

EE442/EE592 Real-Time Digital Signal Processing

Laboratory 6: TI-Based FFT Implementation

1 Obtaining and Building the FFT Code

- 1) Download the FFT Example zip file from the course website (TI 6416 Code tab). Extract the files and save them in C:\Documents and Settings\dspguest\Desktop.
- 2) Launch CCStudio 3 and go to “Project” menu. Choose “Open...” option from this menu.
- 3) Open “dsk_app.pjt” from folder C:\Documents and Settings\dspguest\Desktop\TI_6416DSK_FFT_Example.
- 4) Click on the “+” sign which is to the left side of “dsk_app.pjt (Debug)”. It displays the files that are included in “dsk_app” project.
- 5) The file “user_data.h” contains all necessary declarations (global variables) and includes the util.h file inside the folder “DSPFunctionsFixedPoint”. Once the project has been built, all functions inside “DSPFunctionsFixedPoint” will automatically be added to the project.
- 6) Click on the “+” sign which is to the left of “Libraries” and should find “dsp64x.lib” and “rts6400.lib”. These library files are important to build the project. These files if not included can be added using “Add files to the project” and browse to the location “C:\CCStudio\c6400\dsplib\lib\” and “C:\CCStudio\c6000\cgtools\lib\” respectively.
- 7) Since the FFT requires block processing instead of sample-by-sample processing [process_signal()], we need to use process_block(). The process_block() routine will automatically called by dsk_app instead process_signal(), whenever the buffer size is greater than two. Note that in the FFT example, BUFFSIZE has been set to 2048 in user_data.h.
- 8) In this FFT example, in process_block() we first take left/right blocks of time-domain, complex-valued samples, perform the FFT on each block, and return left/right blocks of frequency-domain, complex-valued samples. Next, we take left/right blocks of frequency-domain samples and perform the IFFT by 1) complex conjugating the block, 2) computing the FFT, and 3) complex conjugating the block. FFTs are computed using routines in DSPLib.
- 9) Go to the Debug menu and choose “Connect” to connect to the target DSP board.
- 10) Go to the Project menu and choose “Build” to build the application (compile).
- 11) Go to the File menu and choose “Load program.” Select dsk_app.out found in the Debug folder.
- 12) Go to the Debug menu and choose “Run.”
- 13) Play any audio file and check whether the audio is passed to the speakers via the processor.
- 14) Now change the BUFFSIZE to 1024 and repeat step 9-12. Do the same with BUFFSIZE of 512.

Note: As of 18 Apr 2011, it appears that BUFFSIZE 1024 (512-point FFT) does not operate correctly.

Please notify pdeleon@nmsu.edu regarding corrections or improvements to this lab.