EECS298 Final Project
Traffic Light Controller Design

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Presentation Outlines

- Part I : Introduction to EDK
  - Design Processes
  - Quick and Simple Example
- Part II : Xilinx Multimedia Board
- Part III : Traffic Light Controller Design and Result Presentation

PART I : Introduction to EDK

- Xilinx Embedded Development kit : A series of software tools for designing embedded processor systems on programmable logic.
- Xilinx Platform Studio (XPS) : An integrated development environment included with the EDK and a graphical user interface technology that integrates all the processes from design entry to design debug and verification.

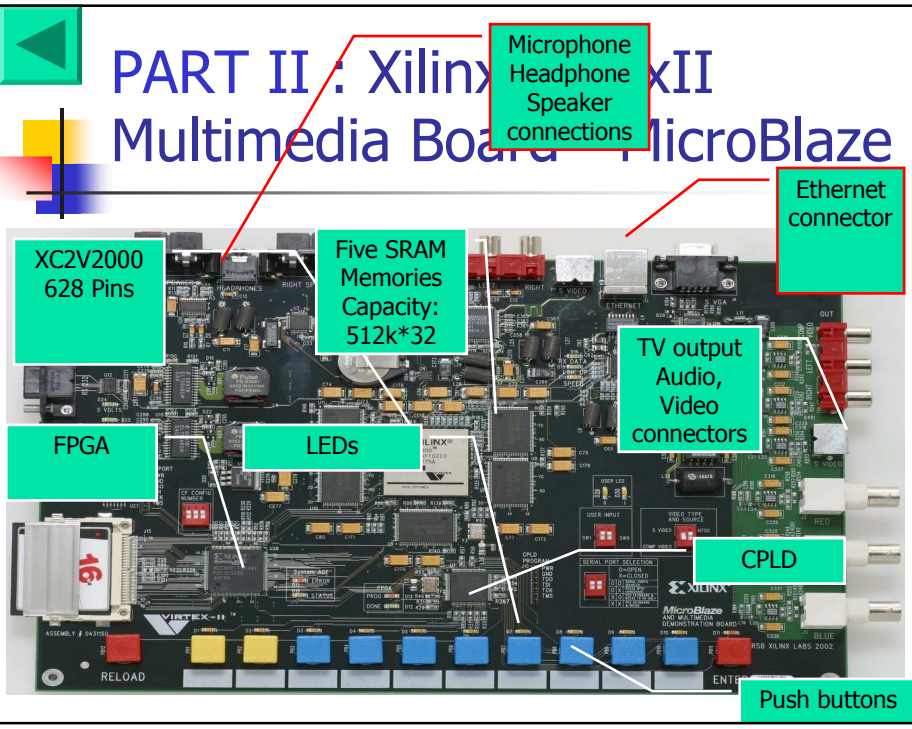
Basic Design Steps

1. Creating an embedded hardware system : select and configure processor, IO, peripherals
2. Creating Software for embedded system : build libraries, compile C application, initialize bit streams , download to external memories and debug with GNU debugger and EDK custom on-chip debugger Xilinx Microprocessor Debugger (XMD).

Example – hello_world.c

- MHS : Generate Netlist elaborates the MHS file into a hardware system.
- UCF : This system.ucf file is generated by Base System Builder based on the settings in the selected Xilinx Board Definition file. Other user constraints must be added to this file based on customer design specifications.
- Drivers

PART II : Xilinx ...xII Multimedia Board – MicroBlaze



Input and Output

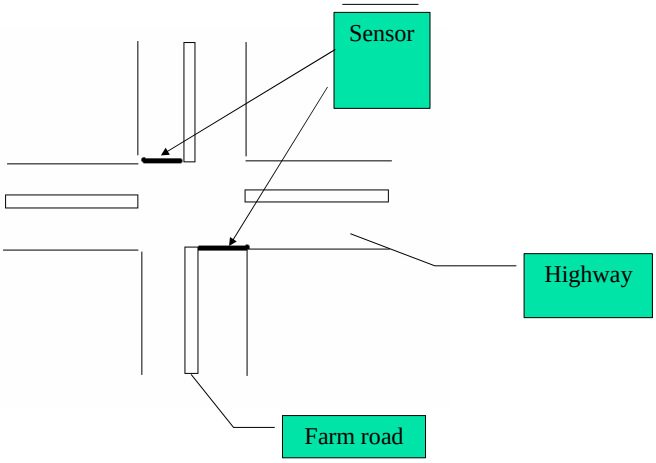
Idea:

1. Push buttons and LEDs are controlled by the CPLD
2. The CPLD only provides the function to send push buttons' data to the processor. In order to control the LEDs, we need to modify the code inside CPLD which is very difficult.

Solutions:

1. **Using UserLEDs and UserSwitches controlled by FPGA.**
2. **Two LEDs and Two dip switches**

Intersection Model

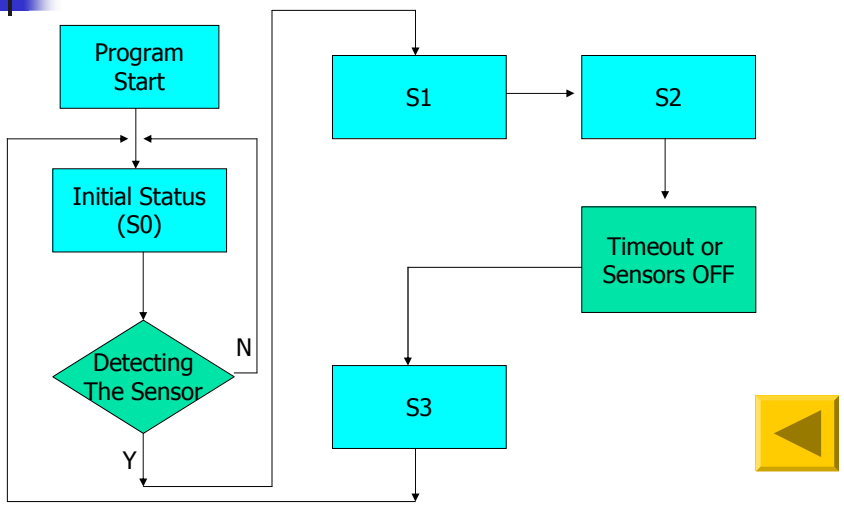


Design overview

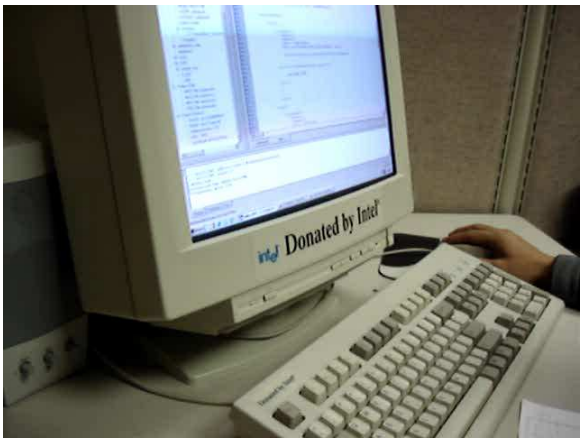
Status	Outputs	Functionality	Duration Time
S0	LED1:ON LED2:ON	Highway is green Farmroad is red	20 seconds
S1	LED1:ON LED2:OFF	Highway is yellow Farmroad is red	5 seconds
S2	LED1:OFF LED2:ON	Highway is red Farmroad is green	10 seconds
S3	LED1:OFF LED2:OFF	Highway is red Farmroad is yellow	5 seconds

LED1 LED2

Design Flow Chart



Demo The Traffic light



Discussion

Problems:

- The board is powerful but very complicated (HW circuits)
- Tools compatibility problem (versions, tutorial)

Traffic light controller

Thank you & Merry Xmas !

PART II : Xilinx VirtexII Multimedia Board - MicroBlaze