DEPT. OF ELECTRICAL & ELECTRONICS ENGINEERING
SRM INSTITUTE OF SCIENCE AND TECHNOLOGY, Kattankulathur – 603203.

Title of Experiment	:12. Stepper Motor Rotate Forward & Reverse Direction
Name of the candidate	: GAUTAM NAG
Register Number	:RA1811005010278
Date of Experiment	:28-04-2021
Date of submission	**:28-04-2021**

S.NO :	MARKS SPLIT UP	MAXIMUM MARKS (50)	MARKS OBTAINED
1	PRE LAB	5	
2	PROGRAM	25	
3	EXECUTION	15	
4	POST LAB	5	
TOTAL		50	

Staff Signature

PRE LAB QUESTION AND ANSWERS

1. What is a stepper motor?

A stepper motor, also known as step motor or stepping motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps.

2. Define Step angle.

Step angle is defined as the angle which the rotor of a stepper motor moves when one pulse is applied to the input of the stator

3. What are the applications of stepper motors?

- As the stepper motors are digitally controlled using an input pulse, they are suitable for use with computer controlled systems.
- They are used in numeric control of machine tools.
- Used in tape drives, floppy disc drives, printers and electric watches.
- The stepper motor is also used in X-Y plotter and robotics.

4.Write the sequence of bit pattern for a four phase stepper motor in half stepping mode of control.

Half Mode Sequence

Step	A	B	C	D
1	1	0	0	1
2	1	0	0	0
3	1	1	0	0
4	0	1	0	0
5	0	1	1	0
6	0	0	1	0
7	0	0	1	1
8	0	0	0	1

Full Mode Sequence

Step	A	B	C	D
1	1	0	0	1
2	1	1	0	0
3	0	1	1	0
4	0	0	1	1

5.Name any four bit manipulation instructions in microcontroller 8051.

1. CLR.
2. SETB.
3. MOV.
4. JC.

12. STEPPER MOTOR ROTATE FORWARD & REVERSE DIRECTION

Aim:

To write an assembly program to make the stepper motor run in forward and reverse direction.

Apparatus required:

Hardware Requirement :

8051 Microcontroller kit, Power supply

Software Requirement :

8051 EdSim

Algorithm:

1. Fix the DPTR with the Latch Chip address FFC0
2. Move the values of register A one by one with some delay based on the 2-Phase switching Scheme and repeat the loop.
3. For Anti Clockwise direction repeat the step 3 by reversing the value sequence.
4. End the Program

Memory Location	Label	Opcode	Mnemonics	Comments
4100		90 FF C0	MOV DPTR, #FFC0	only user-accessible 16-bit (2-byte) register. ... It is used by the 8051 to access external memory using the address indicated by DPTR
4103		74 09	MOV A, #09	moves value to register a
4105		F0	MOVX @DPTR, A	only user-accessible 16-bit (2-byte) register. ... It is used by the 8051 to access external memory using the address indicated by DPTR
4106		12 45 00	LCALL DELAY	target address between 64k bytes address delay
4109		74 05	MOV A, #05	moves value to register a
410B		F0	MOVX @DPTR, A	only user-accessible 16-bit (2-byte) register. ... It is used by the 8051 to access external

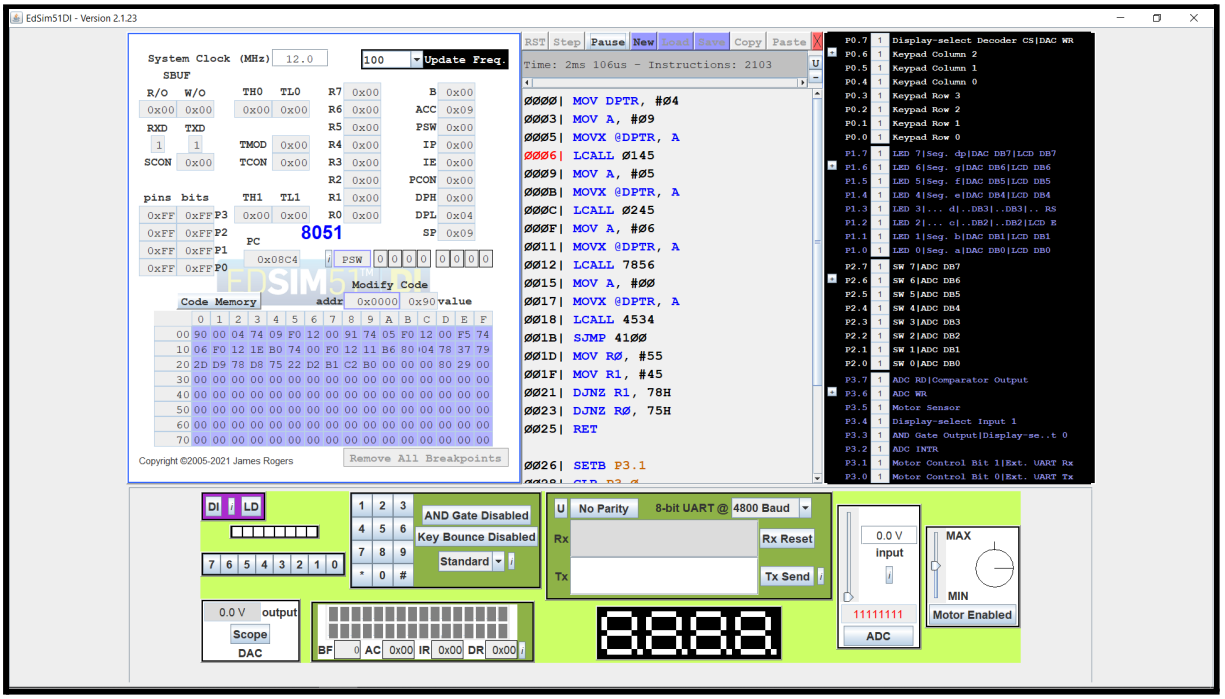
				memory using the address indicated by DPTR
410C		12 45 00	LCALL DELAY	target address between 64k bytes address delay
410F		74 06	MOV A, #06	moves value to register a
4111		F0	MOVX @DPTR, A	only user-accessible 16-bit (2-byte) register. ... It is used by the 8051 to access external memory using the address indicated by DPTR
4112		12 45 00	LCALL DELAY	target address between 64k bytes address delay
4115		74 0A	MOV A, #0A	moves value to register a
4117		F0	MOVX @DPTR, A	only user-accessible 16-bit (2-byte) register. ... It is used by the 8051 to access external memory using the address indicated by DPTR
4118		12 45 00	LCALL DELAY	target address between 64k bytes address delay
411B		80 E3	SJMP 4100	transfers execution to the specified address
4500	DELAY:	78 55	MOV R0, #55	move value to register R0
4502	L2	79 FF	MOV R1, #FF	move value to register R1
4504	L1	D9 FE	DJNZ R1, L1	decrements the byte indicated by the first operand and, if the resulting value is not zero, branches to the address
4506		D8 FA	DJNZ R0, L2	decrements the byte indicated by the first operand and, if the resulting value is not zero, branches to the address
4508		22	RET	pops the high-order and low-order bytes of the PC from the stack (and decrements the stack pointer by

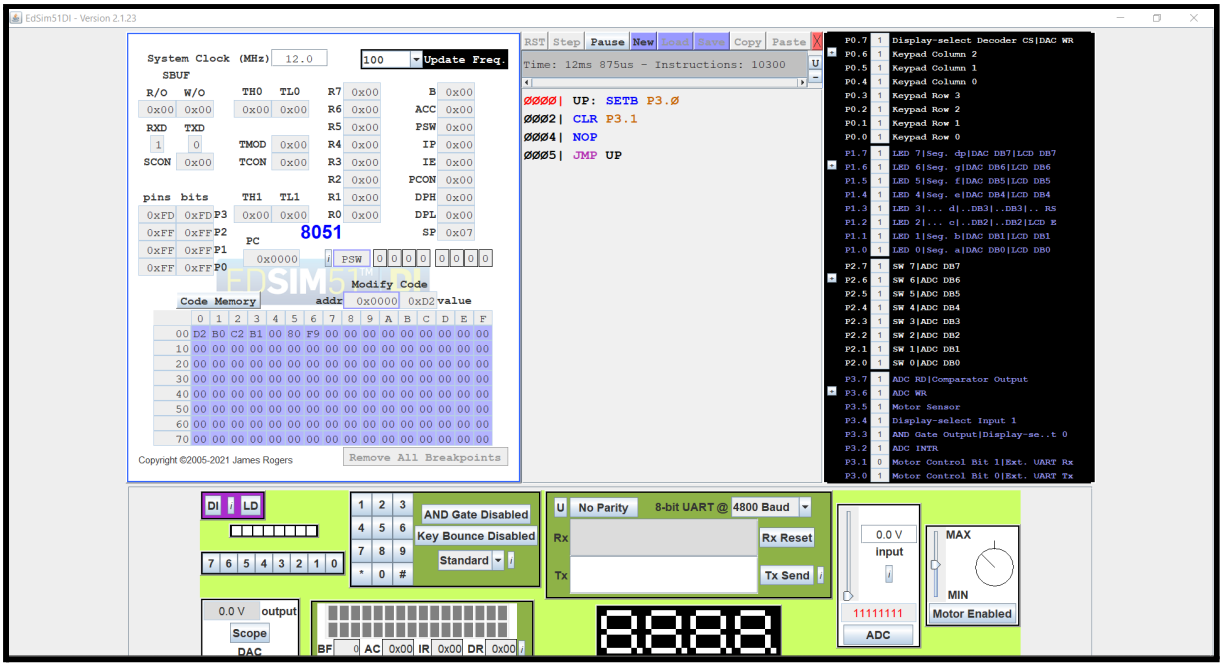
EDSIM51 PROGRAM- STEPPER MOTOR ROTATE FORWARD & REVERSE DIRECTION:

ADDRESS	LABEL	MNEMONICS	OPCODE	COMMENTS

0000	UP	SETB P3.1	74 06	**sets the bit operand to a value of 1 at pin 3.1**
0002		CLR P3.0	F0	**clears (sets to 0) all the bit(s) of the indicated register at pin 3.0**
0004		NOP	12 45 00	**Execution continues with the next instruction. No registers or flags are affected by this instruction**
0005		JMP UP	74 0A	**jumps unconditionally to the address represented by the sum of the value of DPTR and the value of the Accumulator.**

SIMULATION:





Note :

1. **For changing the speed change the delay time**
2. **For changing the direction, change the excitation sequence order**

Result:

Thus an assembly language program to control the stepper motor was executed successfully using the Edsim51 Simulator.

POST LAB QUESTION AND ANSWERS

1. **What are the types of stepper motor?**
    a. Permanent Magnet Stepper
    b. Variable Reluctance Stepper.
    c. Hybrid Synchronous Stepper.

2. **Brief 2-phase on mode?**

    The motor is operated with both phases energized at the same time. This mode provides improved torque and speed performance. Two-phase on provides about 30% to 40% more torque than one phase on, however it requires twice as much power from the driver.

3. **What are the types of stepper motor?**
    a. Permanent Magnet Stepper
    b. Variable Reluctance Stepper.
    c. Hybrid Synchronous Stepper.

4.How keyboard debouncing is done by software?

Debouncing is accomplished by taking multiple samples of the input signal and determining whether to assert an output signal (the debounced version of the signal) HIGH or LOW based on whether consecutive samples are received.

5.What are the operation carried out when 8051 executes the instruction MOVC A,

@A+ DPTR ?

- **MOVC A -** The Code Memory address from which the byte will be moved is calculated by summing the value of the Accumulator with either DPTR or the Program Counter (PC)

- **@A+ DPTR** - The MOVX instruction transfers data between the accumulator and external data memory. External memory may be addressed via 16-bits in the DPTR register or via 8-bits in the R0 or R1 registers. When using 8-bit addressing, Port 2 must contain the high-order byte of the address.