INTRODUCTION
The project objective is to design and produce an expansion board for the XILINX XS40 Series evaluation board. The expansion board will enhance the capabilities of the XS40 evaluation board by adding an onboard A/D converter and D/A converter. The combination of the converters and the 20,000 programmable gates, will allow the evaluation board to be used for communication, control, and complex digital experiments. The expansion board will also have rugged toggle switches, LED’s, and seven-segment displays. The layout of the additions and upgrades featured on the expansion board will be created using the PSPICE PCB Layout software. The software will also create the files needed for the manufacturer to produce the board.

XILINX EVALUATION BOARD
The XILINX XS40 Series Evaluation Board will be the base for the expansion board. Most of the 84 pins on the FPGA can be used for generic I/O, which means that each pin’s function can be individually programmed as needed. The XS40 board also contains a 8031 microcontroller. The majority of the microcontroller’s pins are routed to the FPGA. Therefore, to use the FPGA’s generic I/O pins the 8031 must be “disabled” to prevent interference. Connected to both the 8031 and the FPGA is a static RAM chip. The RAM chip is used to store code for the 8031 and is erased when the power is removed. Another connection on the XS40 board is a parallel port connector. This connector can be used to download bitstreams to the FPGA as well as program the RAM with 8031 code.

EXPANSION BOARD
The expansion board will allow complex experiments to be performed on the XS40 evaluation board, as well as improving the durability. The system block diagram can be seen in Figure 1.

A/D & D/A Converters
The combination of the A/D & D/A converters with the 20,000 gates will allow the XS40 evaluation board to be used for a larger variety of digital training experiments, including communication, control, and complex digital projects. The converters will be onboard, but will use a socket connection that will allow easy replacement of the A/D or D/A should it be damaged during an experiment.
Switches
The switches on the XS40 evaluation board are very small and are meant to be set once and left alone. These switches are inadequate for use in an abusive laboratory environment. The new switches will be larger toggle switches that can withstand repeated use. Each switch will have an indicator LED connected to it to clearly identify which inputs are set high.

LED’s and Seven-Segment Displays
The expansion board will have more LED’s and seven-segment displays than the XILINX board. The displays will also have resistor packs to prevent damage to the displays. Unlike the A/D and D/A converters, the LED’s and seven-segment displays will be thru-hole mount components. Sockets are not needed for the displays due the high degree of reliability.

FIGURE 1: System Block diagram of Xilinx Expansion Board

[Diagram showing system block diagram of Xilinx Expansion Board]