Zynq system using HCSR04 distance sensor Buttons, Switches, Leds and interrupts

### Introduction

The basic system is an led counter using buttons for control. The leds will count every second. From left to right:

- the first button on the board will reset the count to zero and continue counting
- the second button will reset the count to the value shown on the switches and set the counting mode up
- the third button will reset the count to the value shown on the switches and set the counting mode down
- the fourth button will toggle the timer that counts on the leds.

The advanced feature of the system will be the addition of an HCSR04 distance sensor

- There is a trigger pin that will be used to trigger a measurement
- There is an echo pin that will be measured will a timer to determine distance
- Sdk will display the distance

## Hardware design

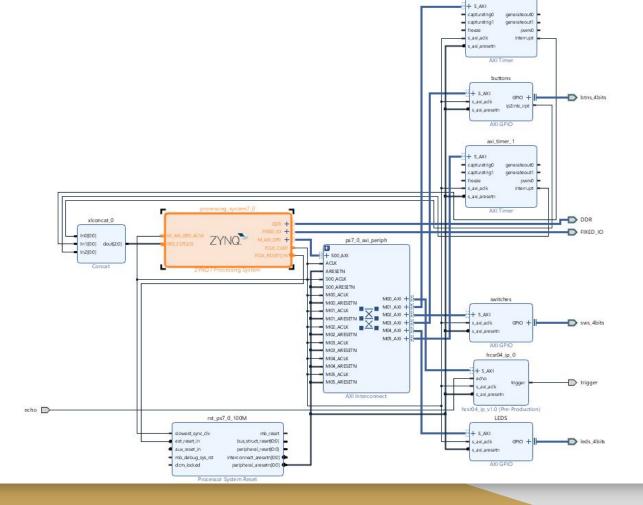
#### For the basic system we will use:

- Zynq Processing system configured with UART1, GPIO 0 Master, 100.000000 CLK, and Interrupts
- Axi timer
- GPIO buttons configured with interrupts
- GPIO switches
- Gpio 4 bit leds

#### For the advanced feature

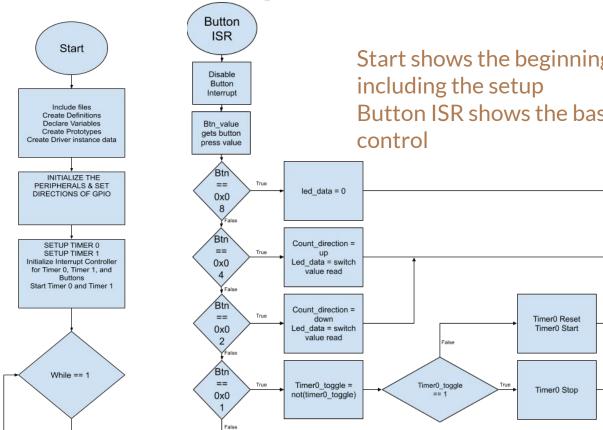
• HCSR04\_IP which has one input and one output

# Block Diagram



axi\_timer\_0

Software design



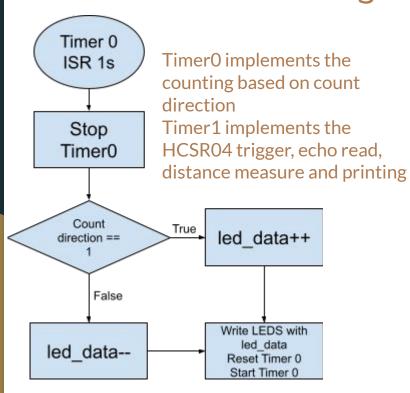
Start shows the beginning of execution Button ISR shows the basic system button

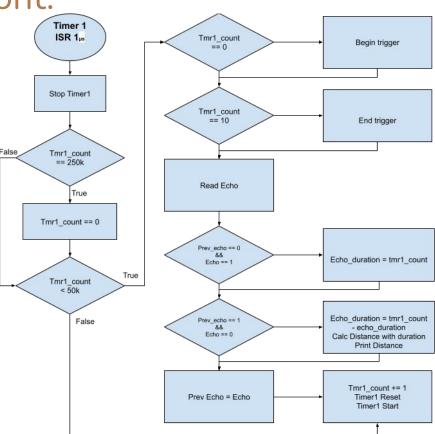
> Write led with led data

Clear Interrupt

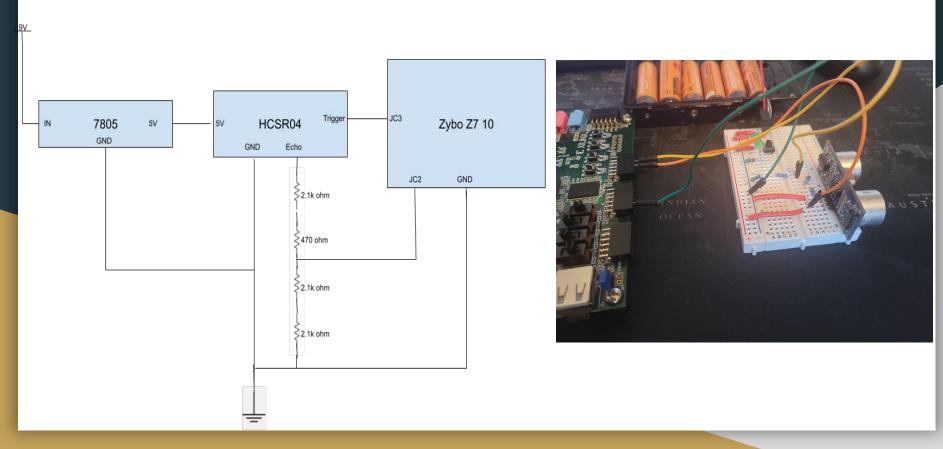
Enable Interrupt

Software Design Cont.





## Connecting sensor to Zybo Board



### Operation

- Create the Zynq system with 2 Axi timers, 3 GPIO blocks, and a concat block.
- Create Application that uses interrupts to control Basic functionality and Advanced
- Build breadboard circuit with HCSR04 and connect it to Zybo
- Program the Zybo with the bitfile and application