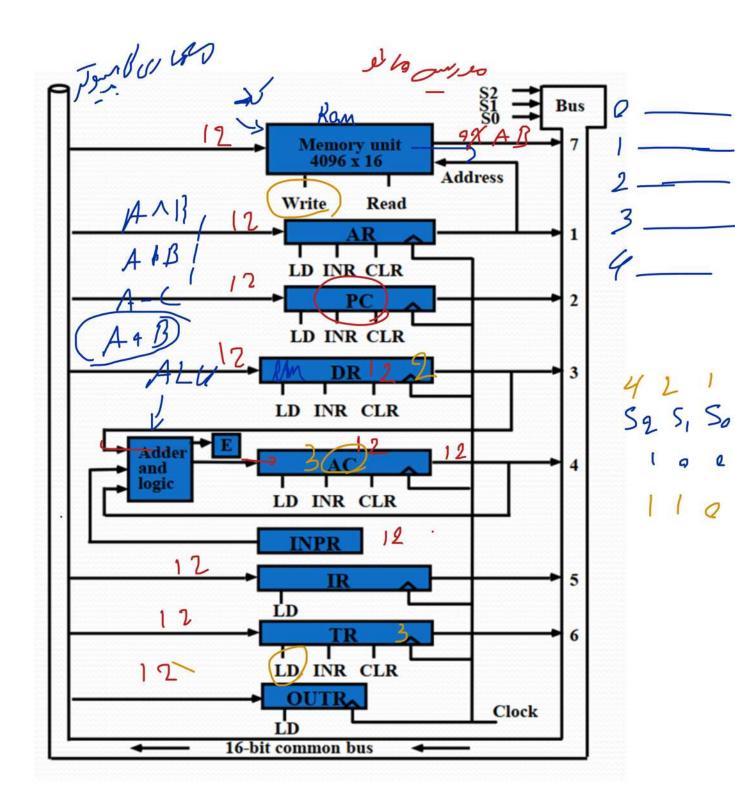


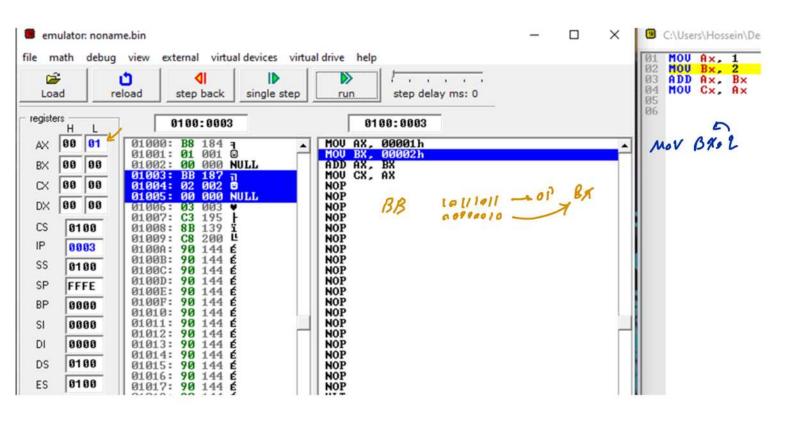
	Contraler,	
Analog Signals	Digital Signals	
Analog signal is continuous and time varying.	Digital signal have two or more states and in binary form.	
Troubleshooting of analog signals are difficult.	Troubleshooting of digital signals are easy.	
An analog signal is usually in the form of sine wave.	An digital signal is usually in the form of square wave.	
Easily affected by the noise.	These are stable and less prone to noise.	
Analog signals use continous values to represent the data.	Digital signals use discrete values to represent the data.	
Accuracy of the analog signals may be affected by noise.	Accuracy of the digital signals are immune from the noise.	
Analog signals may be affected during data transmission.	Digital signals are not affacted during data transmission.	
Analog signal use more power.	Digital signal use less power.	
Examples: Temperature, Pressure, Flow measurements, etc.	Examples: Valve Feedback, Motor Start, Trip, etc.	
Components like resistors, Capacitors, Inductors, Diodes ar used in analog circuits.	e Components like transistors, logic gates, and microcontrollers are used in Digital circuits.	

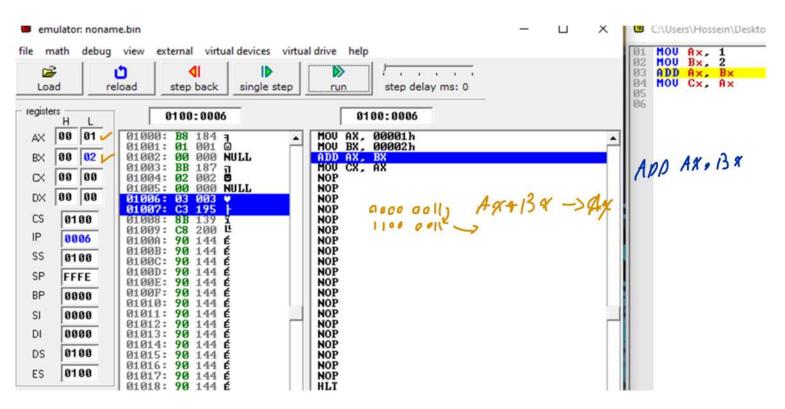


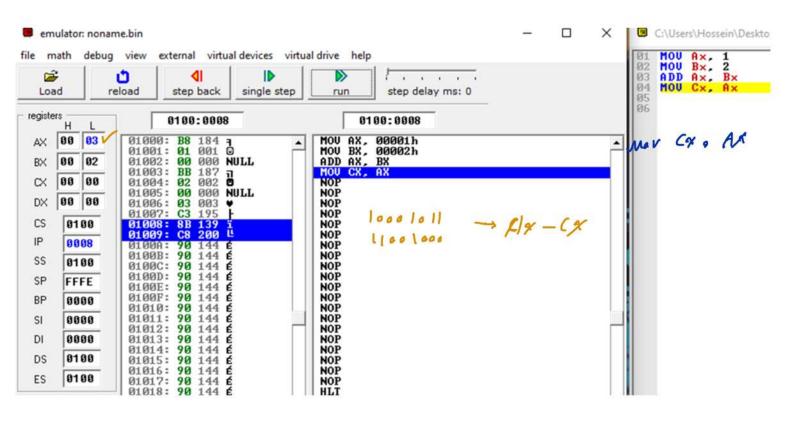
DR	16	Data Register Hold	ls memory operand
AR	12	Address Register	Holds address for memory
AC	16	Accumulator	Processor register
IR	16	Instruction Register	Holds instruction code
PC	12	Program Counter	Holds address of instruction
TR	16	Temporary Register	Holds temporary data
INPR	8	Input Register	Holds input character
OUTR	8	Output Register	Holds output character

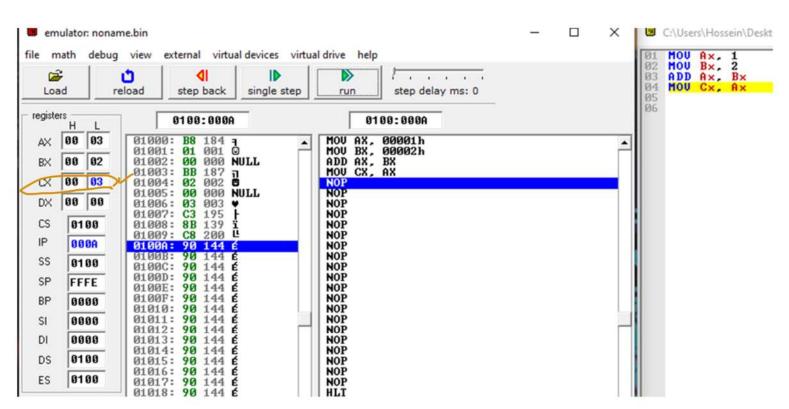
		Hex Co	do	
	Symbol		[=1	Description
	AND		xxx	
	ADD	The second secon	XXX	AND memory word to AC
	LDA	The second second second	Axxx	Add memory word to AC
	STA	The second second		Load AC from memory Store content of AC into memory
	BUN	The second secon	XXX	Branch unconditionally
	BSA	The second second second)XXX	Branch and save return address
	ISZ	The second secon	Exxx	Increment and skip if zero
	152	UAAA J	CAAA	increment and skip it zero
	CLA	7800	0	Clear AC
	CLE	7400		Clear E
	CMA	7200		Complement AC
	CME	7100		Complement E
	CIR	7080		Circulate right AC and E
	CIL	7040	0	Circulate left AC and E
	INC	7020)	Increment AC
	SPA	7010)	Skip next instr. if AC is positive
	SNA	7008	3	Skip next instr. if AC is negative
	SZA	7004	4	Skip next instr. if AC is zero
	SZE	7002	2	Skip next instr. if E is zero
	HLT	7001	l	Halt computer
	INP	F80		Input character to AC
	OUT	F400		Output character from AC
	SKI	F200		Skip on input flag
	SKO	F10		Skip on output flag Interrupt on at Code
	ION IOF	F080		Interrupt off operation Co
			0	
	 emulator: noname.bin. file math debug view external virtual devices virtual. 		devices virtual	I drive help 2 2 C:\Users\Hossein\Desl
	ڻ 🗃	di	IÞ [MOU Bx. 2
_	Load reload	step back	single step	run step delay ms: 0 94 MOU Cx, Ax
	egister 10 Low	0100:0000		8199:9990
1/	AX 00 00 01 01 01 01 01 0	000: B8 184 7 001: 01 001 © 002: 00 000 NU 003: BB 187 1	LL _	HOU AX, 69861h HOU BX, 69861h ADD AX, BX HOU CX, AX HOU CX, AX A A
- 1/	CX 88 88 83	.003: BB 187 1 .004: 02 002 0 .005: 00 000 NU	vana Et	NOP A
	DX 99 99 91	.006: 03 003 ♥ .007: C3 195 ►		NOP NOP
-160	01	008: 8B 139 i 009: C8 200 L 00A: 90 144 £		NOP NOP NOP
0	SS 0100 01	100B: 90 144 £		NOP NOP
	or FFFE 01	00D: 90 144 £ 00E: 90 144 £ 00F: 90 144 £		NOP NOP NOP
	SI 6999 91	010: 90 144 £		NOP NOP
100	DI 0000 01	012: 90 144 £ 013: 90 144 £ 014: 90 144 £		NOP NOP NOP
	DS 0100 01	015: 90 144 É		NOP NOP
	01	017: 90 144 £ 018: 90 144 £ 019: 90 144 £		NOP HLT ADD [BX + SI], AL
	0:1	01A: 90 144 É 101B: 90 144 É		ADD (BX + SI), AL ADD (BX + SI), AL
	1 80		1. 10	

861t 8618 6 =



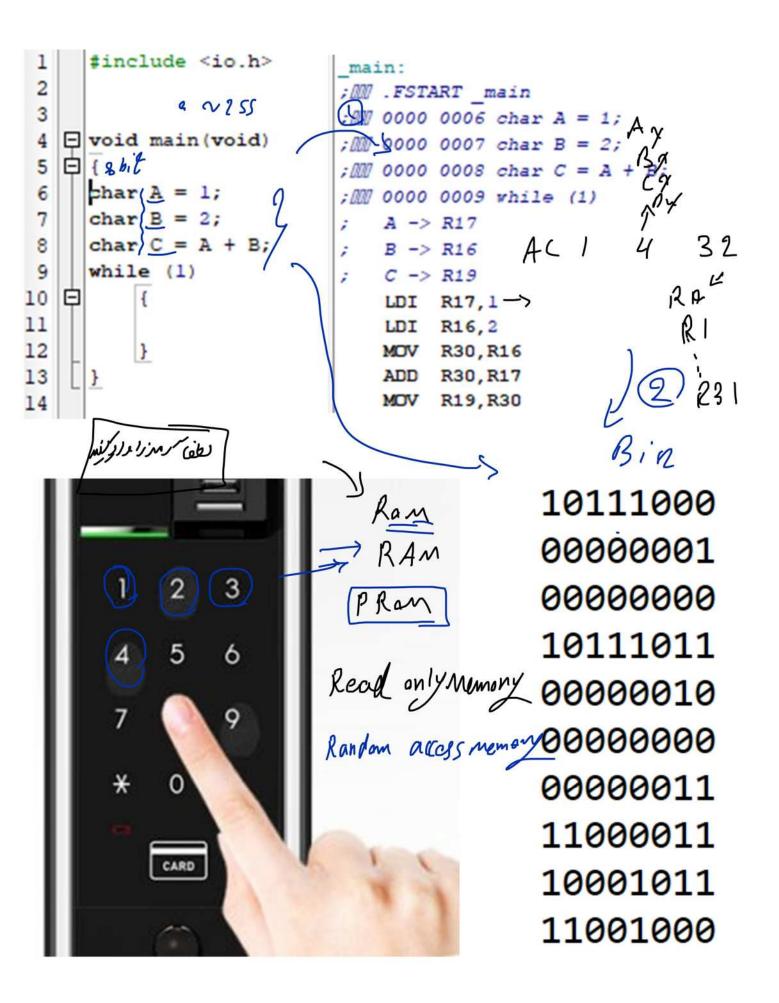






b801 00bb 0200 03c3 8bc8

```
Myr here
       Low Level
PL
       B8
0000
            00000001
0001
       01
000241
            00000000
       00
0003½ FI
            10111011
       BB
0004
            00000010
       02
0005
            00000000
       00
                      Ax+BX -) Ax
0006
            00000011
       03
0007
            11000011
       C3
8000
            10001011
       8B
0009
            11001000
       C8
000A
```



RAM

Definition Random Access Memory or RAM is a form of data storage that can be accessed randomly at any time, in any order and from any physical location., allowing quick access and manipulation.

ROM (flush)

Read-only memory

Read-only memory or ROM is also a form of data storage that can not be easily altered or reprogrammed. Stores instuctions that are not nescesary for rebooting up to make the computer operate when it is switched off. They are hardwired.

Stands for Random Access Memory Use RAM allows the computer to read data quickly to run applications. It allows reading and writing.

ROM stores the program required to initially boot the computer. It only allows reading.

Volatility RAM is volatile i.e. its contents are lost when the device is powered off.

It is non-volatile i.e. its contents are retained even when the device is powered off.

Types The two main types of RAM are static RAM and dynamic RAM.

The types of ROM include PROM, EPROM and EEPROM.

w Statie RAM	Dynamic RAM
SRAM uses transistor to store a single bit of data	DRAM uses a separate capacitor to store each bit of data
> SRAM does not need periodic refreshment to maintain data	DRAM needs periodic refreshment to maintain the charge in the capacitors for data
SRAM's structure is complex than DRAM	DRAM's structure is simplex than SRAM
SRAM are expensive as compared to DRAM	DRAM's are less expensive as compared to SRAM
> SRAM are faster than DRAM	> DRAM's are slower than SRAM
> SRAM are used in Cache memory 4 mg/	PRAM are used in Main memory

Programmable Read-Only Memory (PROM)

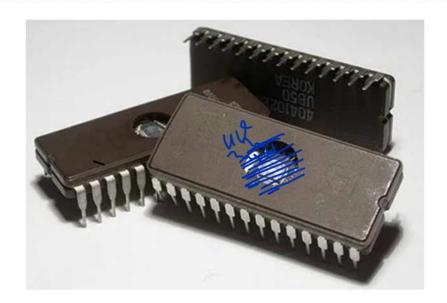
This type of ROM can be re-programmed by using a special device called a PROM programmer. Generally, a PROM can only be changed/updated once.

Erasable Programmable Read-Only Memory (EPROM)

This type of ROM can have its contents erased by ultraviolet light and then reprogrammed by an RPROM programmer. This procedure can be carried out many times; however, the constant erasing and rewriting will eventually render the chip useless.

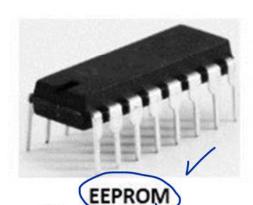
Electrically Erasable Programmable Read-Only Memory (EEPROM)

This type of ROM works in a similar way to Flash memory in that it can its contents can be 'flashed' for erasure ad then written to without having to remove the chip from its environment. EEPROMs are used to store a computer system's BIOS, and can be updated without returning the unit to the factory. In many cases, BIOS updates can be carried out by computer users wishing a BIOS update.





EPROM Erasable Programmable Read-Only Memory



Electrically Erasable Programmable Read-Only Memory

Figure 7-1. Block Diagram of the AVR Architecture

