EE451 Senior Project:

Integration of Matlab Tools
for DSP Code Generation

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U N I V E R S I T Y

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Introduction

The purpose of this project is to allow a user to be able to compile C, C++, Simulink and assembly language on a digital signal processing (D.S.P) board without the user understanding the hardware architecture and functionality of the D.S.P board. Our main goal in this project is to design a software user interface using Matlab tools that will allow a user to easily compile code in any of the above mentioned languages on a Texas Instrument D.S.P board (TMS320C6713).

Description

The software interface to be developed for the code integration will operate according to the block diagram shown below in Figure 1.
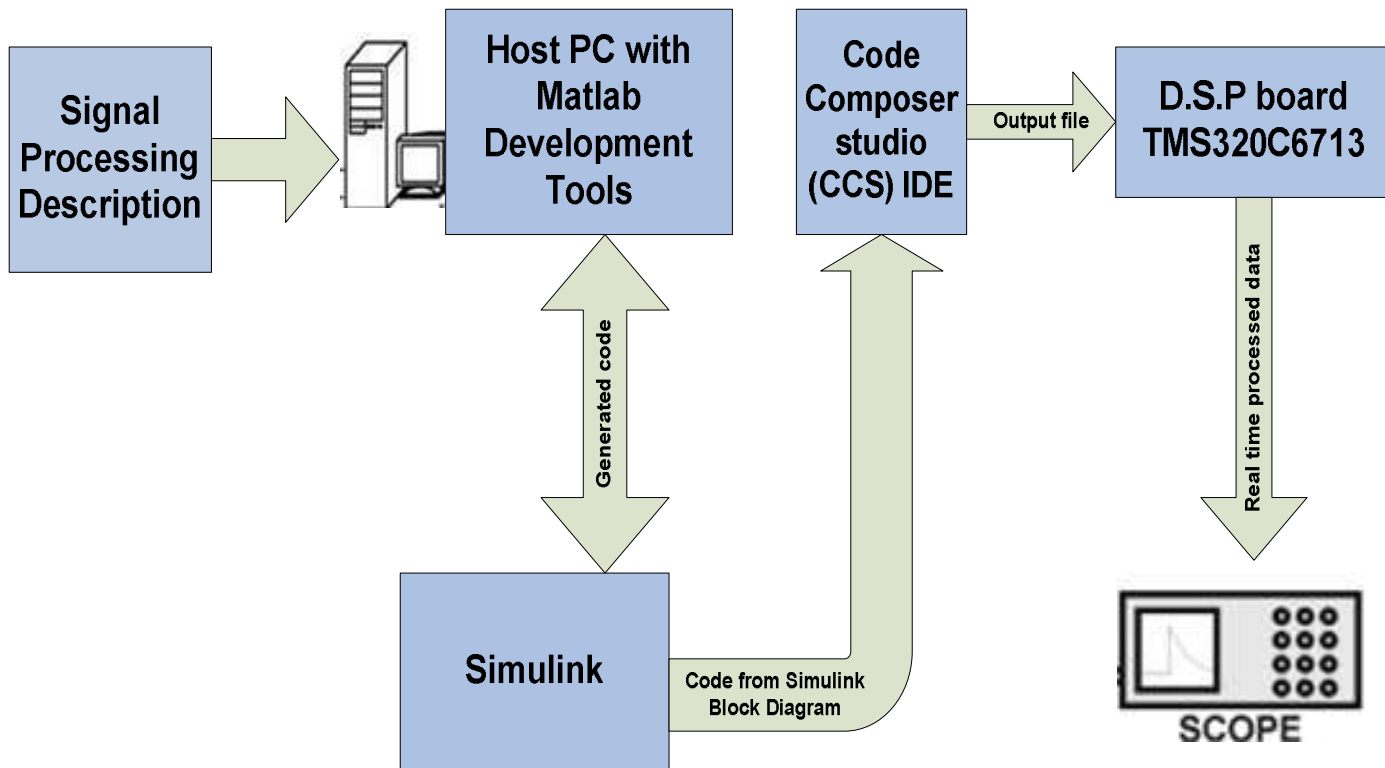

Figure 1: High-level system block diagram

Functionality of the Block diagram Subsystems

Signal Processing Description

This is a given problem to be implemented on the D.S.P board. It can involve implementing a control feedback system on the D.S.P board or analyzing a complex data acquisition scheme on a D.S.P board. Any problem whose output is in the form of signals or data that can adequately be processed in real time on the TMS3206713 is our Signal Processing Description.

Host PC with MATLAB Development Tools

The signal processing description is implemented by first writing code using Matlab development tools. If the signal processing description is in C++, C or assembly language code, it has to be converted to a MEX file, which is interfaced with Matlab. The Matlab code generated is saved into an input file or a workspace to be used in Simulink.

Simulink

Simulink, an extension of Matlab will be used also to solve our Signal Processing Description by first obtaining from Matlab an input file and displaying our graphical results numerically. A number of design blocks which may be unavailable in Simulink need to be developed in Matlab by writing C code. Only a constructed block diagram representation of the Signal Processing Description in Simulink is sent to the Code Composer Studio (CCS).

Code Composer Studio (CCS)

The CCS integrated development software converts the Simulink block diagram into C and assembly language, which is downloaded as an output file onto the TMS3206713. The running process can be accessed only from the CCS debugging tools or across a link for CCS or Real-time data Exchange. Otherwise the running process is not accessed.

D.S.P Board (TMS3206713)

The TMS3206713 replaces the work of Simulink. The TMS3206713 outputs real time processed data or signals to the oscilloscope. The output on the scope represents our signal processing result.