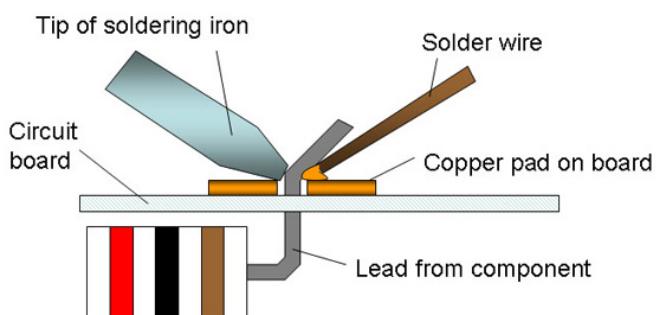
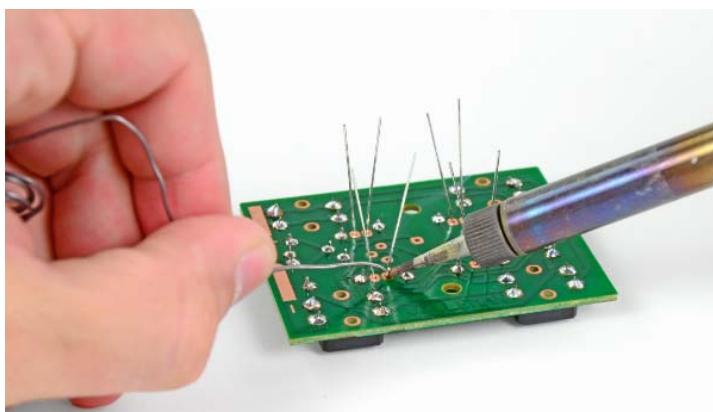
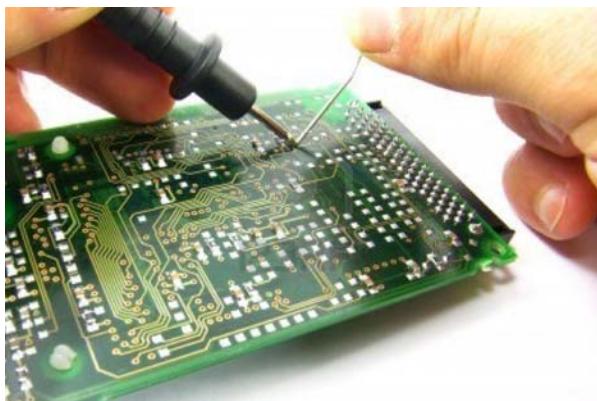
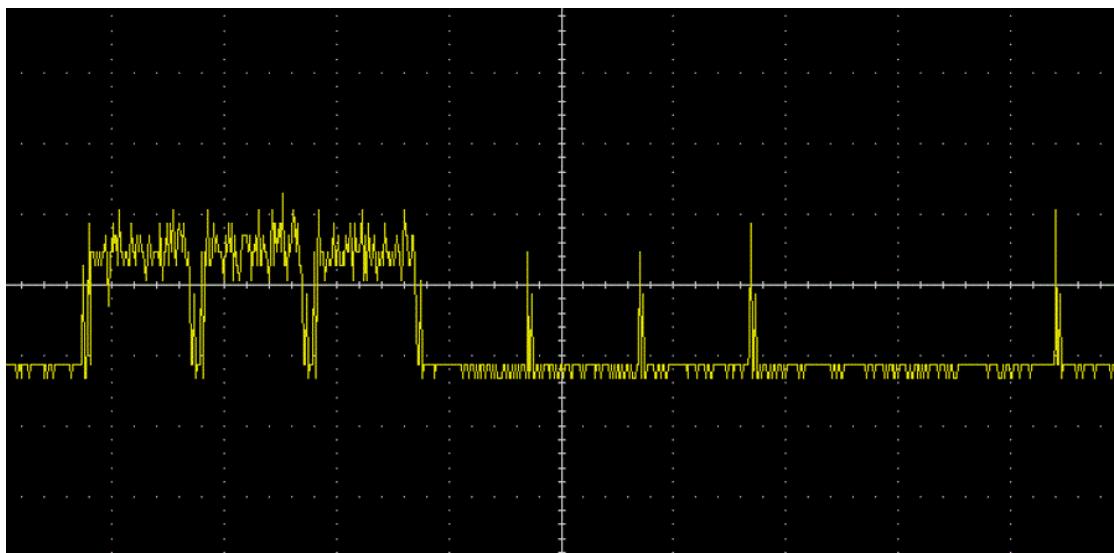
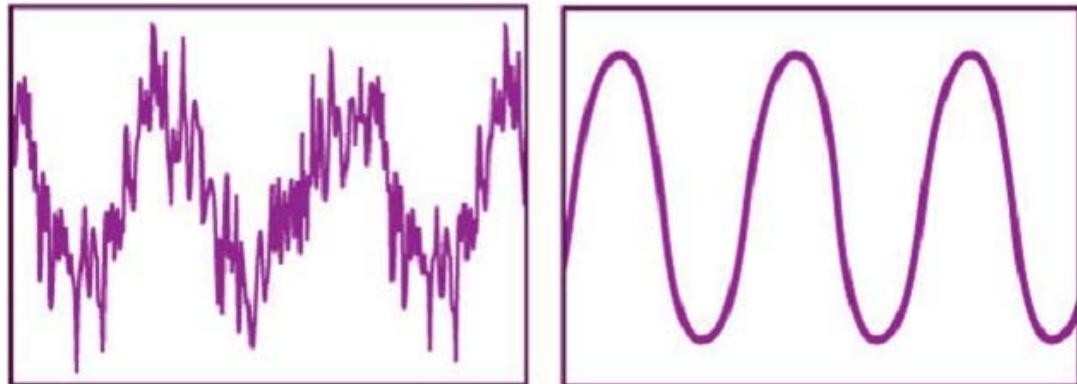
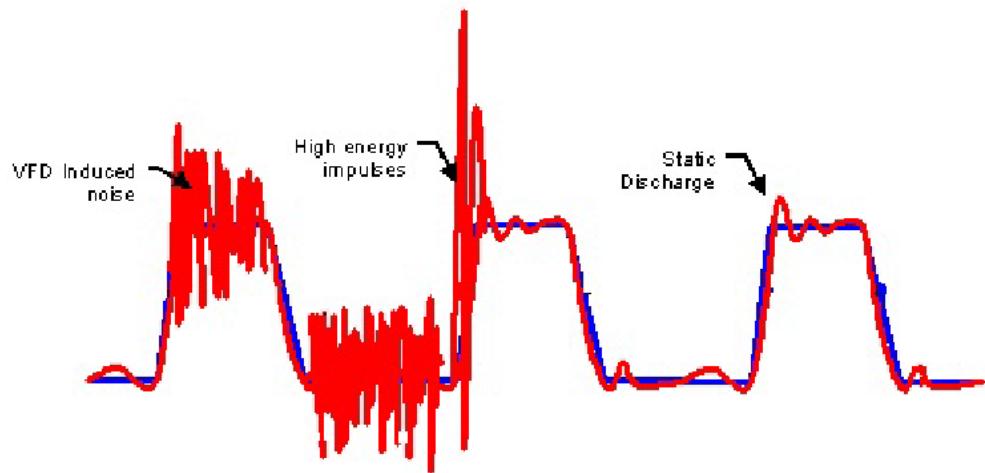


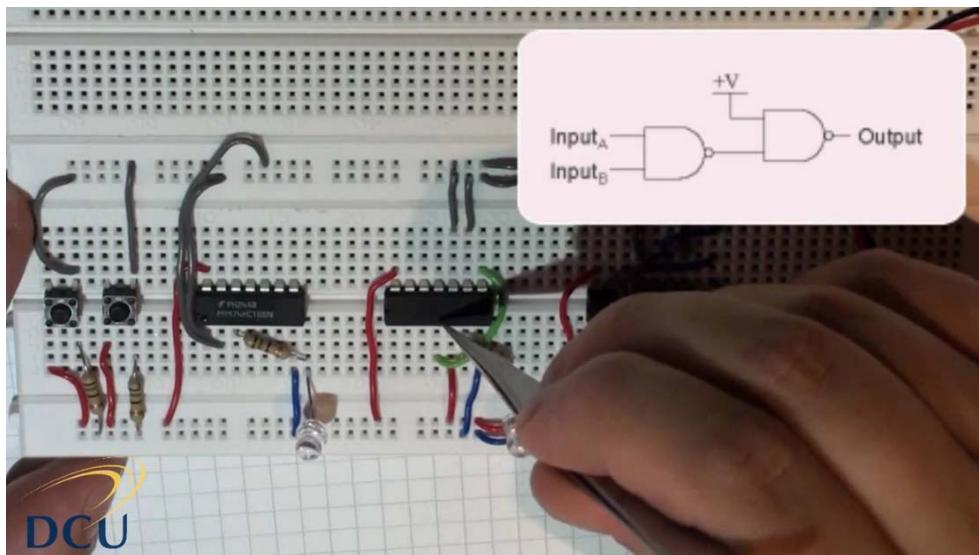
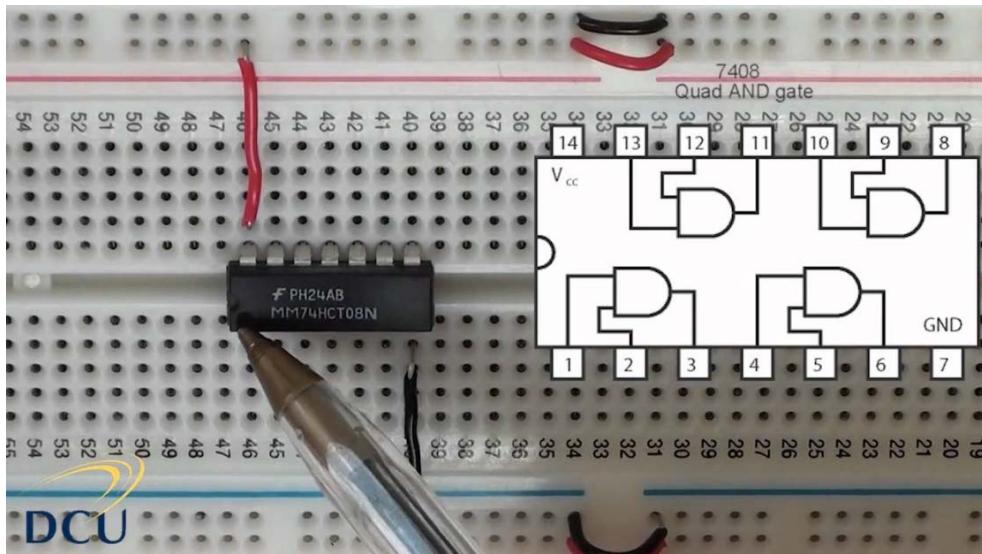
Soldering



Noise



Implementing logic circuits based on gates on Breadboards (old labs)

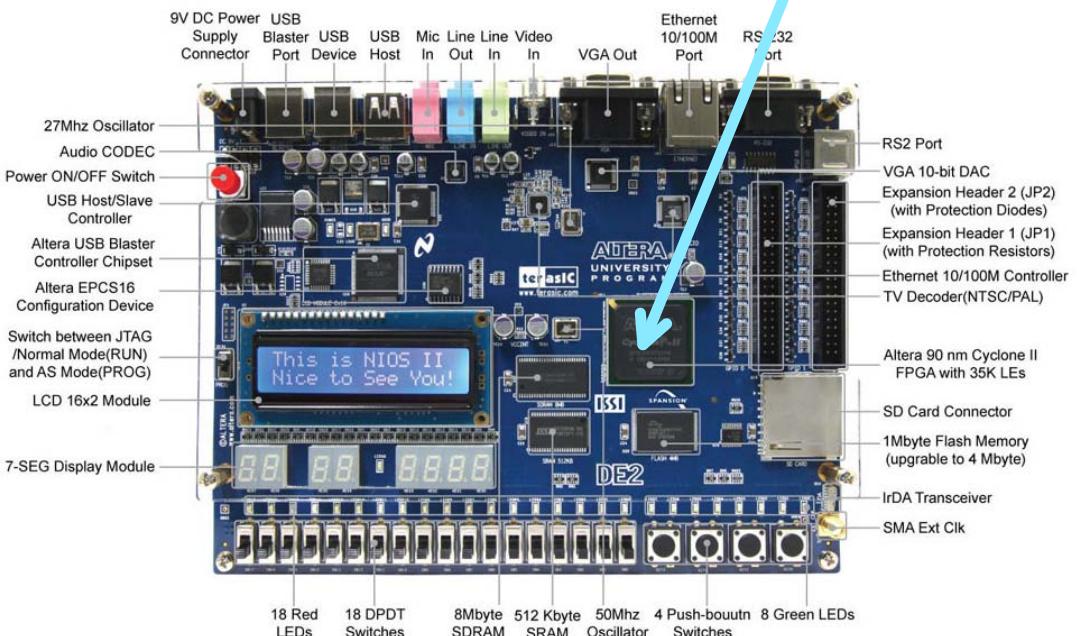
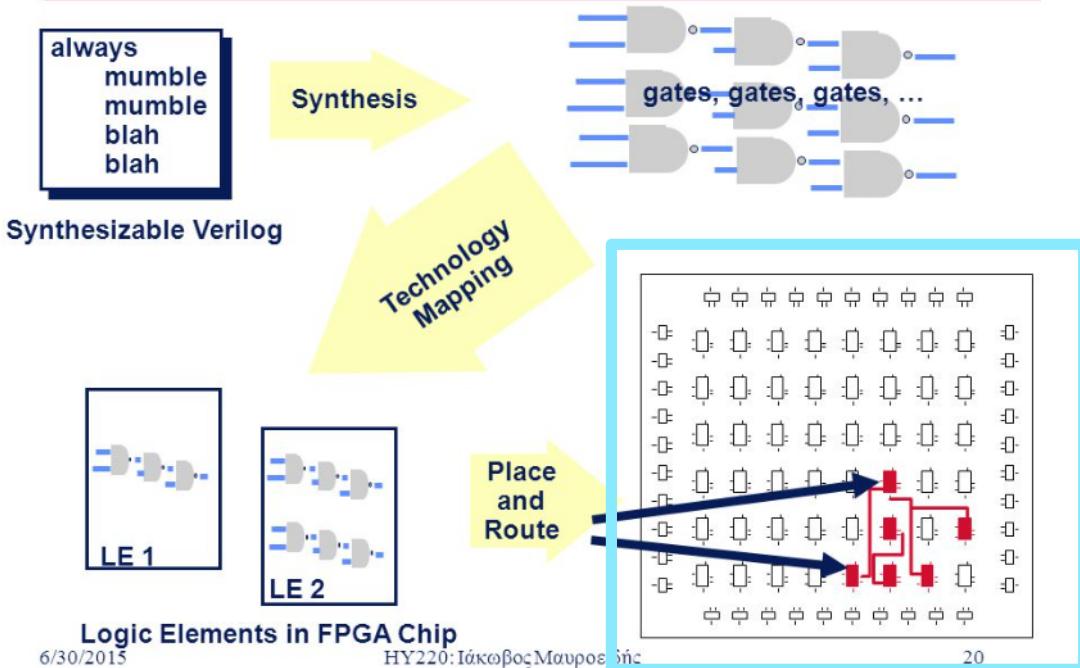


Implementing logic circuits based on gates on PCB



Implementing logic circuits based on gates on FPGA (Field Programmable Gate Array) **ECE2060 Labs**

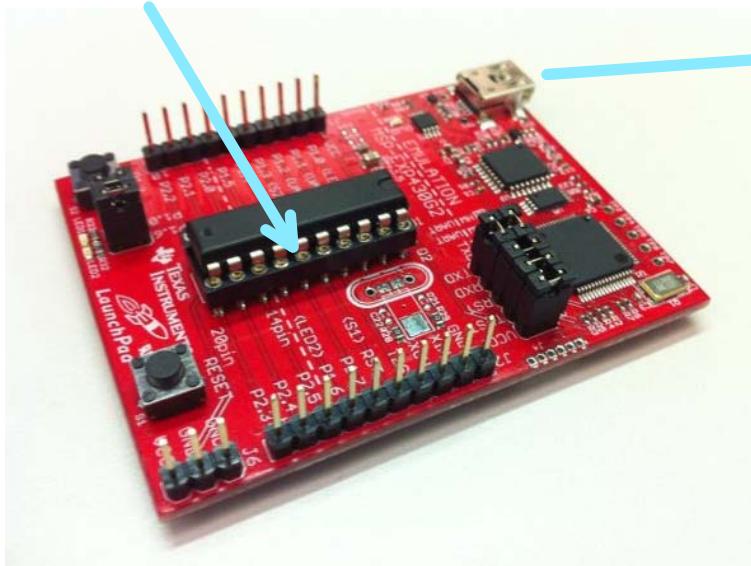
FPGA Modern Design Methodology



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Implementing logic in Firmware (software) of a Microcontroller. System logic is not based on logic gates. No gates are used by the designer. However note that Microcontrollers themselves are implemented based on gates! **ECE2560, ECE3567 Lab**

Microcontroller (MCU)



To PC for
programming
Firmware

The screenshot shows the CCS Debug interface with the following details:

- Title Bar:** CC5 Debug - /opt/ti/ti_ccs6_1/tirtos_msp432x_14_03_28/products/bios_6_42_03_35/packages/ti/sysbios/knl/ldle.c - Code Composer Studio
- Menu Bar:** File, Edit, View, Project, Tools, Run, Scripts, Window, Help
- Toolbars:** Quick Access, CCS Edit, CCS Debug
- Left Panel:**
 - Debug II
 - uartecho, MSP_EXP432P040R_TL_MSP432P040R [Code Composer Studio - Device Debugging]
 - Texas Instruments XDS110 USB Debug Probe[CORTEX M4 0 (Suspended)]
 - ti_sysbios_knl_Idle_run_El at lidle.c:72 0x000007F50
 - ti_sysbios_knl_Idle_loop_U{unsigned int, unsigned int} at lidle.c:51 0x000008604
 - ti_sysbios_knl_Task_exit_El at Task.c:414 0x000053F8 (next frame is identical to an existing frame)
- Variables View:** Shows a table of variables with columns: Identity, Name, Condition, and Count.
- Assembly View:** Shows assembly code for the current function, including labels like SCL153, SCL154, and SCL155, and instructions like ldr, cmp, b, mov, and add.
- Memory Browser:** Shows memory dump with columns: Enter location here, Address, Value, and Hex.
- Bottom Panels:**
 - Console II: Displays system logs and errors.
 - Scripting Console, Modules, Control Panel, Available Products, Terminal 1, Search, Progress, Target Status, RTOS Object View (ROV) II.
 - Properties View: Shows component details for 'uartecho' including HWI, Idle, Load, Task, TaskMode, Queue, QueueDescriptor, Registry, Semaphore, Startup, Swi, SysMin, System, and Timer(B).sysbios.

IDE
(Integrated Development Environment) on PC, used to write Firmware