ECE 480 Design Team 4

Progress Report

11/3/10

Introduction:

The project has fallen behind schedule due to a slow start at the beginning of the semester, miscommunication with the sponsor, and simply not having the right schematics and software to view what had already been accomplished with the C2000 control card. Working diligently, the team hopes to be back on schedule very soon, and has high hopes for the success of the project. Searching for vendors and software that could handle a low number of prototypes to be made was also an issue. After contacting the PCB fabricator that Texas Instruments uses to fabricate their boards it was determined that this company would not be appropriate due to the large scale and cost that they required to fabricate chips. Other vendors were considered such as ExpressPCB, but this would have entailed developing our control card PCB from scratch in ExpressPCB, the proprietary software of this vendor. The software package was relatively simple to figure out, but it was decided that using the same software that Texas Instruments uses to develop PCB boards would be better, were they to produce our design for retail. Hughes Circuits was the next company we contacted, and they could produce small quantities of chips at a reasonable price. After determining that PADS PCB was the correct software to view the PCB layout for the C2000 Control Card developed by Texas Instruments the next challenge was to actually learn and utilize this software to achieve our goal, a MSP430 control card to control a Brushed DC Motor. After the basic functions of this software package were understood the semester began to pick up some steam, and move in the right direction to complete our project by design day.

Hardware:

After determining the capabilities of each pin on the C2000, and how these worked in controlling the motor, the next challenge was to find pins on the MSP430 that could perform equivalent functions for motor control of the Brushed DC Motor. Some difficulties quickly became apparent. The C2000 has 16 ADCs were as the MSP430 only has 12 ADCs. Here we were forced to compromise on some of the sensing capabilities that were onboard of the C2000 chip.

Some pins on the MSP430 also had no equivalent function on the C2000, such as VCORE, and the next task was to determine what the function of this pin was, and how it could be used in motor control. After scouring the Data Sheet of the MSP430, this pin was determined to stabilize the internal voltage of the MSP430, and was tied through a 470 nF cap to ground.

When a satisfactory mapping of pins and peripheral circuitry was determined for the MSP430 to the 100 slot DIMM and USB device, the next challenge became developing a schematic for our card. Many options were considered, but PADS proved to be very difficult software to use to develop this schematic, because many of the components on the chip would have to be developed before the schematic could be made. This proved to be a lengthy and time consuming process, and was quickly abandoned for an alternative that would allow us to expedite the development of our card. Seeing as Hughes required only a PDF of the schematic, and we were provided with a PDF of the C2000 schematic we decided to reflect the changes we had made on the provided schematic by editing it in Photoshop.

After developing the schematic the next challenge was making the nets reflect the changes on the schematic. This was done by hand, and was an exceedingly tedious process; carefully checking that each pin was hooked up to the appropriate peripheral circuitry, adding and removing components to the PADS layout were needed. The next step was to actually wire the MSP430 into the Control Card.

Wiring of the MSP430 to the control card at first seemed simple, but as more and more wires on the primary and secondary sides appeared, along with the vias in-between the layers this became a nontrivial problem, and required much more planning than initially anticipated. There was a huge learning curve for this process, and the wiring had to be constantly modified to accommodate pins being mapped to awkward spots on the DIMM that had already been blocked by wires on the primary and secondary side. After this lengthy process was completed the next step was to find a vendor to produce the card, and we are still waiting to hear back from Hughes Circuits on this point.