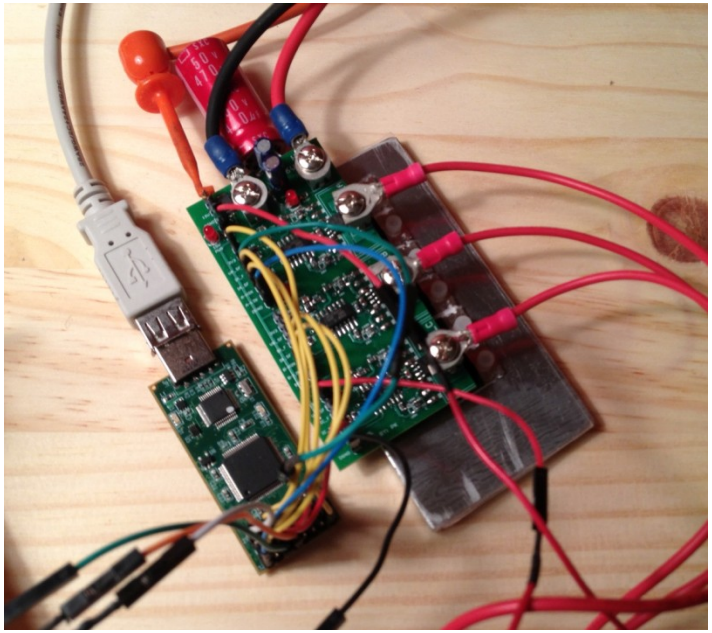
Low Power Motor Controller (LPMC)

By: Paul Karplus



Project Goals

Motivation

Brushless motors becoming more common (EVs, robots, etc.)

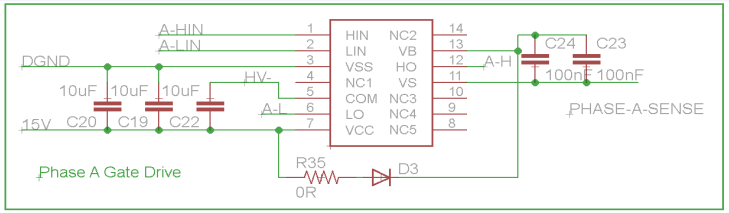
Encompass multiple disciplines (controls, hardware, software)

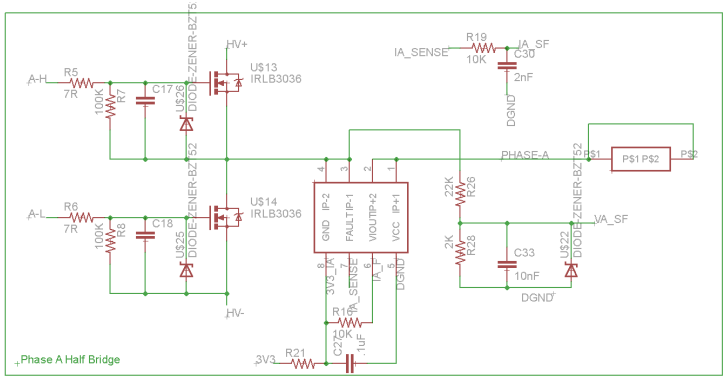
Super cool! (
http://www.youtube.com/watch?feature=player_embedded&v=dkSkVd43Txo#t=198s
)

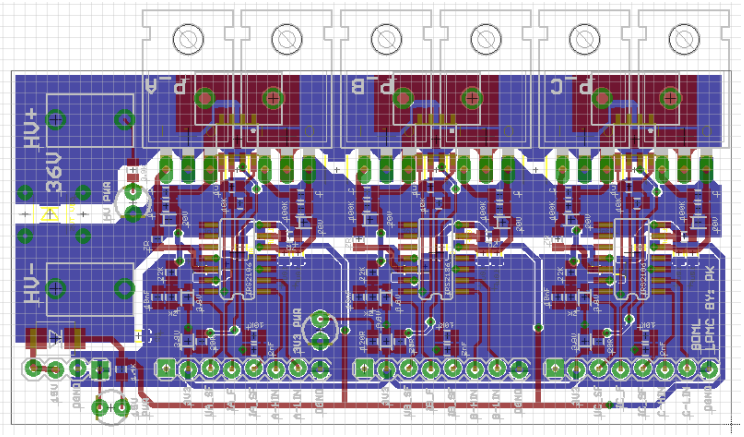
Goals

- Design Inverter PCB
- Brushless Motor and Controller Model in MATLAB
- Motor Dynomometer for Testing and Debug
- PI Speed Loop

PCB

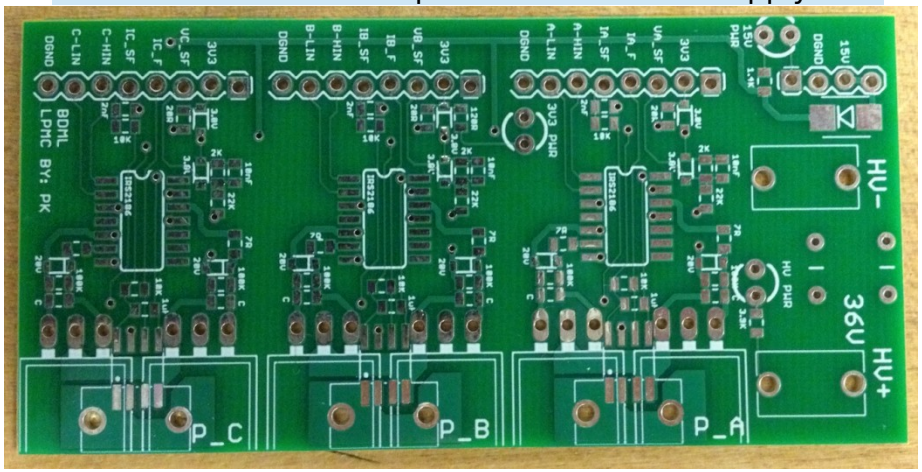




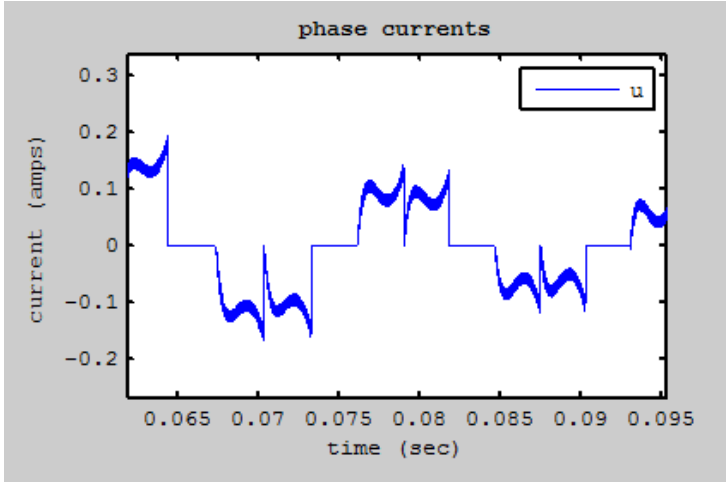


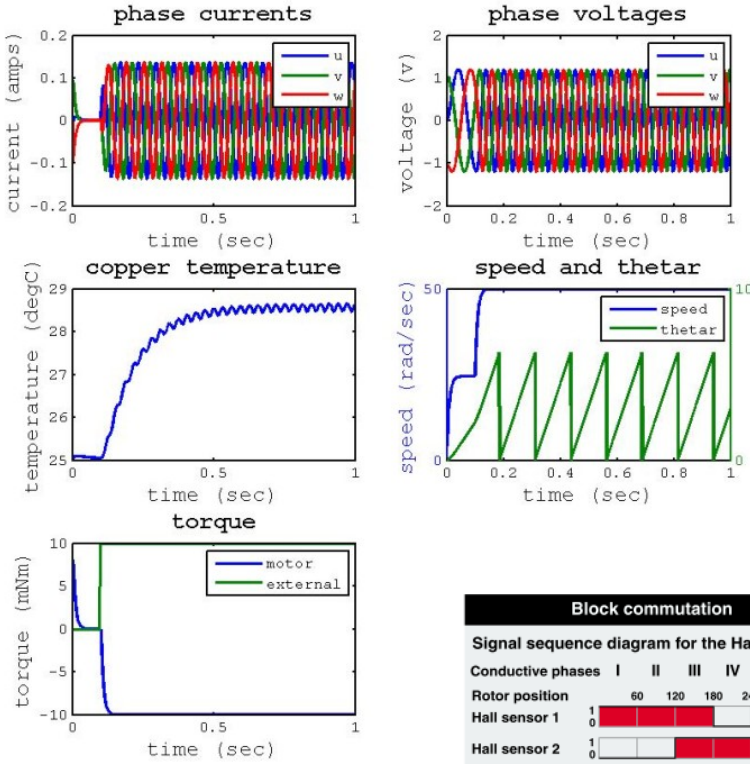
IC Part List

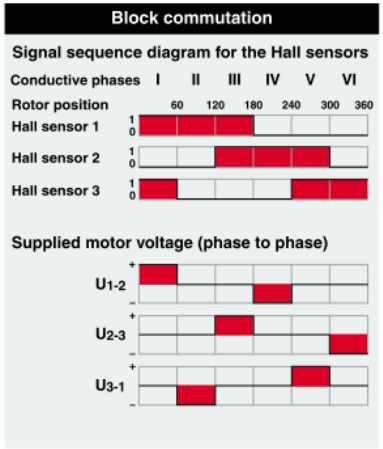
Part Type	Part	Purpose
Microprocessor	TI F28069 Piccolo	Generate PWM for gate driver. Floating point processor. Run control algorithm. Handle user interface.
Gate Driver	IRS21864	4A source sink bootstrap gate driver. No deadtime built in. Separate high and low side PWM inputs
MOSFET	IRLB3036	60V 195A Power MOSFET
Hall Effect Current Sense	ACS711	+/- 12.5A Isolated Linear Current Sensor to measure phase current. 3.3V supply



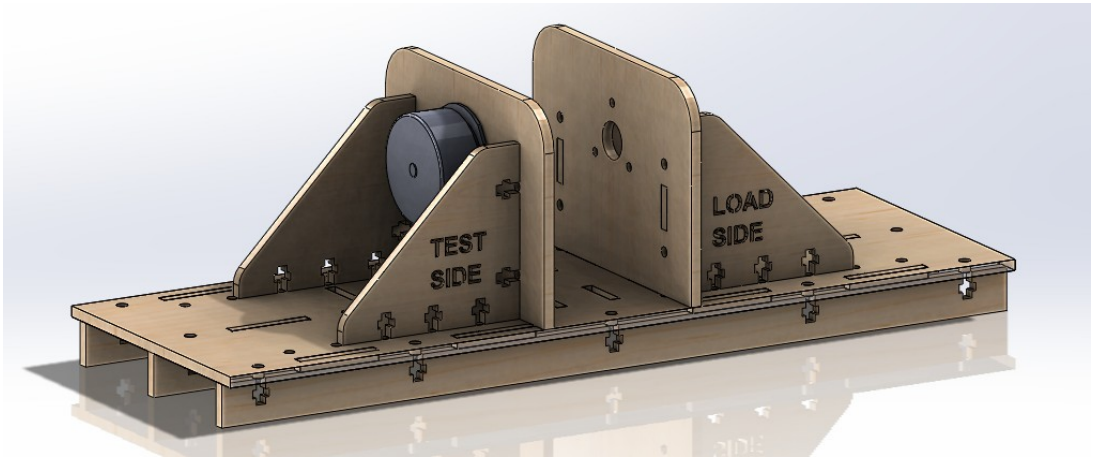
MATLAB Model

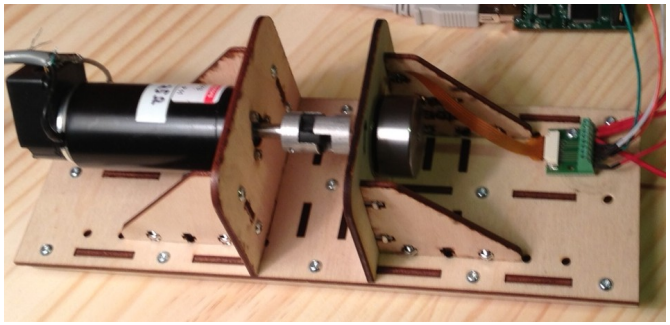






Dynomometer





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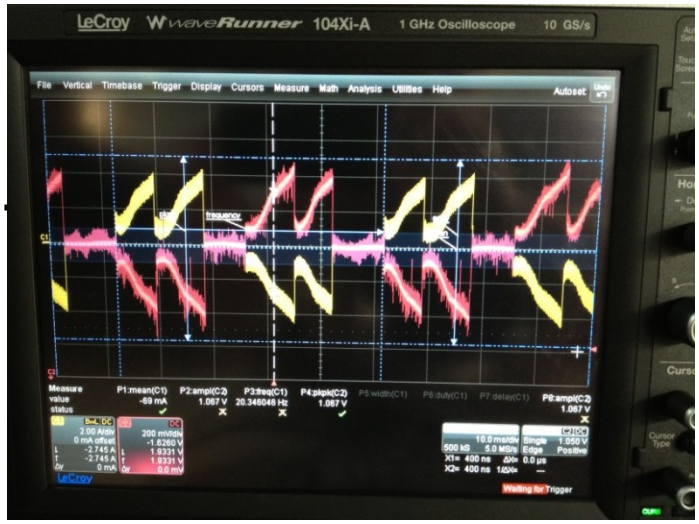
Lessons from Testing and Debug

- Denoising ADC Measurements
- Use good tools
- Using F28069 ControlS



Thank You!
Questions?