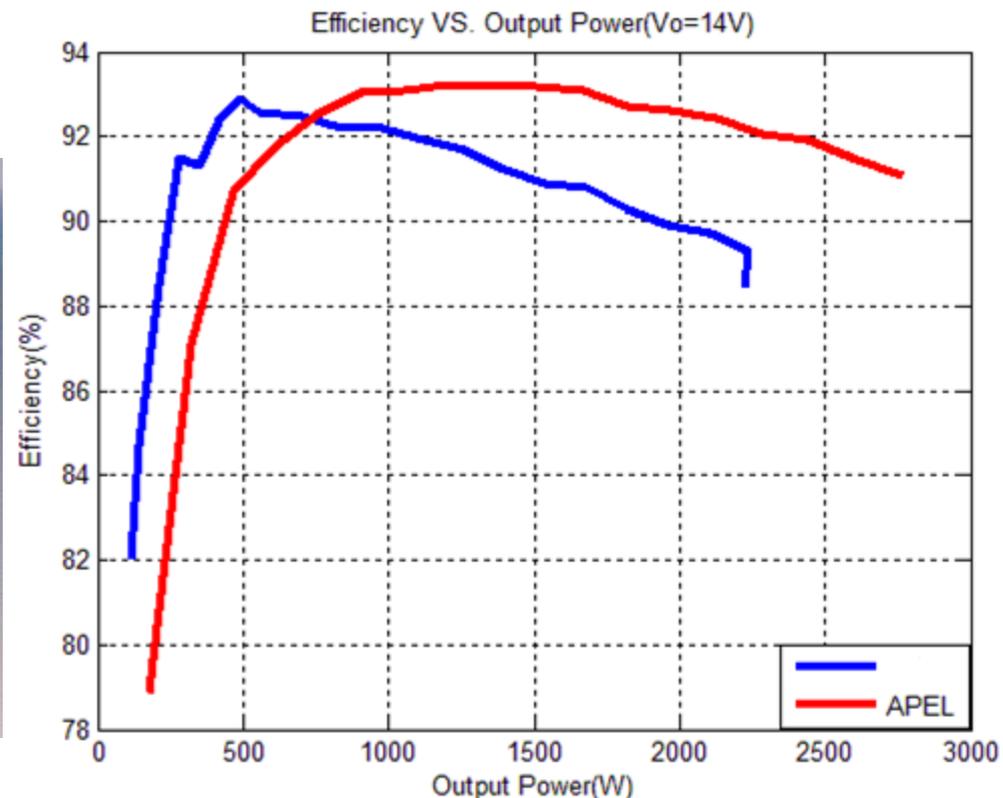


10kW 98%-efficiency AC/DC PFC



10kW 97%-efficiency DC/DC Charger

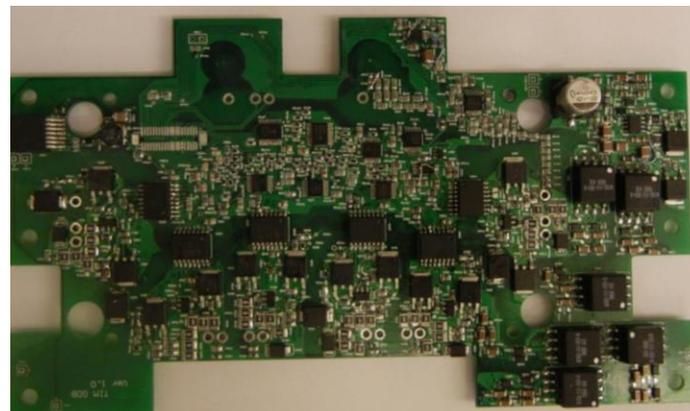
APEL Sponsored Research (2)



2.5kW 93%-efficiency Electric Alternator for EV

Efficiency Comparison

APEL Sponsored Research (3)

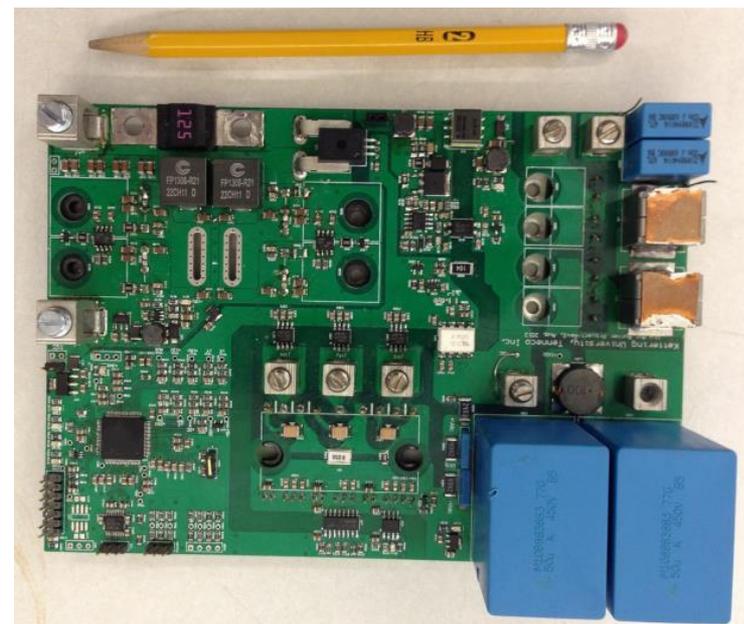
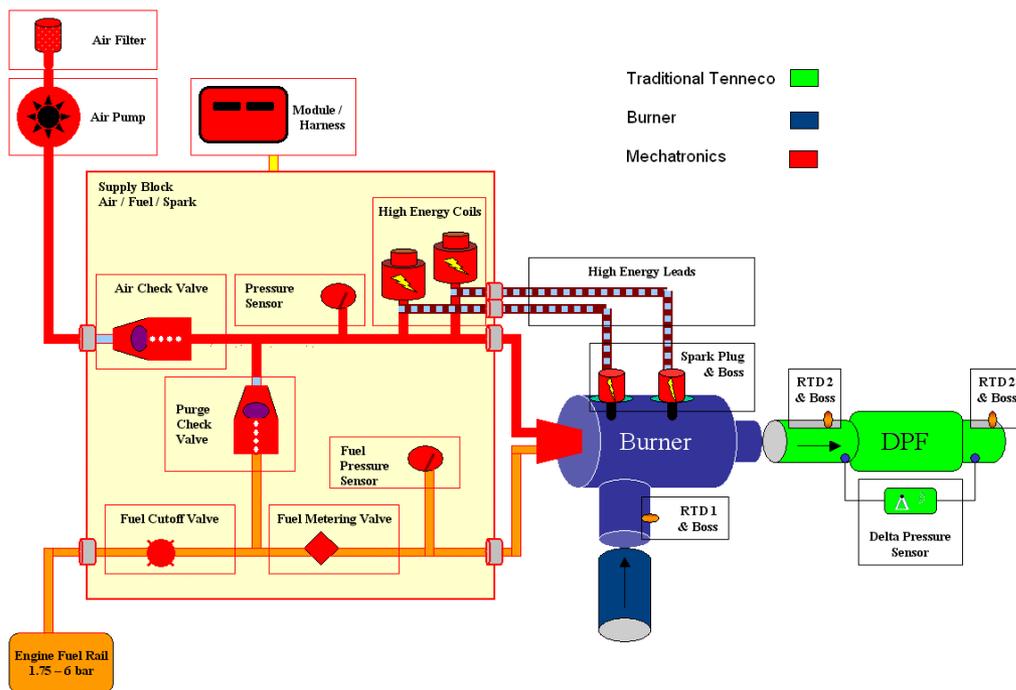


55kW DC/AC Inverter for EV



110kW PowerPC based DC/AC Inverter for EV

APEL Sponsored Research (4)



12V/1kW BLDC Drive System for Diesel Engine Vehicle

APEL Sponsored Research (5)



BMS + Battery Charger for Scooter



48V/4kW Inverter + 100W E Alternator



Battery Pack



HMI

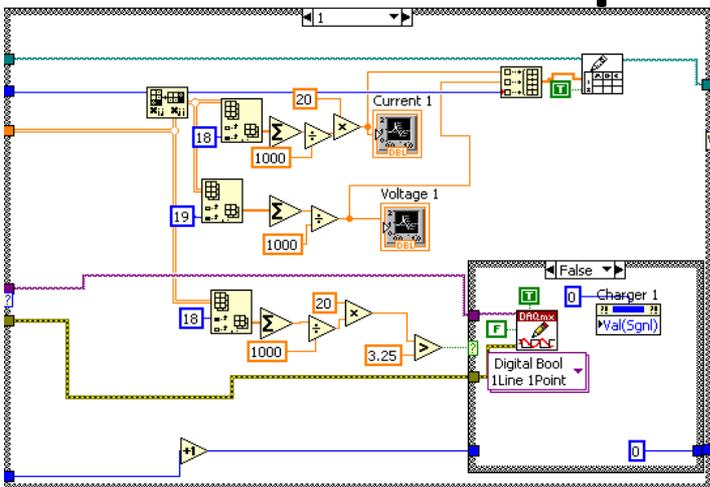


Mahindra-Kettering E Scooter

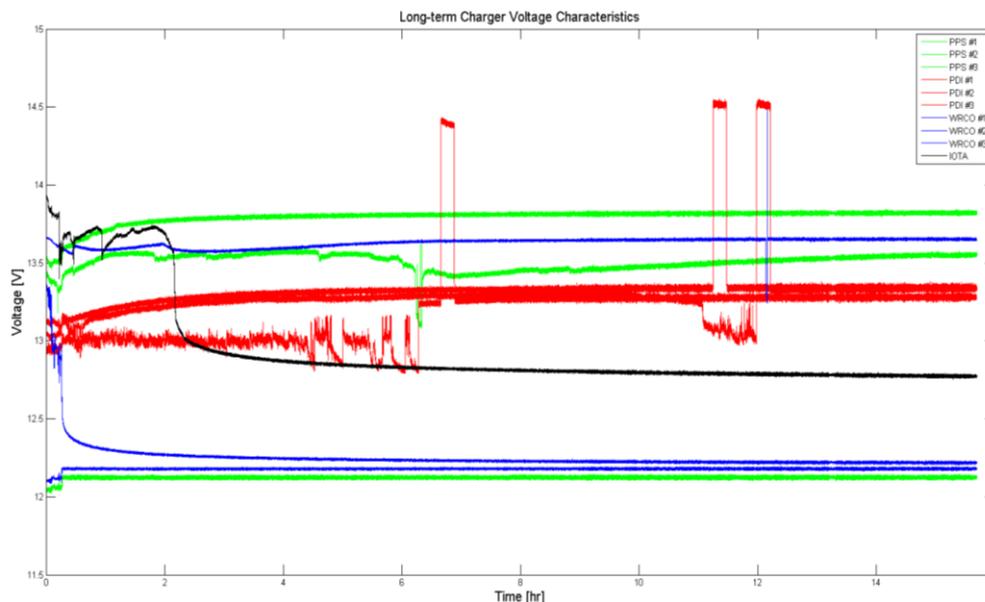


Harvard Show

APEL Sponsored Research (6)



BATTERY	MFG	MODEL
1	PPS	ParaMode 4455
2	PPS	ParaMode 4456
3	PPS	ParaMode 4457
4	PDI	PD9260C
5	PDI	PD9260C
6	PDI	PD9260C
7	WFCO	WF-9854
8	WFCO	WF-9855
9	WFCO	WF-9856
10	IOTA	DLS-75



Charging curves of different chargers in long term

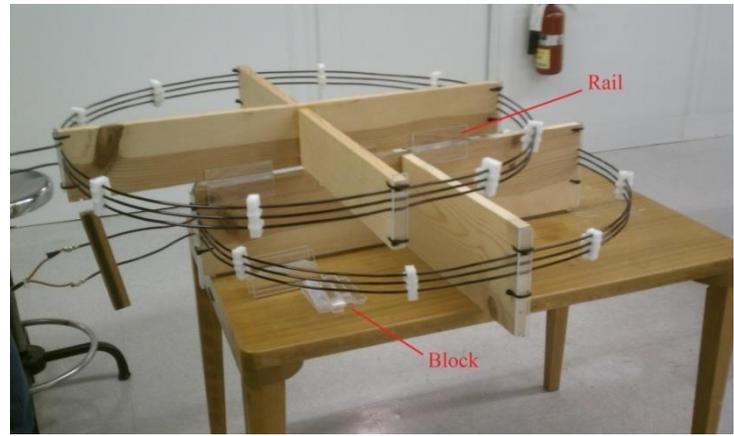
APEL Non-Sponsored Research (1)



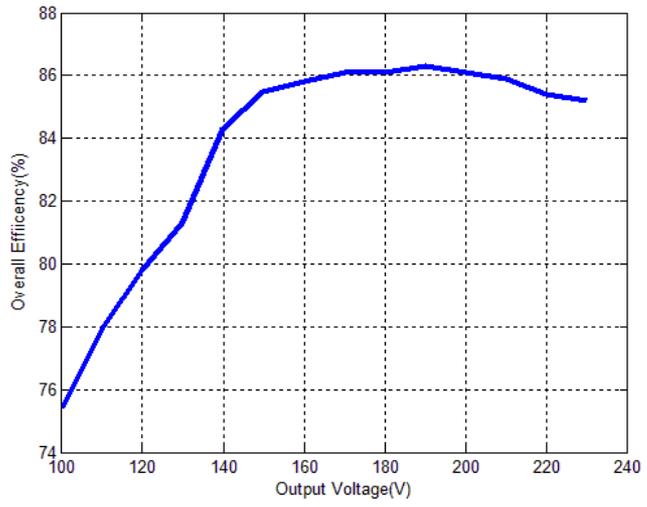
48V/10kW DC/AC Inverter for Electric Vehicles

E Bicycle

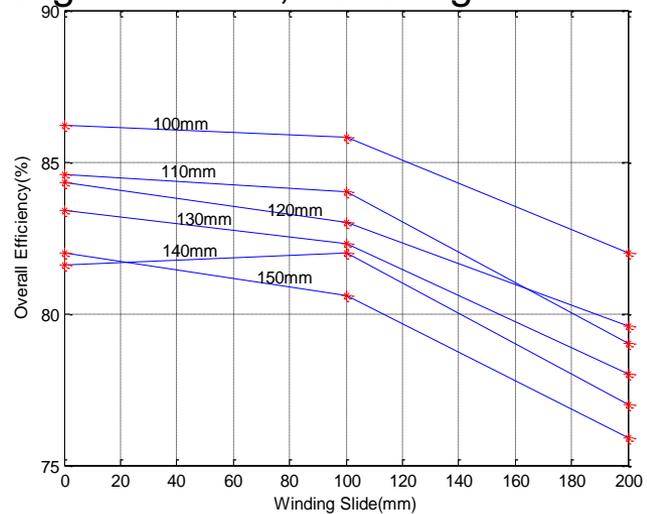
APEL Non-Sponsored Research (2)



Level-1 Wireless Charger in APEL, Kettering



Experimental Efficiency



Efficiency @ (1.3kW, 200V)

Acknowledgement



Allan Taylor
Research Scientist



Wei Guo
Postdoctoral fellow



Gyula Szatmari-Voicu
Research Engineer



Fei Yang
Research Engineer



Trifon Tsekov
Research Engineer



Mike Johnson
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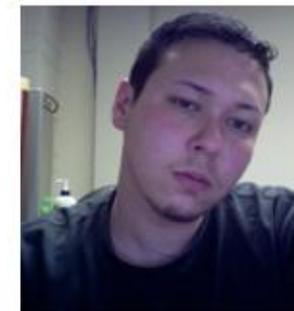
Christopher Mitchell



Nelson Wang



Yang Yang



Mori Yatsui

Thank you!

Questions?