Next Generation DSP Based Electric Drives Lab

**Undergraduate Education**

System Setup

**Developed Experiments**
1. Introduction to DSP Electric Drives
2. RTI of DC Switch Mode Converter
3. No Load DC Motor Test
4. Characterization of DC Motor
5. DC Motor Speed Control
6. Four Quadrant Operation of DC Motor
7. Characterization of Induction Motor
8. V/f Speed Control of Induction Motor
9. PMAC Motor Vector Control

**Induction Motor**

- PMAC Motor
  - Simulink model of vector control

**DC Motor**

- DC Motor characterization and closed-loop speed control

**Graduate Lab (Under Development)**

Dual Fed Induction Generator

- Rotor Lock, DC motor speed control, DFIG torque control

**Additional Experiments (in dev.):**
- d-q transforms and control
- DFIG Characterization
- Motoring and Generator
- Pos. and Neg. Reactive Power

**3 Inverter Board**

- $3^\text{rd}$ Inverter Board
- PC and DSP based interface & control w/ data
- dSPACE

**Reference Material**


Vendor Info and Budget: Available online at [http://www.ece.umn.edu/groups/power/labs/labs.html](http://www.ece.umn.edu/groups/power/labs/labs.html)

Vendor information and laboratory budget:
- MOTORSOLVER LLC (www.motorsolver.com), for motors
- HiRel Systems LLC (LoisK@HiRelSystems.com), for drives board
- dSPACE (emo@dspaceinc.com), for DSP system
- Budget: $10,000 for one complete setup