

DESN2000 (Computer Engineering) 2026 T2

Lab sheet 1 (weeks 1 and 2)

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See the “Assessment Guide for Laboratory Exercises” document on the course page for details on marking. You should use the provided UNSW coaST board for these exercises. Make reasonable assumptions if not explicitly stated and state such assumptions to your demonstrator when getting marked.

Task 1 (20%)

Write a programme that turns on the corresponding direct LED (D1-D4) on the development board as long as the corresponding direct button (SW1-SW4) is pressed. For example, when SW1 is pressed, D1 should light up. When multiple buttons are pressed, all the corresponding LEDs should light up.

Task 2 (20%)

Write a programme that shows the upper nibble (the four most significant bits) of a 16-bit number on the LEDs D4-D1. D4 should have the most significant bit of the nibble. The 16-bit number can be hardcoded in your programme as an `uint16_t` integer variable.

Task 3 (30%)

Write a programme that moves a 16-bit pattern on the LED bar (D5-D20). The pattern can be a hardcoded `uint16_t` integer variable, which you can define as for example “`uint16_t pattern = 0b0000111100001111`”. By default, the pattern should move to the right, and the right corner should wrap to the left corner. Pressing the SW1 button should change the direction of the pattern movement. Make sure your buttons are appropriately debounced in the software.

Task 4 (30%)

Write a programme that increments a 16-bit unsigned binary counter on the LED bar when SW1 is pressed. Initially, the counter starts with 127. When SW2 is pressed, the counter should decrement. You should make sure the counter does not overflow or underflow – it should saturate at the minimum/maximum. Pressing SW3 should reset the counter to the maximum possible count. Pressing SW4 should set the counter to 0. You must make sure the buttons are debounced in the software so that one press only leads to one increment/decrement.