# Laboratory 2

(Due date: October 9th)

## OBJECTIVES

- ✓ Create an Embedded System using the ZYBO Board.
- ✓ Use the Block Based Design in Vivado to instantiate the PS and the AXI GPIO.
- ✓ Create a software application in SDK to control the LEDs (via AXI GPIO) and to print out messages via UART.

## EMBEDDED SYSTEM DESIGN

- ✓ Refer to the Tutorial: Embedded System Design for Zynq SoC for a tutorial specific to the ZYBO Board.
- ✓ Refer to the Zynq Book Tutorials (www.zynqbook.com) for step-by-step instructions.

## FIRST ACTIVITY (100/100)

- Create a new project in Vivado. Select the **ZYNQ XC7Z010-1CLG400** device.
- Block Design: Instantiate the Zynq PS and the AXI GPIO peripherals.
- SDK Software application:
  - ✓ Make the 4 LEDs flash as follows: `1000, 1100, 1110, 1111, 0111, 0011, 0001, 0000` (and then repeat the sequence). '1': LED on, '0': LED off.
  - ✓ Play with the software delays until you make the LED flash approximately every 0.5 s.
  - ✓ Each time a full sequence is completed, print the following message on the terminal (via UART): '`ECE495 – LEDs ok!`'.
- File to use:
  - ✓ `ZYBO_zynq_def.xml`
  - ✓ `ZYBO_Master.xdc`.

- Download the hardware bitstream on the ZYNQ SoC.
- Launch your software application on the Zynq PS. The LEDs should be flashing properly and the messages should be appearing on the Terminal. **Demonstrate this to your instructor.**

- Submit the software routine (`.c` file) you created to Moodle (an assignment will be created).

**Instructor signature:** _____ **Date:** _____