

5.3 Stepper Motor Control

The complete board consists of transformer, control circuit, keypad and stepper motor. The circuit has inbuilt 5 V power supply so when it is connected with transformer it will give the supply to circuit and motor both.

Step Angle – The step angle is the angle in which the rotor moves when one pulse is applied as an input of the stator. This parameter is used to determine the positioning of a stepper motor.

Steps per Revolution – This is the number of step angles required for a complete revolution. So the formula is $360^\circ / \text{Step Angle}$.

Steps per Second – This parameter is used to measure a number of steps covered in each second.

RPM – The RPM is the Revolution Per Minute. It measures the frequency of rotation. By this parameter, we can measure the number of rotations in one minute.

The 8 Key keypad is connected with circuit through which user can give the command to control stepper motor. The control circuit includes micro controller 89C51, indicating LEDs, and current driver chip ULN2003A. By giving different commands the stepper motor can run clockwise, run anticlockwise, increase/decrease RPM, increase/decrease revolutions, stop motor, change the mode, etc. Stepper motor has four coils. One end of each coil is tied together and it gives common terminal which is always connected with positive terminal of supply. The other ends of each coil are given for interface. Specific color code may also be given.

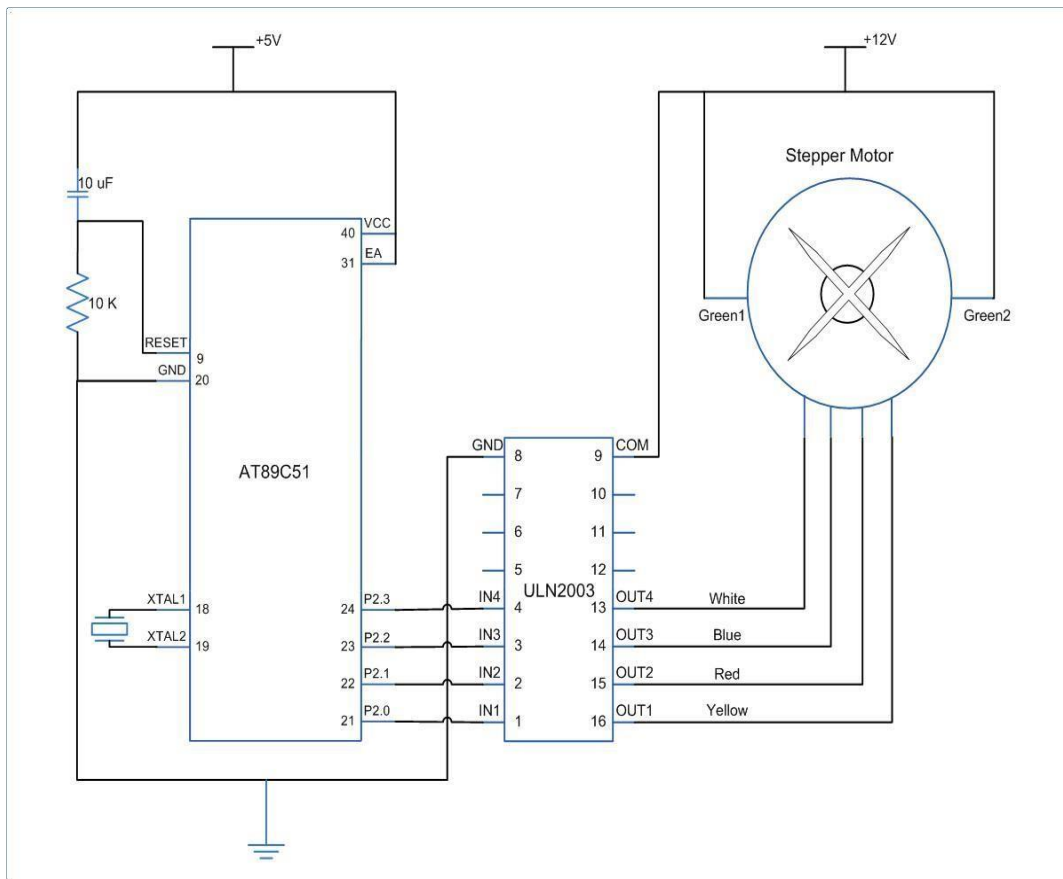
First Coil L1-Orange

Second Coil L2 -Brown

Third Coil L3 - Yellow

Fourth Coil L4 - Black C

ommon Terminal -Red



To vary the RPM of motor we have to vary the PRF (Pulse Repetition Frequency). Number of applied pulses will vary number of rotations and last to change direction we have to change pulse sequence. So all these three things just depends on applied pulses. Now there are three different modes to rotate this motor

1. Single coil excitation
2. Double coil excitation
3. Half step excitation

Clockwise	B2	B1	A2	A1	Anti clockwise
	D3	D2	D1	D0	
↓	1	1	0	0	↑
	1	0	0	1	
	0	0	1	1	
	0	1	1	0	
	1	1	0	0	

```
#include<reg51.h>
sbit LED_pin = P2^0; //set the LED pin as P2.0
void delay(int ms){
    unsigned int i, j;
    for(i = 0; i<ms; i++){ // Outer for loop for given milliseconds
value
        for(j = 0; j< 1275; j++){
            //execute in each milliseconds;
        }
    }
}
void main(){
    int rot_angle[] = {0x0C,0x06,0x03,0x09};
    int i;
    while(1){
        //infinite loop for LED blinking
        for(i = 0; i<4; i++){
            P0 = rot_angle[i];
            delay(100);
        }
    }
}
```