Programming with DSP Processors TMS320C6713/TMS320C6416 on CCS

This course is mainly deals with programming on TMS320C6713/TMS320C6416 DSP Starter Kit (DSK) using CCS, which is a low-cost development platform designed to speed the development of high precision applications based on TI’s TMS320C6XXX floating point DSP generation.

**COURSE CONTENT :**

| Introduction to MATLAB® | • Quick overview on MATLAB® architecture and computing environment  
| | • Data types and operators in MATLAB®  
| | • Array and matrix operations  
| | • Functions  
| | • Structures  
| | • Plots |

| Introduction to Digital Signal Processing | • Introduction to signals and systems  
| | • Sampling and Quantization  
| | • Overview of Digital Signal Processing  
| | • Windowing Techniques  
| | • Filtering |

| Introduction to DSK | • Why Special Purpose processor for DSP  
| | • History of TMS Series  
| | • What is Code Composure Studio  
| | • Difference Between Floating and Fixed Point Processors  
| | • An Introduction to TMS320C6713  
| | • An Introduction to TMS320C6416 |

| DSK(TMS320C6X) Architecture | • Von Neumann Architecture and Harvard architecture  
| | • Concerns on Fixed Point Processors (Quantization Error)  
| | • Functional Units  
| | • Pipelining  
| | • Registers  
| | • Interrupts  
| | • McBSP's  
| | • DMA |
| Hands on DSK | • Introduction to CCS  
|            | • Quick Test of DSK  
|            | • Difference between Compiler, Linker, Assembler  
|            | • Detailed Explanation of Support Files  
|            | • Building a small Project (hello world)  
|            | • Generation of Sinusoid using DIP switch and explanation of the program  
|            | • Illustration of Watch Window, GEL file  
|            | • Few Experiments on Sine generation program using DIP Switch  
| Plotting with CCS | • Generation of Sine and Plotting with CCS  
|            | • Usage of Circular Buffer  
|            | • Usage of Hardware Interrupt int_11  
| Profiling with CCS | • Dot Product of Two Arrays  
|            | • Implementing Variable watch  
|            | • Setting up Break Points  
|            | • Profiling Printf function  
| Real Time Implementation | • Input with Onboard AIC23 Stereo Codec  
|            | • TLV320AIC23 Onboard Stereo Codec  
|            | • Example Program to Illustrate onboard Stereo Codec using Hardware Interrupt and explanation of the program using McBSP's.  
|            | • Example Program to Illustrate onboard Stereo Codec using polling and explanation of the program using McBSP's.  
|            | • Example program to illustrate Multi Channelled McBSP's.  
|            | • Examples Illustrating Echo and Delay  
|            | • Example illustrating sine generation using table created by MATLAB  
|            | • Few assignments (Square generation and ramp generation using table created by MATLAB and CCS plotting  
| Real time Implementation | • Generation of amplitude Modulated signal using C6713 DSK  
|            | • Generation of Pseudorandom Noise using C6713 DSK  
|            | • recording Voice using external Memory (SDRAM)  
| FIR filters | • Real Time Convolution  
|            | • FIR Implementation of LP HP BP BS Using DSK 6713 DSK  
|            | • FIR Implementation using Pseudorandom Noise sequence as
input to filter and output stored in memory
- Two Notch filters recovering the Corrupted Input
- Voice Scrambler using Filtering and Modulation

IIR and Adaptive Filters
- IIR filtering using cascaded direct form -II
- Adaptive Filters
- What is Adaptive Filter
- Application of adaptive Filters
- Least Mean Square Algorithm and RMS
- Noise Cancellation, System Identification

Implementation of Adaptive Filters
- Implementing Adaptive Filter for sinusoidal Noise cancellation on DSK 6713
- Adaptive FIR Filter for System ID of a Fixed FIR as an Unknown System
- Adaptive FIR for System ID of a Fixed FIR as an Unknown System with Weights of an Adaptive Filter Initialized as an FIR Bandpass-Plotting with CCS
- Adaptive FIR for System ID of Fixed IIR as an Unknown System

DSP/BIOS
- What is DSP BIOS?
- Uses of DSP BIOS
- Sine Generation with DIP Switch Control Through DSP/BIOS
- Blinking of LEDs at Different Rates Using DSP/BIOS
- Sine Generation Using BIOS to Set Up Interrupt INT11