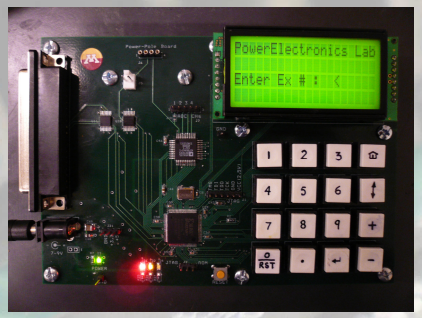
ONR-Funded FPGA-Based Additional Experiments in the Power Electronics Lab

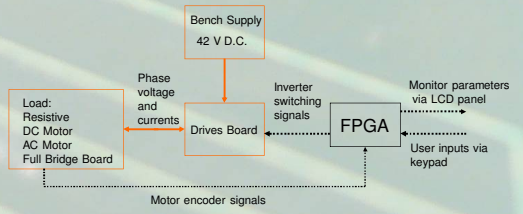
FPGA Board



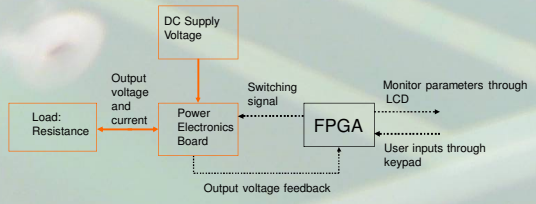
FPGA-based Control Board

- Xilinx Spartan 3E FPGA
- User input with 16 push buttons
- User feedback with LCD Display
- Interface to Power-Pole Board as well as Drives Board
- On board 12-bit parallel ADC
- On board ROM - Completely stand-alone
- JTAG capable
- Single power supply
- Programmed with Verilog

Drives Board Control



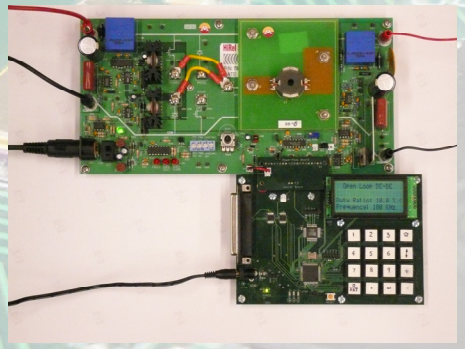
Power Electronics Board Control



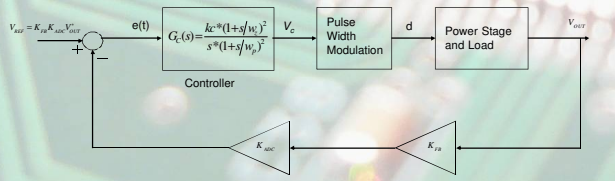
List of Experiments

- Open-Loop DC-DC Converters
- Feedback Control of DC-DC Converters
- PWM Control of Full-Bridge Converters
- Phase-Shift-Modulated Full-Bridge Converters
- Soft Switching
- Single-Phase AC Converters
- Three-Phase AC Converters

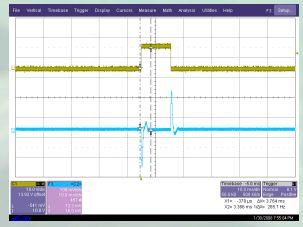
Control of Buck Converter



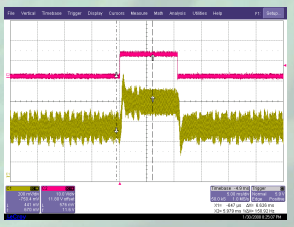
Feedback Control



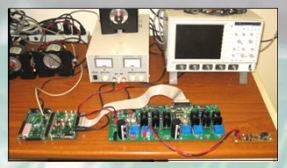
Regulated Output Voltage

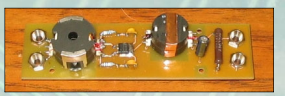


Inductor Current

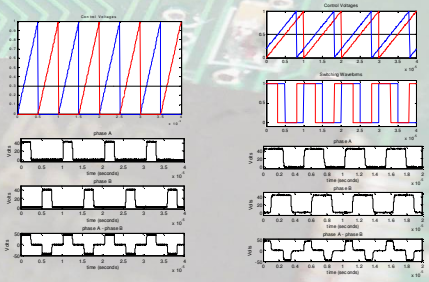


Control of Full-Bridge Converter

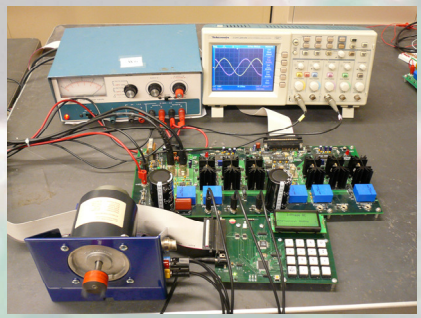




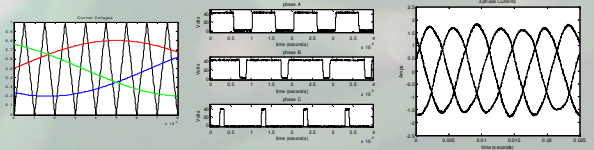
- Uses 2 of 3 inverter legs
- Secondary circuit includes transformer, rectifier and filter
- Switching technique - Pulse Width Modulation or Phase Shift Modulation



Control of AC-Motor Drive



- Uses 3 inverter legs
- V/f control



Sine modulated PWM