LAB 4-B

I/O OPERATION ON THE AVR PORT

OBJECTIVE:

- To perform I/O operation on the AVR port.

REFERENCE:

- Mazidi and Naimi, "The AVR Microcontroller and Embedded System," Chapters 3 and 4

MATERIALS:

- Arduino Uno, Arduino Nano, or any other AVR Trainer
- Atmel Studio

ACTIVITY 1

a) Test the AVR's ports for input operation as follows.
b) Connect the pins of PORTx (PORTD for instance) of the AVR to DIP switches. Also connect the pins of PORTy (e.g. PORTB) to LEDs.
c) Then, write and run a program to get data from PORTx and send it to PORTy. Any change of status of the switches connected to PORTx will be instantly reflected on LEDs connected to PORTy. The testing program could look like this.

```
        LDI     R20, 0x00   ;make port D an input port
        OUT     DDRD, R20

        LDI     R20, 0xFF   ;make port B an output port
        OUT     DDRB, R20
        OUT     PORTD, R20  ;enable pull-up resistors

L1:     IN      R20,PIND    ;get data from port D
        OUT     PORTB,R20   ;send it to port B
        RJMP    L1          ;keep doing this
```

ACTIVITY 2

a) Write and run a program to get data from PORTx and after adding a fixed value of 5 send it to PORTy.
b) Set the switches and examine the LEDs and verify the result.

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```
        LDI     R20, 0x00   ;make port D an input port
        OUT     DDRD, R20
        LDI     R20, 0xFF   ;make port B an output port
        OUT     DDRB, R20
        OUT     PORTA, R20  ;enable pull-up resistors

L1:     IN      R20,PIND    ;get data from port D
        ADD     R20, 5
        OUT     PORTB,R20   ;send it to port B
        RJMP    L1          ;keep doing this
```

WORKSHEET

Name: *Class:*
Last Name: *Lab#:*

1) In this Lab, which port of the AVR Trainer did we use for inputting data into AVR? Explain what is role of lines 2 and 3 of the program:

```
        LDI     R20, 0x00
        OUT     DDRD, R20
```

2) In this Lab, which port of the AVR Trainer did we use for outputting?

3) How did you provide the power to the trainer board?