NABsys, Inc.
60 Clifford St
Providence, RI 02903
401-276-9100

Power Supply for Sequencing System

Capstone Class Project
2011/2012

Overview:

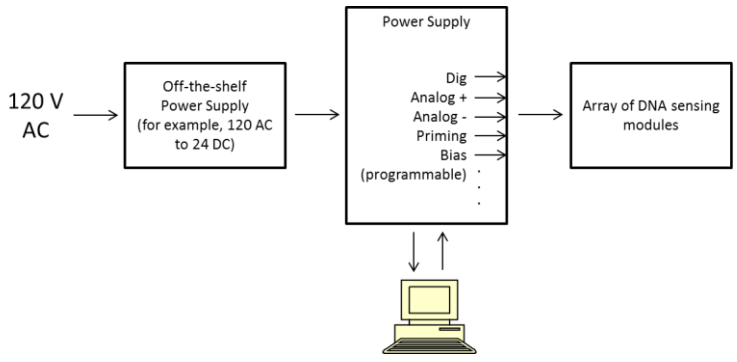
NABsys is developing a system for sensing DNA molecules using solid state detectors. The system requires a power supply, which will be built to stringent requirements. The team of students in the class will design, simulate, build and test a simplified embodiment of the power supply, which was designed for educational purposes. The power supply will operate as a standalone unit.

Each module requires several supply voltages to be sourced externally including:

1. Digital: V_D V, isolated
2. Analog: $\pm V_{CC}$ V, bipolar
3. Priming: 0 to V_{Prime} V, programmable
4. Bias: 0 to $\pm$ V_{Bias} V, bipolar programmable w/common mode control

Each module will source back a Common Mode Error signal to allow the bias supply to provide closed loop control of the bias supply to provide an accurate 0V common mode level for the bipolar bias supply. Since the supplies may be implemented with switching topologies, ripple and noise specifications are of paramount importance. The input power source for this power supply module may be implemented with a commercially available isolated wall supply or something similar to the style used with laptop computers.

System Diagrams:



Deliverables:

1. A wall powered, multiple output power supply
2. Detailed electrical specification (developed interactively with NABsys Engineers)
    a. Input power supply requirements
    b. Input control specification
    c. Output specifications i.e. voltage, current, ripple, noise etc. for each supply
    d. Isolation specification for digital supply
    e. Common Mode Control specification i.e. accuracy, bandwidth & step settle etc.
3. Selection of any "off-the-shelf" components i.e. DC to DC converters, wall supplies etc.
4. Implementation of computer interface (i.e. Labview, NI DAQ)
5. Detailed circuit design & schematic capture via PCB Artist™ software (available from Advanced Circuits) or equivalent.
6. Working breadboard meeting all agreed upon specifications
7. Final report including block diagram, theory of operation, material cost & electrical performance report.

Team Description:

1. Team consists of three students – one computer engineering, two electrical/electronics engineering
2. Strong drive, independence and initiative is a must
3. Lab experience is a big plus
4. Knowledge of power engineering, electronic circuits and Labview experience is a big plus