Assignment #2 – Toy Emergency Vehicle Effects Generator

In this assignment you will use the DigitalIn and PwmOut interfaces on the mbed microcontroller board to implement sound effects and blinking LEDs for a toy emergency vehicle.

Connect the piezo transducer (it looks like a small black cylinder with a hole at the top to emit sound) between the mbed's p21 and GND. Connect two pushbutton switches, one between the mbed's p19 and VOUT and another between p20 and VOUT. Connect a red LED in series with a 220 ohm resistor between the mbed's p22 and GND (the LED's cathode should be oriented towards GND).

The mbed should start in an idle mode in which all of the LEDs are off and the piezo transducer is silent. If either switch is pressed, the mbed begins one of two different effects, one effect for each switch. When no effects are active, the mbed should return to the idle mode.

If the switch connected to p19 is pressed, the mbed should generate a warbling siren effect and repeat the effect until the switch is released. During this effect the piezo transducer should generate ascending frequencies from 900 Hz to 1100 Hz over the span of 0.5 seconds and then descending frequencies from 1100 Hz to 900 Hz, also over the span of 0.5 seconds. Synchronized with this sound effect, red LED should transition from fully off when the piezo is generating 900 Hz, to fully on when the piezo is generating 1100 Hz. For both the piezo and the LED, the changes in frequency and brightness should occur in small enough steps that it appears to a human to be a continuous transition rather than discrete steps.

If the switch connected to p20 is pressed, the mbed should generate a two tone siren effect and repeat the effect until the switch is released. During this effect the piezo transducer should generate a 960 Hz tone for 0.7 seconds followed by a 770 Hz tone for 0.7 seconds. Synchronized with this sound effect, the red LED and one of the built-in blue LEDs should alternately flashing on and off. When the piezo is generating 960 Hz, the red LED should be on and the blue LED off. When the piezo is generating 770 Hz, the red LED should be off and the blue LED on.

To simplify the programming, you need only check for a switch release once per cycle of each effect rather than continuously.

Submit your "main.cpp" to the appropriate dropbox on Canvas by the end of February 19th.