UNIT IV

DEMOSTRATE APPLICATION OF MICROPROCESSOR FOR CONTROL OF ELECTRONIC DEVICES

Interfacing Stepper Motor with 8085

- Stepper motor is an electromechanical device that rotates through fixed angular steps when digital inputs are applied.
- It is suitable for precise position, speed and direction control which are required in automation system.
- The angle through which stepper motor rotates with a fixed angle for each digital data is called step angle.
- Different stepper motor has different step angle. The more frequently used stepper motor has step angle of 0.9 degrees and 1.8 degrees.

INTERFACING STEPPER MOTOR

- Depending on the sequence applied to stepper motor, it can be classified in two category:
- 4- Step sequence or full step sequence
- 8- Step sequence or half step sequence
- 4-Step sequence:
- In this type of functioning, the following 4 binary sequence/code are used for rotation:
- (Considering step angle= 1.8 degrees)

4 binary sequence/code are used for rotation

4- Step sequence binary pattern	HEX code	Comments			
A	B	C	D		
0	1	0	1	09H	Sequence for anti-clockwise rotation
0	0	0	1	01H	
1	0	0	1	09H	
1	0	0	0	08H	
1	0	1	0	0AH	
0	0	1	0	02H	
0	1	1	0	06H	
0	1	0	0	04H	

Table 4.9. Chips select Logic

Chip select address lines	Address lines to select port	HEX address	Selected I/O						
A7	A6	A5	A4	A3	A2	A1	A0		
1	0	0	0	0	0	0	0	80H	PORT A
1	0	0	0	0	0	0	1	81H	PORT B
1	0	0	0	0	0	1	0	82H	PORT C
1	0	0	0	0	0	1	1	83H	Chip select register

Table 4.10. Program in Look-up table

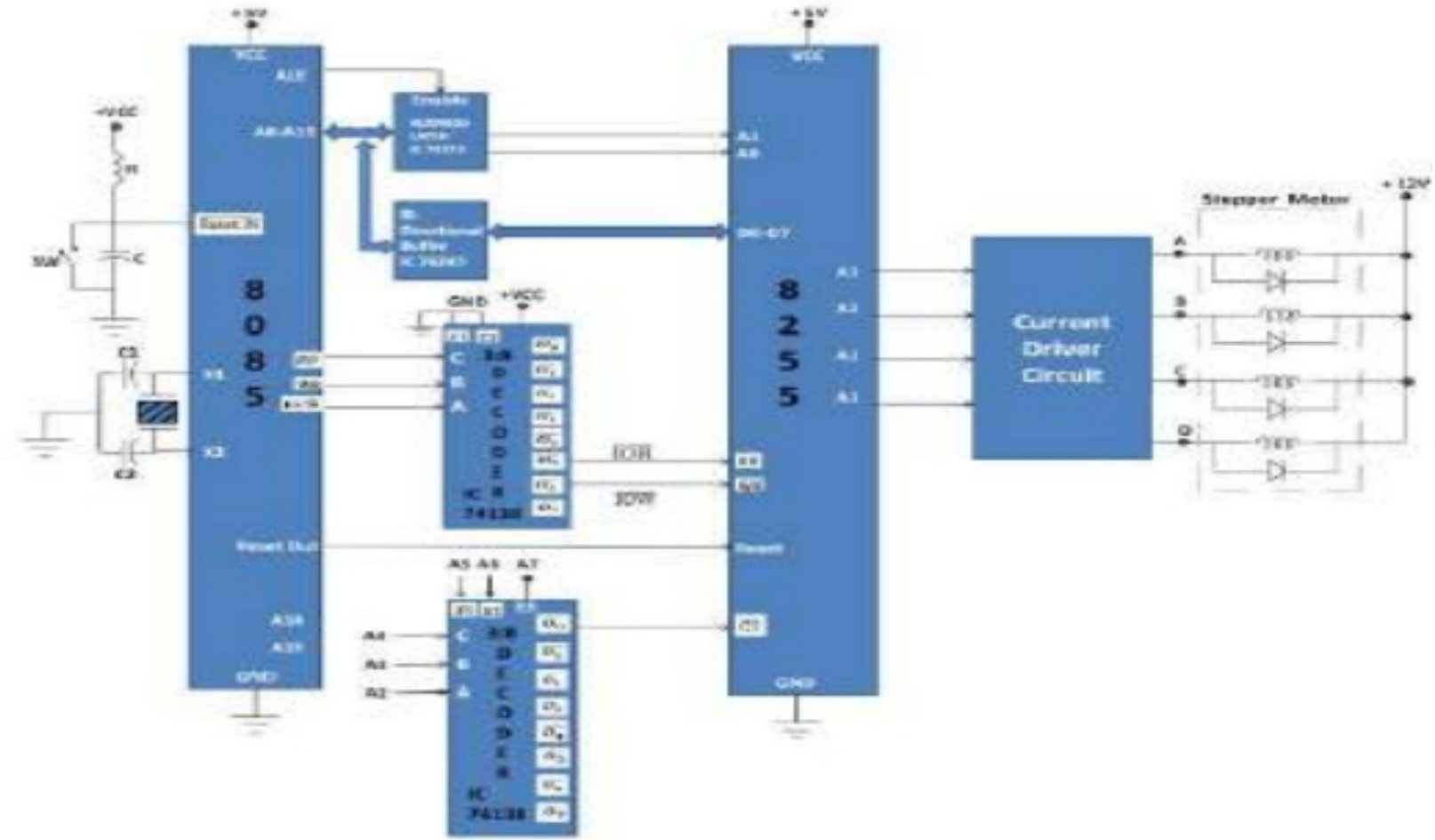
D7	D6	D5	D4	D3	D2	D1	D0
IO/BSR	MA	MA	PA	PCU	MB	PB	PCU
1	0	0	0	0	0	0	0

LABEL	OPCODE	OPERAND	COMMENT
	LXI	SP,2800H	Initialize Stack pointer
	MVI	A, 80H	Initialize 8255
	OUT	83H (CWR)	
	MVI	B, 32H	Initialize repeated count
REPEAT:	LXI	H, 2100H	Initialize 4-step sequence
	MVI	C,04H	Initialize 4-step sequence from look up table
BACK:	MOV	A,M	
	OUT	80H (PORT A)	Sends data to Port A
	CALL	DELAY	Provide time interval between steps
	INX	H	Increment look up table
	DCR	C	Decrement 4-step count
	JNZ	BACK	Is count= "00"? if no then jump to BACK
	DCR	B	Is count= "00"? if yes then decrement repeated count
	JNZ	REPEAT	Repeated count is repeated for further rotation
	HLT		

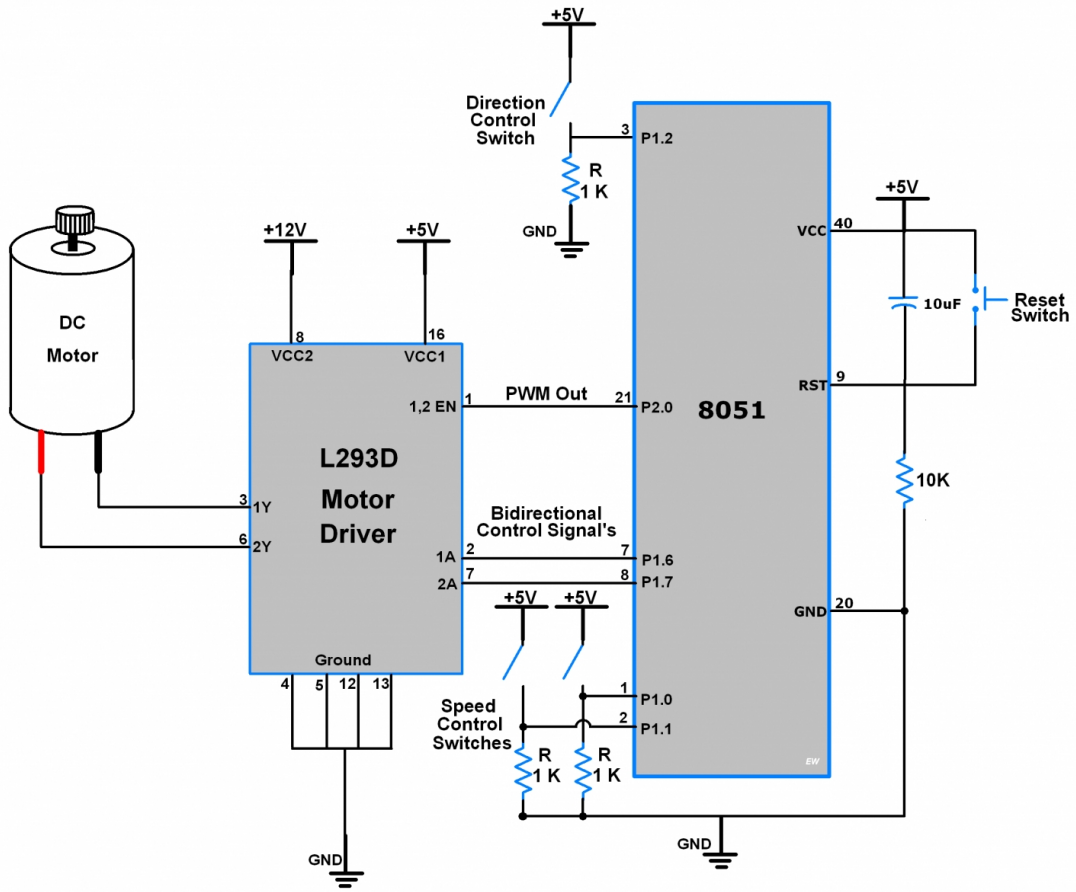
Control word Format:

- In the above program in look up table if the 4-step sequence for clock wise then stepper
- motor will rotate in clockwise direction and if the 4-step sequence for anti-clock wise
- then stepper motor will rotate in anti-clockwise direction.
- Speed control of stepper motor is achieved by writing program to rotate stepper motor
- continuously in delay program. We can change the delay between two steps and thus
- change the speed of stepper motor

Interfacing diagram of Stepper motor with 8085



microcontroller in DC motor control



microcontroller in DC motor control

- Let’s interface the DC motor with the AT89S52 microcontroller and control the DC motor speed by using the Speed Increment Switch and Speed Decrement Switch connected to the Microcontroller port and direction by using Direction Switch.
- We are going to use the L293D motor driver IC to control the DC motor movement in both directions. It has an in-built H-bridge motor drive.
- As shown in the above figure we have connected two toggle switches on the P1.0 and P1.1 pin of the AT89S52 microcontroller to change the speed of the DC motor by 10%.

microcontroller in DC motor control

- One toggle switch at pin P1.2 controls the motor's rotating direction.
- P1.6 and P1.7 pins are used as output direction control pins. It provides control to motor1 input pins of the L293D motor driver which rotate the motor clockwise and anticlockwise by changing their terminal polarity.
- And Speed of the DC Motor is varied through PWM Out pin P2.0.
- Here we are using the timer of AT89S52 to generate PWM.