

# ECE 4501/6501: Advanced Embedded Systems

## Mini Project 1 Solution

1) Solution code provided.

2) Deliverables for **Part 2**:

- Calculations for **TEST\_PERIOD**:

A hardware timer is essentially a counter. It counts the number of ticks in a clock signal. Since the system clock is 80 MHz, to get a 20 Hz period, we need:

$$Timer\ Period = \frac{80\ MHz}{20\ Hz} = 4000000$$

Timer1A is in countdown mode for this Mini Project. The counter goes from a **reload value** to 0, and then back to reload value. An interrupt will be triggered every reload value + 1, so

$$Reload\ Value = 3999999$$

- **Snapshots:**

Figure 1 shows the Keil Logic Analyzer tool with the heartbeat signal on PE1. The pin is toggled every time the producer function runs. The pulse-width of this signal corresponds to the period of the timer.

$$Timer\ Frequency = \frac{1}{49.98745\ ms} \cong 20\ Hz$$

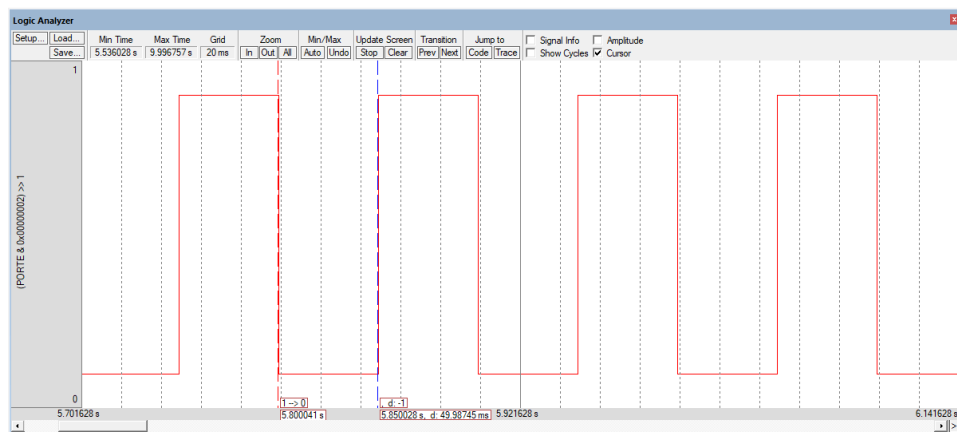


Figure 1: Heartbeat on PE1 in Simulation

Figure 2 shows the same heartbeat signal on the oscilloscope.

$$\text{Timer Frequency} = \frac{1}{50.00 \text{ ms}} \cong 20 \text{ Hz}$$

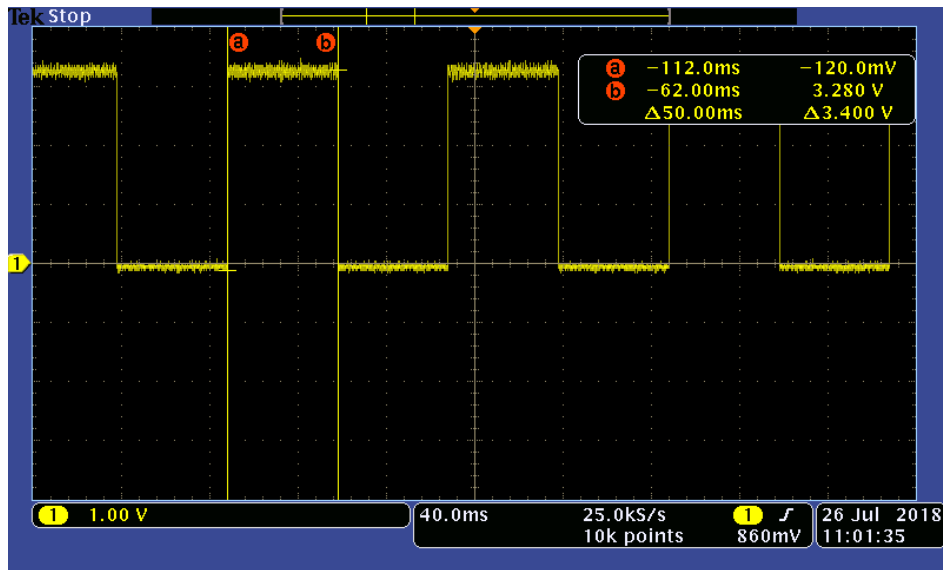


Figure 2: Heartbeat on PE1 on Board

3) Videos not provided. Solution code implements functionality.