Experiment 1

Using the DSK Tools and Generating a sine wave

by

Alfredo Archilla

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In this experiment I used the Texas Instruments TMS320C3X DSK digital signal processing board to generate a sine wave and to single step through a program that multiplied two matrices.

The sine wave was generated using an assembly language program called sine4p.asm. This assembly language program was first converted into machine language by the DSK assembler with the following command:
> >>dsk3a sine4p

The assembler takes the assembly program and outputs a machine language program called sine4p.dsk. This machine language program is then loaded into the DSK and run.

The program was loaded into the DSK and run using two different methods. First, a debugging program that allows interactive communication with the DSK board was used. The debugger was run on the PC using the command:
> >>dsk3d reset

The DSK is first reset, then the machine language program is read by the debugger and downloaded into the DSK.

The second method for running the machine language program was the boot loader.
> >>dsk3load sine4

This program reads in the machine language program, and downloads it into the DSK where it starts running automatically.

The sine4passembly language program consists of three parts. First, the starting addresses for the data and the text are defined. Second, the data to be used in the program is defined, and third, the program steps are given. The program first initializes the D/A converter which specifies the sampling rate. Next, a circular buffer is defined with the values of the sine wave. This program uses four values 0, 1000, 0, and -1000 to approximate a sine wave. The first zero is loaded into Register 7 and the program waits and polls the timer for the correct time to output this sample into the D/A converter. Once this sample has been output to the D/A, it loads the next value, 1000, into register 7 and goes through the process again. It continues in the same way outputting the 0 and -1000. Since a circular buffer of length four has been defined, it returns to the first value, 0, after the -1000. This continues until the program is terminated by the user.

The second program run was called matrix.asm. This probram multiplies a matrix with an array, and is used to learn the debugger program commands. The debugger allows the user to see the DSK registers, the memory, and the program being run. This part of the program consisted of various steps. They are: running the program one instruction at time, or single stepping through the program; looking at the memory in hexadecimal, float and integer; and looking at the R0-R7 registers in hexadecimal and float.