Homework 1

BE/EE/MedE 189a: Design and Construction of Biodevices

Fall 2017

Due October 3, 2017

1. Create a front panel that has 8 LED indicators and a vertical slider control that is an 8-bit unsigned integer. Display a digital indicator for the slider. The problem is to turn the 8 LEDs into a binary (base 2) representation for the number in the slider. For example, if the slider is set to the number 10 (which in base 2 is 00001010), the LEDs in positions 1 and 3 (indexing from right to left starting at zero) should be on. Verify your result with numbers 46 and 131.

2. Develop a VI to find the roots of the quadratic equation $ax^2 + bx + c = 0$, where a, b, and c are real numbers and $a > 0$. The two roots of the equation can be either real or complex numbers. The VI should have three numeric controls and two numeric indicators. Do not use the Mathematics $\rightarrow$ Polynomial $\rightarrow$ Poly Roots function for your VI, but you may use it to make sure yours is operating correctly.

3. Energy expenditure during workout depends on the type of activities and your weight. The metabolic equivalent of task (MET) is a physiological concept expressing the energy cost of physical activities. An estimation of the calories that are burned can be written as

$$\text{Total Calories Burned} = \text{Duration (min)} \cdot \text{MET} \cdot \text{Weight(kg)} \cdot 0.0175 \tag{1}$$

Develop a VI to calculate the calories burned, given the type of activities, duration, and weight. A list of activities and their MET can be found at `http://en.wikipedia.org/wiki/Metabolic_equivalent`. *Hint*: you can use a ring control for activities input.