



University of Tehran
School of Electrical and Computer Engineering

Course:	8101993 - Real-time Digital Signal Processing Laboratory		
Course type:	Elective	EE*	Credit: 1
Level:	Undergraduate – open to graduate students as elective course		
Co-requisite(s):	Digital Signal Processing (8101125)		
Prerequisite(s):	-		
Prerequisite by topic:	Familiarity with MATLAB, FIR and IIR Filters, Discrete Fourier Transform, C programming		
Textbook(s):	Amin Khansefid, Farshad Lahouti, <i>Real-time Digital Signal Processing Laboratory Manual</i> , School of E&CE, University of Tehran, 2011.		
Coordinator:	Farshad Lahouti, Associate Professor, School of ECE		
Goals:	Attaining hands-on experience with implementation of DSP algorithms on modern state of the art DSP hardware		
Outcome:	<p>Upon successful completion of the lab, students will be able to</p> <ol style="list-style-type: none"> 1. work with Code Composer Studio IDE software 2. program TI digital signal processors 3. become familiar with DSPs structures and terminology, e.g., interrupt, ports, ... 4. implement FIR and IIR filters on DSP chips 5. implement audio band digital spectrum analyzer based on FFT function 6. challenge the real-time implementation of practical algorithms 7. understand fixed-point computation and finite word length effects 8. use MATLAB and CCS interface in order to test and debug DSP algorithms 9. use Simulink to program DSP with processor-in-the-loop functionality 		
Topics:	<p>Lab 0: Introduction: Getting to know the lab hardware and software Lab 1: Introduction to Code Composer studio IDE Lab 2: Sampling and signal generation with C6713 DSK Lab 3: TI DSP function library and FIR filtering Lab 4: TI DSP function library and IIR filtering Lab 5: FFT and spectrum estimation (Two parts) Lab 6: Fixed point programming</p>		

	Lab 7: MATLAB and CCS interface with processors (processor in the loop)
Computer usage:	MATLAB and Simulink Code Composer Studio – C Programming
Assignments:	Each lab experiment involves some assignments, which are mostly done in the lab.
Projects:	One final project (case by case basis as applicable)
Grading:	Pre-lab report, Class participation and Assignments: 35 % Lab report, Exam, Project: 65 %
Further readings:	[1] Texas Instruments related documents [2] R. Chassaing and D. Reay, <i>Digital signal processing and applications with the TMS320C6713 and TMS320C6416 DSK</i> , 2 nd Ed., Wiley, 2008. [3] S. M. Kuo, B. H. Lee and W. Tian, <i>Real-time digital signal processing implementation and applications</i> , 2 nd Ed., Wiley, 2006 [4] S. A. Tretter, <i>Communication system design using DSP algorithms with laboratory experiments for TMS320C6713 DSK</i> , Springer, 2008. [5] N. Kehtarnavaz, <i>Real-time digital signal processing based on the TMS320C6000</i> , Newnes, 2005. [6] A. V. Oppenheim and R. W. Schaffer, <i>Discrete-time signal processing</i> , Third Ed., Prentice Hall, 2010.
Prepared by:	Amin Khansefid, Research Associate, Center for Wireless Multimedia Communications, University of Tehran Farshad Lahouti, Associate Professor, University of Tehran
Date:	October 2012

*EE: Electrical Engineering CE: Computer Engineering IT: Information Technology