A Project Report on

# STEPPER MOTOR

Submitted by

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in fulfillment of

**MINI-PROJECT of MCA**

in

**Electronics & Telecommunication Engineering**

Under the Guidance of

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(2020 - 2021)

**Components for hardware Required** :

- 89c51 microcontroller
- Stepper motor (unipolar)
- Motor driver (ULN2803)
- Crystal (16MHz)
- Capacitors (22pF)
- Push Button
- Jumper wires

Software:

- Proteus 8.6
- Keil v4

## HEX CODES

| 4- Step sequence binary pattern | | | | HEX code | Comments |
|---|---|---|---|---|---|
| A | B | C | D | | |
| 1 | 0 | 0 | 1 | 09 | Sequence for Clock wise rotation |
| 1 | 1 | 0 | 0 | 0C | |
| 0 | 1 | 1 | 0 | 06 | |
| 0 | 0 | 1 | 1 | 03 | |
| | | | | | |
| 0 | 0 | 1 | 1 | 03 | Sequence for anti-clockwise rotation |
| 0 | 1 | 1 | 0 | 06 | |
| 1 | 1 | 0 | 0 | 0C | |
| 1 | 0 | 0 | 1 | 09 | |

## 1.1 Hardware/Software Used:

Stepper motor control using both of assembly code, C language at Proteus platform AND Keil Software. Stepper motor interfacing with **8051 up** using ULN2803, simulated in proteus 8.6, programmed by Keil Software.

## 1.2 Project Description

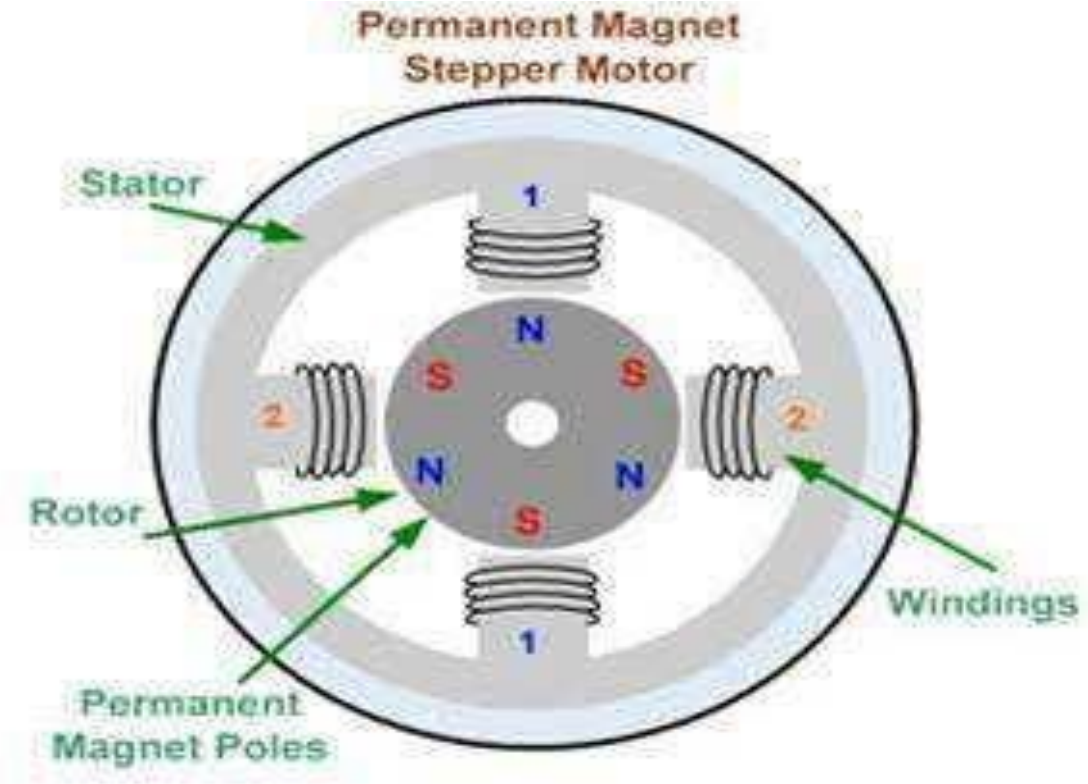
A stepper motor is an electromechanical device which converts electrical pulses into discrete mechanical movements. The shaft or spindle of a stepper motor rotates indiscrete step increments when electrical command pulses are applied to it in the proper sequence. The motors rotation has several direct 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.

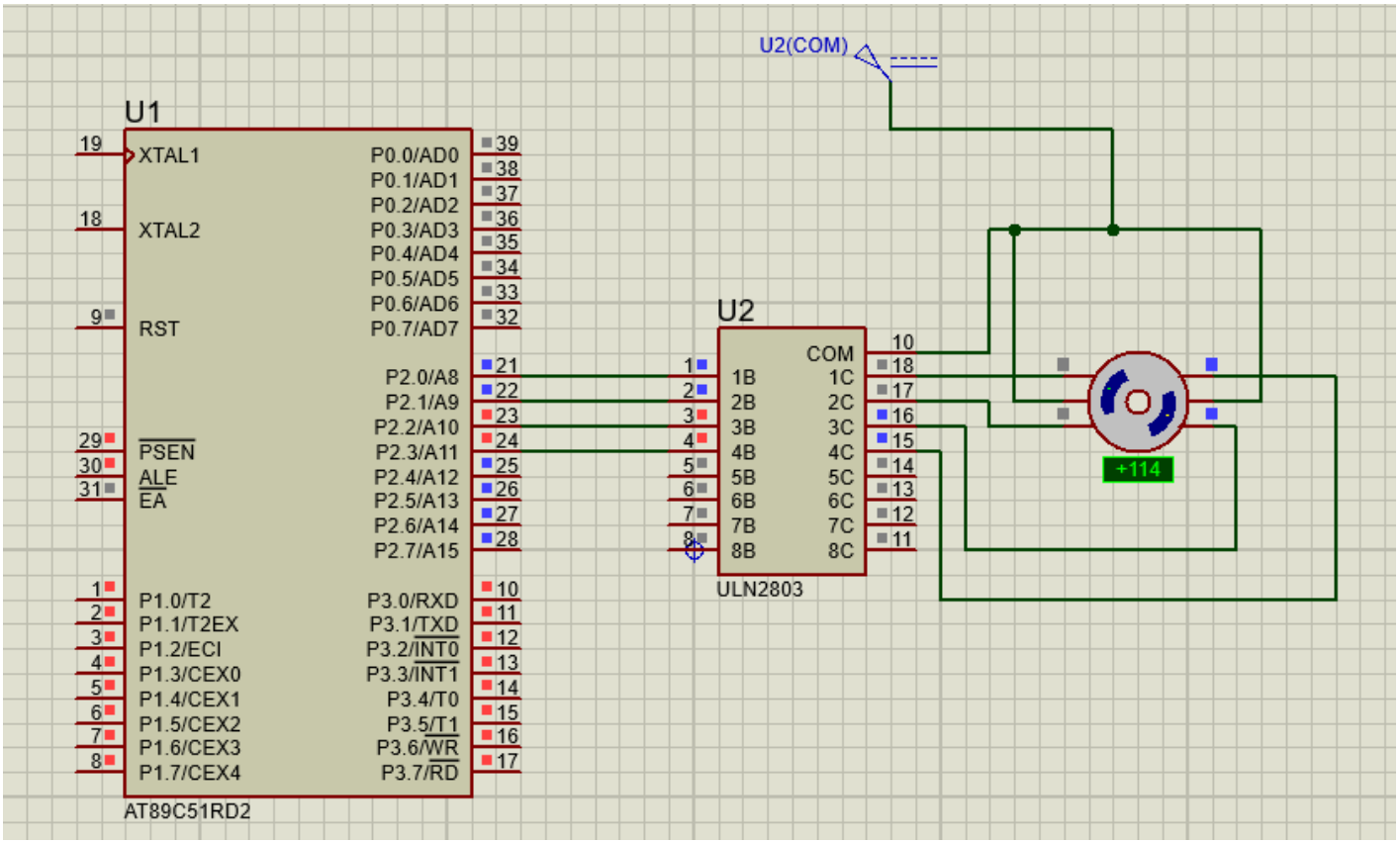


### 1.3 Program Code

```
ORG 0000H
UP: MOV P2, #09H
ACALL DELAY
MOV P2, #0CH
ACALL DELAY
MOV P2, #06H
ACALL DELAY
MOV P2, #03H
ACALL DELAY
SJMP UP

DELAY:MOV R4, #18
H1: MOV R3, #255
H2: DJNZ R3, H2
DJNZ R4, H1
RET
END
```

## 1.4 Result


U1
XTAL1
XTAL2
RST
PSEN
ALE
EA
P1.0/T2
P1.1/T2EX
P1.2/ECI
P1.3/CEX0
P1.4/CEX1
P1.5/CEX2
P1.6/CEX3
P1.7/CEX4
P0.0/AD0
P0.1/AD1
P0.2/AD2
P0.3/AD3
P0.4/AD4
P0.5/AD5
P0.6/AD6
P0.7/AD7
P2.0/A8
P2.1/A9
P2.2/A10
P2.3/A11
P2.4/A12
P2.5/A13
P2.6/A14
P2.7/A15
P3.0/RXD
P3.1/TXD
P3.2/INT0
P3.3/INT1
P3.4/T0
P3.5/T1
P3.6/WR
P3.7/RD
AT89C51RD2
U2(COM)
U2
1B
2B
3B
4B
5B
6B
7B
8B
COM
1C
2C
3C
4C
5C
6C
7C
8C
ULN2803
+114

CONCLUSION:

- That project can be used perfectly in many domains.
- The device is easy to implement in hardware and software means.
- The circuit is cost-effective consume less power and take minimum time.