Control instruction and I/O operation

1. Purpose

- Familiarize with the control instruction: branching, subroutine calling
- Familiarize with time delay calculation
- Familiarize with I/O port operation using pushbutton/led as example

Note for this lab:

Keep looping/judging in assembly (not C, C code, the three files format are only for running the program as indicated in Friday, Feb.18 's lecture),

2. Task

Task 1: (60%)

Connect one pushbutton 1 to Port D pin 1, one LED to Port D pin 4

- TA set a time interval for how long the LED on and how long LED off;
- You start to make proram to read the pushbutton, if pushed, flashing LED with time interval set by TA.
- the program is effective after it is run once, i.e., at anytime pushbutton can be pushed and LED will flash.

TA evaluation and signature

TA set time interval: ms
Read switch:
Flashing LED:
Time interval corect:

Task 2: (40%) Connect 3 pushbuttons 1, 2, 3 to Port D pin 1,2, 3 and 3 LEDS 1, 2, 3 to Port D pin 4, 5, 6. Make an assembly code as follows.

Pushbutton 1 controls LED1, i.e., pushgbutton 1 pressed, LED1 keeps flashing with X1 ms of and X1 ms off till pushbutton1 is released.
Pushbutton 2 controls LED2, i.e., pushgbutton 2 pressed, LED2 keeps flashing with X2 ms of and X2 ms off till pushbutton 2 is released..
Pushbutton 3 controls LED3, i.e., pushgbutton 3 pressed, LED3 keeps flashing with X3 ms of and X3 ms off till pushbutton3 is released..

X1: ms; X2 ms; X3 ms set by TA

TA evaluation and signature

Pushbutton1/LED1 flashing with time interval corect:
Pushbutton2/LED2 flashing with time interval corect:
Pushbutton3/LED3 flashing with time interval corect:

3. Reference documents

- Week 4, Week 5, week 6 Lecture notes
- ATmega 328 datasheet
- I/0 Port D address – DDRD is 0x0A, PortD is 0x0B, PINC is 0x09

4. Procedure

- Try examples from class.
- Make program to accomplish the task.
- Once it is working properly, demonstrate to your TA and ask him/her to sign off.

5. Lab Report: submit to D2L

- Signed lab report cover page: http://www.ryerson.ca/mie/documents/
- Abstract, Introduction
- Experimental Equipment (ie. what on the MechBot was used)
- Description of the Program with flowchart.
- Conclusions & Recommendations
- Appendix: Assembly and C Program listing,
- This sheet with the TA's signature. Print this sheet and bring it to the lab room.

- *Lab reports are due in 1 week, please submit to D2L within one week starting from your lab time!*

- ***Each student needs to print this page and bring it to the lab.***