American International University- Bangladesh

Faculty of Engineering (EEE)

EEE 4103: Microprocessor and Embedded Systems Laboratory

Title: Familiarization of assembly language program in a microcontroller.

Introduction: In this experiment, the main objective is to learn how to write an assembly program for a blink program in a microcontroller.

Theory and Methodology: The idea is to implement a blink using assembly language programs.

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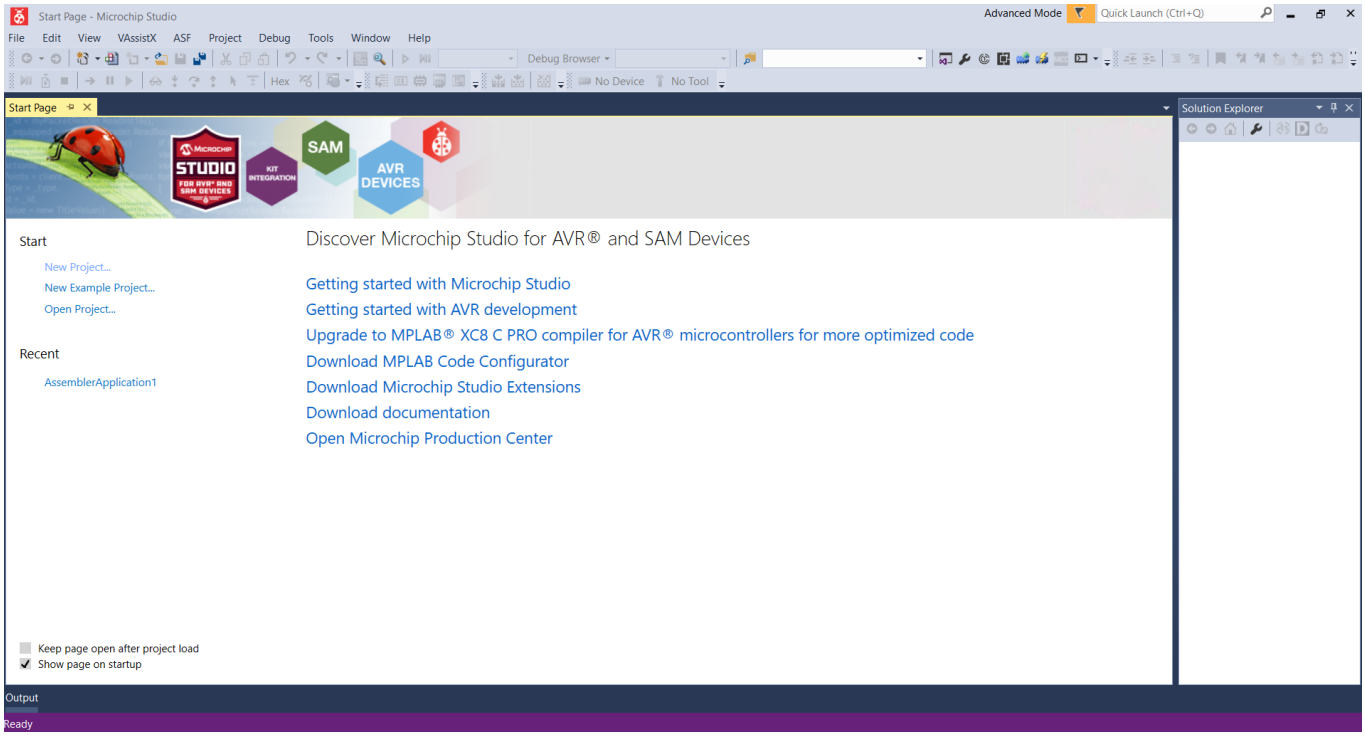
Equipment:

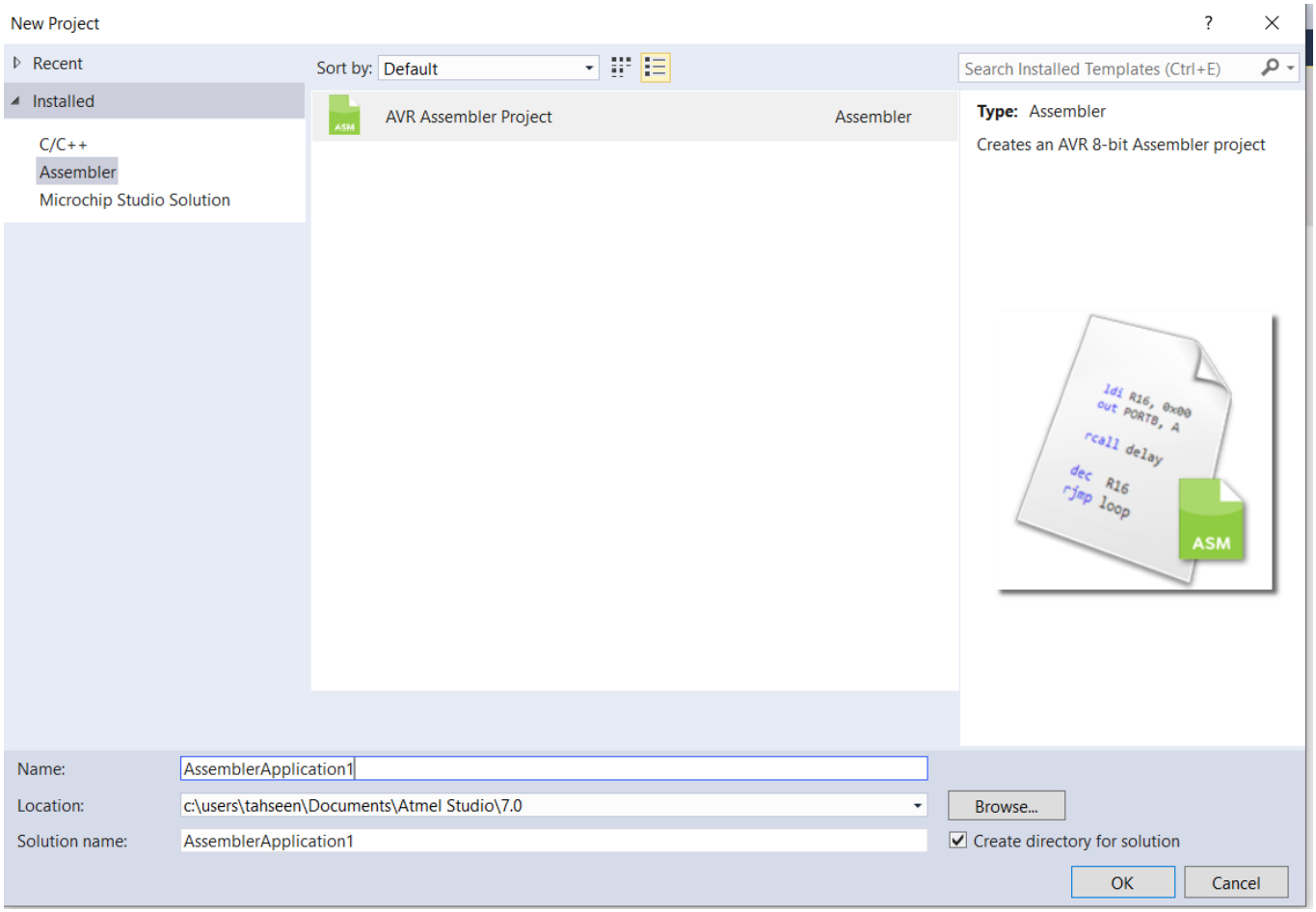
1) Microchip studio [ver.7]
2) PC having Intel Microprocessor

Lab Procedure:

1) From the start up homepage of the software, new project must be selected.

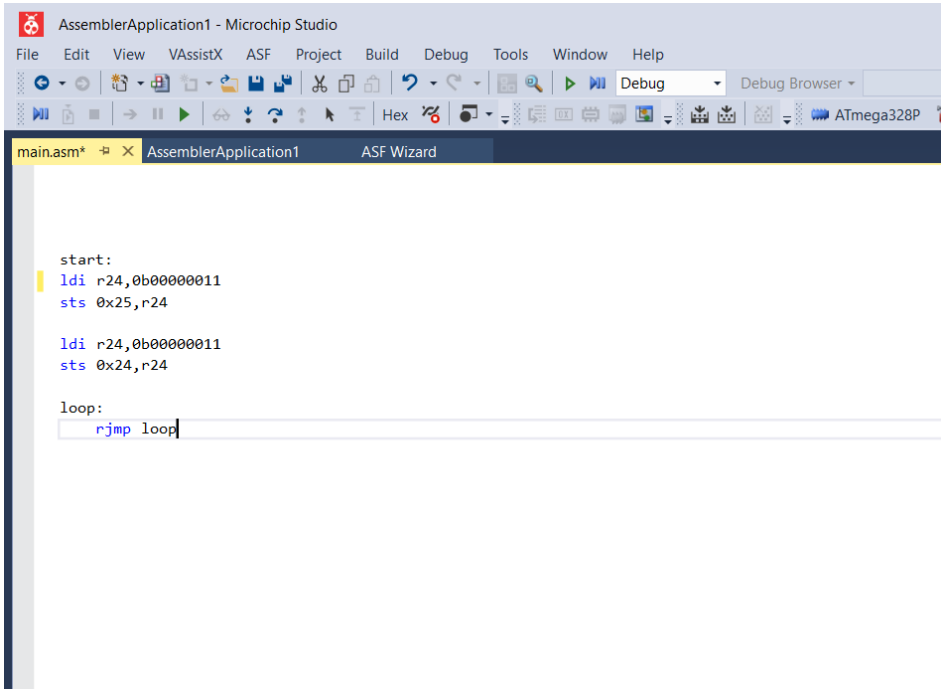


2) Select AVR 8-bit assembler for ATmega328P and save the file in a directory as follows:

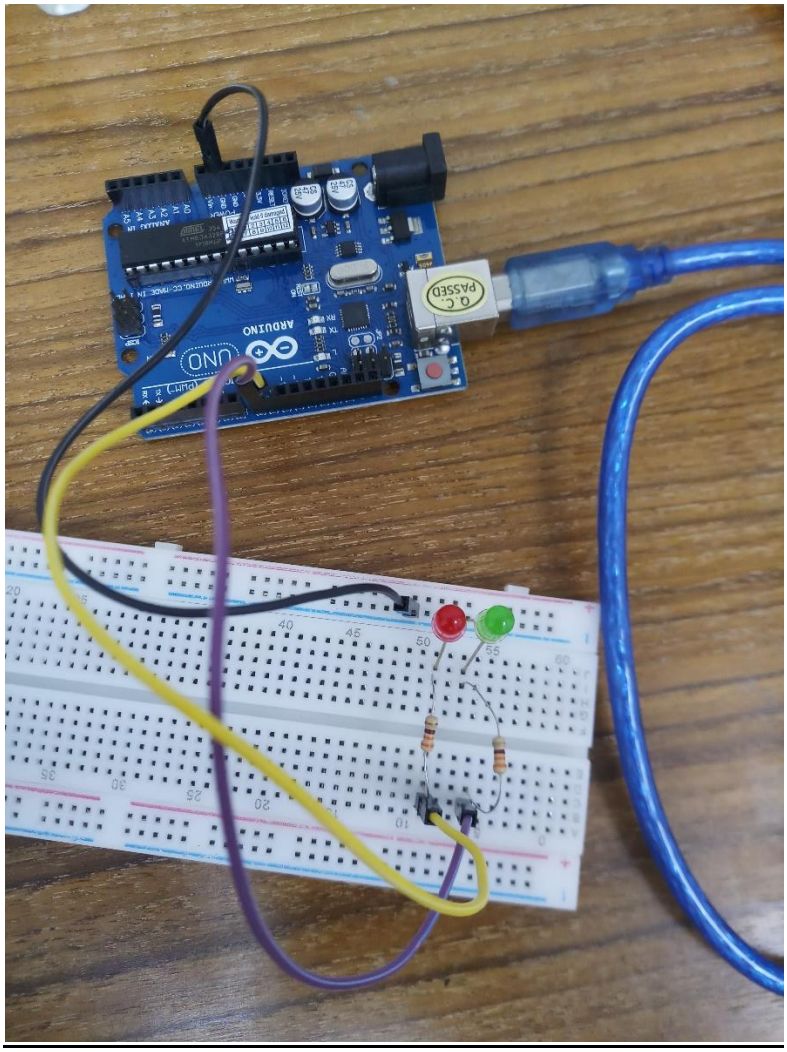


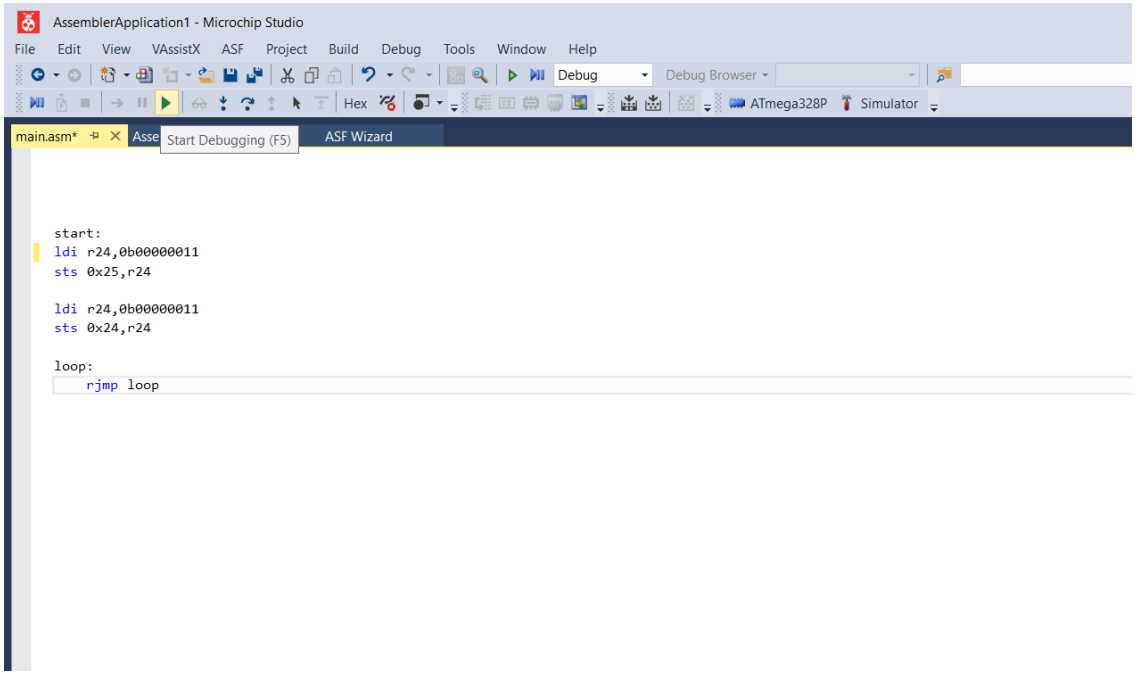
3) Now write the following program in the main.asm file editor as follows:

```
start:
ldi r24,0b00000011
sts 0x25,r24

ldi r24,0b00000011
sts 0x24,r24

loop:
rjmp loop
```



4) Connect the hardware implementation as below circuit connection and then select start debugging for seeing the results in circuit.





Lab Task:

1) Now upgrade the program as follows and observe the changes in LED blinking in hardware implementation.

```
start:
ldi r24,0b00000010
sts 0x25,r24

ldi r24,0b00000011
sts 0x24,r24

loop:
rjmp loop
```

2) Now upgrade the program as follows and observe the changes in LED blinking in hardware implementation.

```
start:
ldi r24,0b00000000
sts 0x25,r24

ldi r24,0b00000011
sts 0x24,r24

loop:
rjmp loop
```

3) Now upgrade the program as follows and observe the changes in LED blinking in hardware implementation.

```
start:
ldi r24,0b00000001
sts 0x25,r24

ldi r24,0b00000011
sts 0x24,r24

loop:
rjmp loop
```

Questions for Report writing:

1. Include all codes' list file printouts following lab report writing template mentioned in appendix A.

References:

1) https://www.youtube.com/watch?v=RxWwbaDy_uM

PORTB – The Port B Data Register

Bit	7	6	5	4	3	2	1	0	
0x05 (0x25)	PORTB7	PORTB6	PORTB5	PORTB4	PORTB3	PORTB2	PORTB1	PORTB0	PORTB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

DDRB – The Port B Data Direction Register

Bit	7	6	5	4	3	2	1	0	
0x04 (0x24)	DDB7	DDB6	DDB5	DDB4	DDB3	DDB2	DDB1	DDB0	DDRB
Read/Write	R/W	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

PINB – The Port B Input Pins Address

Bit	7	6	5	4	3	2	1	0	
0x03 (0x23)	PINB7	PINB6	PINB5	PINB4	PINB3	PINB2	PINB1	PINB0	PINB
Read/Write	R	R	R	R	R	R	R	R	
Initial Value	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

PORTC – The Port C Data Register

Bit	7	6	5	4	3	2	1	0	
0x08 (0x28)	–	PORTC6	PORTC5	PORTC4	PORTC3	PORTC2	PORTC1	PORTC0	PORTC
Read/Write	R	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

DDRC – The Port C Data Direction Register

Bit	7	6	5	4	3	2	1	0	
0x07 (0x27)	–	DDC6	DDC5	DDC4	DDC3	DDC2	DDC1	DDC0	DDRC
Read/Write	R	R/W	R/W	R/W	R/W	R/W	R/W	R/W	
Initial Value	0	0	0	0	0	0	0	0	

PINC – The Port C Input Pins Address

Bit	7	6	5	4	3	2	1	0	
0x06 (0x26)	–	PINC6	PINC5	PINC4	PINC3	PINC2	PINC1	PINC0	PINC
Read/Write	R	R	R	R	R	R	R	R	
Initial Value	0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Arduino Pin Mapping

www.arduino.cc