A Project Report on

STEPPER MOTOR

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1.1 Hardware/Software Used:

Stepper motor control using both of assembly code and C language at Proteus platform. Stepper motor interfacing with **8086 up** using ULN2003A Transistor Array, 8255A PPI and 74HC373 Latch, simulated in proteus 8.6 and programmed by EMU8086.

1.2 Project Description

A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates indiscrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct relationships to these applied input pulses. The sequence of the applied pulses is directly related to the direction of motor shafts rotation. The speed of the motor shafts rotation is directly related to the frequency of the input pulses and the length of rotation is directly related to the number of input pulses applied.

To rotate the shaft of the stepper motor, a sequence of pulses is needed to be applied to the windings of the stepper motor, in proper sequence. The numbers of pulses required for complete rotation of the shaft of the stepper motor are equal to the number of internal teeth on its rotor. The stator teeth and the rotor teeth lock with each other to fix a position of the shaft. With a pulse applied to the winding input, the rotor rotates by one teeth position or an angle x.

the angle x may be calculated as.

x = 3600 / no. of rotor teeth

After the rotation of the shaft through angle x, the rotor locks it self with the next tooth in the sequence on the internal surface of the stator.

Permanent Magnet Stepper Motor

Stator

Rotor

Permanent Magnet Poles

Windings
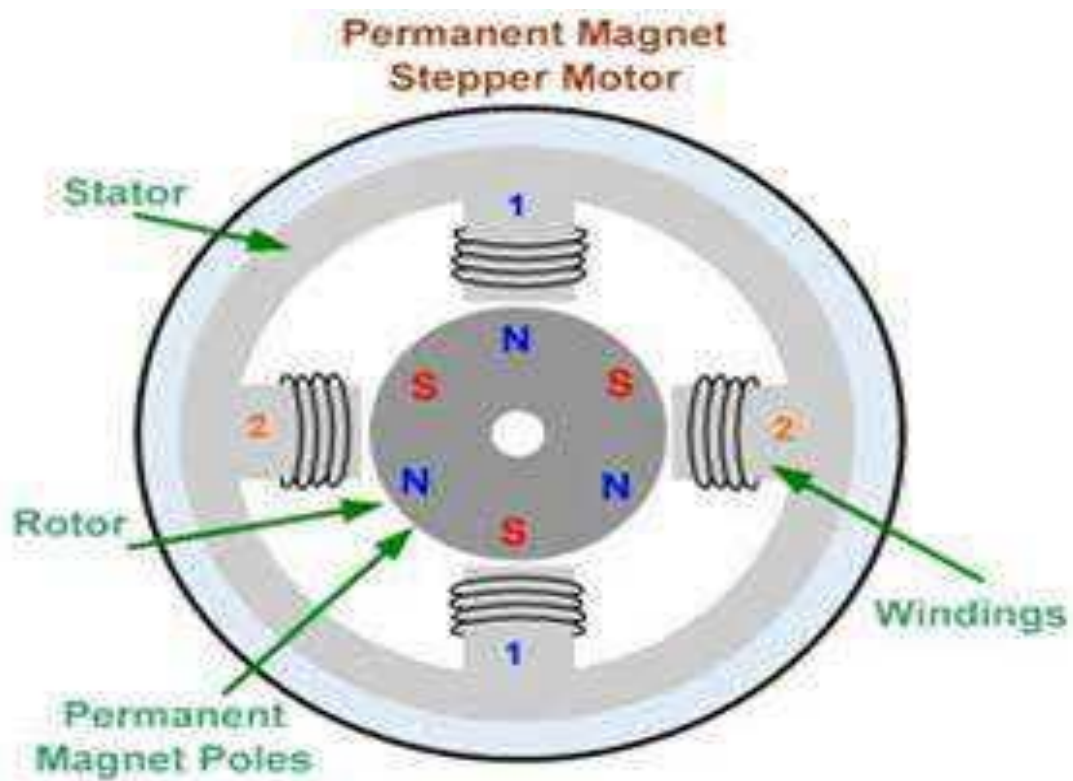
1.3 Program Code

```
2    ; Stepper Motor
3    CODE SEGMENT
4     PORTA  EQU 00H    ;Address of Port A      = 00H
5     Config EQU 06H    ;Address of Config. Word = 06H
6    ORG 100H
7      MOV DX, Config
8      MOV AL, 10000000B;port A=output/ mode 0, PORT B=output/ mode 0 ,port C=output
9      OUT DX, AL
10
11   START:
12     MOV DX, PORTA
13     MOV AL, 00000110B
14     OUT DX,AL
15   ;--------------------
16     MOV CX, 0ffffh    ; Delay
17   loopy1:loop loopy1   ;
18   ;--------------------
19     MOV AL, 00001100B
20     OUT DX,AL
21   ;--------------------
22     MOV CX, 0ffffh    ; Delay again
23   loopy2:loop loopy2   ;
24   ;--------------------
25     MOV AL, 00001001B
26     OUT DX,AL
27   ;--------------------
28     MOV CX, 0ffffh    ; Delay again
29   loopy3:loop loopy3   ;
30   ;--------------------
31     MOV AL, 00000011B
32     OUT DX,AL
33   ;--------------------
34     MOV CX, 0ffffh    ; Delay again
35   loopy4:loop loopy4   ;
36   ;--------------------
37   JMP START        ;Loop forever
38   CODE ENDS
39   END
```

1.4 Result