ECEGR 2220 Microprocessor Design

Make-up for Mid-term Exam (Due: 6/13/2025 5:00 pm)

Total points: 100

An early method of telegraph communication was based on the Morse code. This code uses patterns of short and long pulses to represent a message. Each letter is represented as a sequence of dots (a short pulse), and dashes (a long pulse). For example, the first eight letters of the alphabet have the following representation:

A diagram of a written text

AI-generated content may be incorrect.

Design and implement a circuit that takes as input one of the first eight letters of the alphabet and displays the Morse code for it on a red LED. Your circuit should use switches SW2−0 and pushbuttons KEY1−0 as inputs. When a user presses KEY1, the circuit should display the Morse code for a letter specified by SW2−0 (000 for A, 001 for B, etc.), using 0.5-second pulses to represent dots, and 1.5-second pulses to represent dashes. Pushbutton KEY0 should function as an asynchronous reset. A high-level schematic diagram of the circuit is shown in Figure 1.

A diagram of a circuit

AI-generated content may be incorrect.

Hint: Use a counter to generate 0.5-second pulses, and another counter to keep the LEDR0 light on for either 0.5 or 1.5 seconds.

The recommended preparation for this assignment includes:

1. Verilog code for modulo-k counter (Lab 6 Demo 1)

2. Verilog code for a 3-digit BCD counter. Display the contents of the counter on the 7-segment displays, HEX2−0. Derive a control signal, from the 50-MHz clock signal provided on the DE2-series board, to increment the contents of the counter at one-second intervals. Use the pushbutton switch KEY0 to reset the counter to 0.

3. Verilog code for time-of-day clock (Lab 6 Demo 2)

**Submit a report along with your Verilog code and detailed explanation of your work (similar to your past lab reports).**