ROB-GY-5103 Mechatronics: Project 1

Problem 1: Write and implement a PBasic program to do the following. Using the debugin command, have a user enter two integers (Num1 and Num2) in the range of 0 to 127. Accept and store the user input in two Byte-sized variables. Next, compute the difference of Num1 and Num2 (i.e., Num1-Num2) and store the result in a byte size variable Result. Your PBasic program should correctly display the difference of Num1 and Num2 for all cases, i.e., whether the Result turns out positive or negative.

Problem 2: Using the debug command, graphically display coordinates within the debug terminal. Specifically, in the first row of the debug terminal, display

0123456789x

Next, starting from the second row, in the first column of the debug terminal, display

1
2
3
4
5
y

Next, using the debug and debugin commands, from the user, get (x,y) coordinates where the user wants to place an asterisk. Finally, your program should place an asterisk at the user specified coordinate.

Problem 3: Traffic Signaling Make an automatic streetlight timer. Assume that drivers from both north and south can see the lights made by the green, yellow, and red LED circuits connected to P13, P14, and P15. Make another bank of LEDs connected to P3, P4, and P5 that control east-west traffic. Write a program that gives the north-south traffic 30 seconds green, then a 10 second yellow, followed by a 40 second red. When the north-south traffic is red, the east-west traffic should be green for 30 seconds and yellow for ten seconds, then red for 40 seconds. Keep in mind that if this were a real traffic controller, you would be responsible for traffic problems if both red lights stay on for any length of time. If both green lights are on at the same time, you could cause a car accident! Since your LEDs are all of the same color, in each of your LED bank, let the top LED represent red, middle LED yellow, and the bottom LED green.
Caution: Make sure to use appropriate resistors to limit current from/into BS2.

Problem 4: Pupil Counting Recently, at a local primary school a young student was left behind on the school premises at the end of the school day. The student was rescued after his parents' frantic efforts to locate him. Following this incident, the school hired a safety consultant to recommend solutions to prevent recurrence of such incidents. The safety consultant has suggested that the school implement the following solution to keep real-time count of individuals on school's premises.

Individuals will enter and exit the school from two separate gates. A pressure sensitive pad at the entrance gate will register entrance by an individual whenever it is depressed. Another pressure sensitive pad at the exit gate will register exit by an individual whenever it is depressed. A microcontroller will continuously monitor the two pressure pads. You are to develop a prototype real-time pupil counting system. Use two buttons to mimic the pressure pads and write a program that will provide real-time people count. What are some of the drawbacks of the above solution? How can this solution be further improved?