**COL215**

Controlling brightness of LEDs

**September 05, 2019**

# Overview

In this experiment we have to output different level brightness of LEDs using the LEDs on the BASYS3 FPGA Board. We controlled brightness of LED displays using pulse width modulation.

# Goals

1. **Designing a circuit that controls brightness of LED displays based on a 4­bit input.**
2. **Using pulse width modulation to control LED brightness.**

# Milestones

## 1 Hz Clock generator

We basically used counter circuit output to divide the frequency by 100000000 and then We made a variable that inverts its value only when the counter reaches 100000000 and this output value is the 1Hz clock.

## 16 KHz Clock generator

We basically used counter circuit output to divide the frequency by 6250 and then We made a variable that inverts its value only when the counter reaches 6250 and this output value is the 16KHz clock.

## Up- Down Counter

We kept a variable called checkforinvert which checked whether the counter should go up or go down. It have the value 0 when the counter increases and the value 1 when counter should decrease.

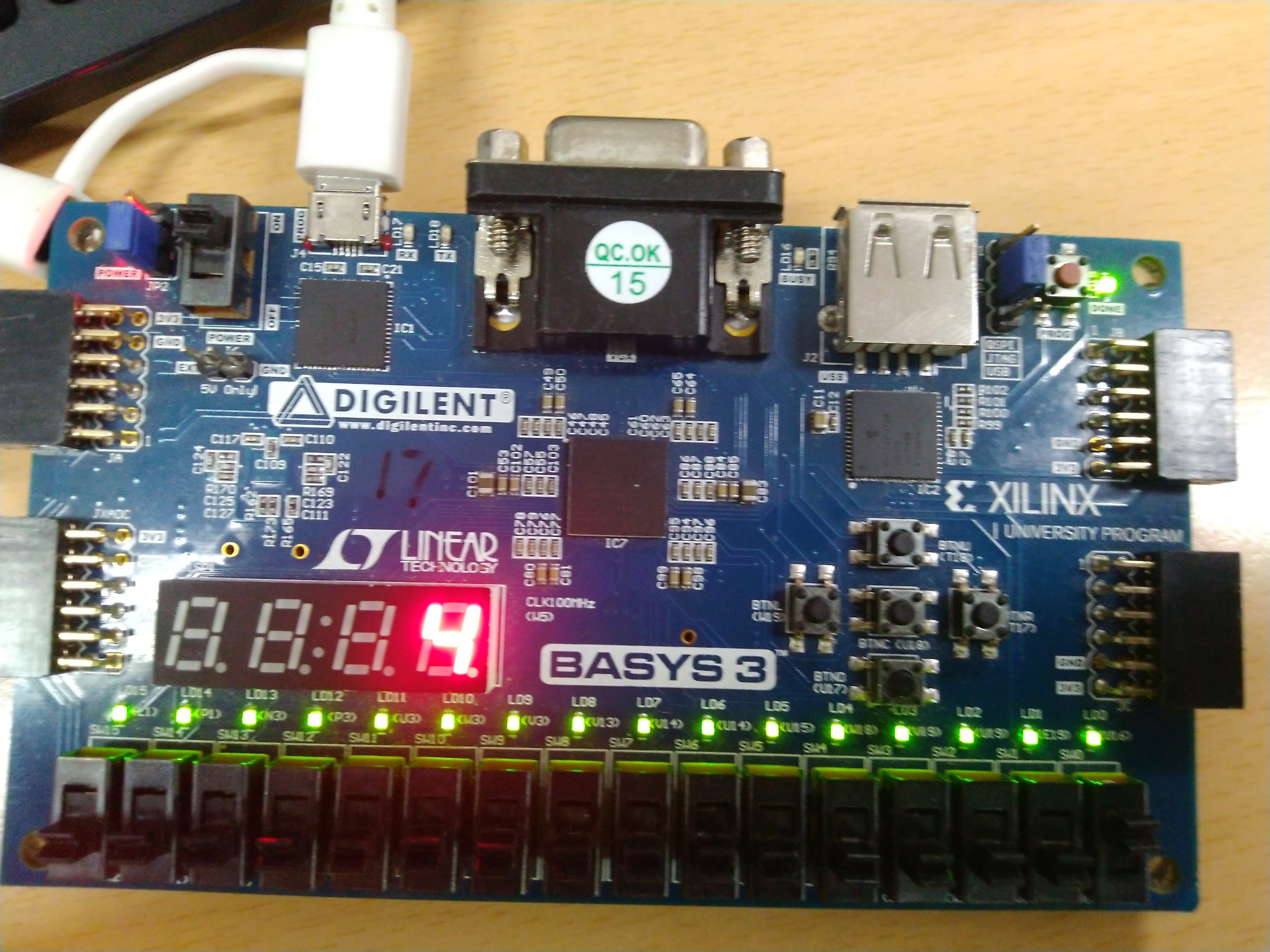
## PWM module

For creating PWM module, We checked for the output of 1Hz clock and just increase one bit each time for the rising edge of the frequency and like the UpDown counter we just invert its output.

## Seven Segment Display

We basically made a decoder circuit and used its output to determine which number should be displayed in the seven segment display. We used or gates to determine which segment of the seven segment display should be displayed

**CLICKS:**

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