Marwadi University	**Marwadi University** **Faculty of Technology** **Department of Information and Communication Technology**	
Subject: Foundation Skills in Sensor Interfacing (01CT11032)	**Aim:** To interface Stepper Motor with Arduino	
Experiment No: 09	**Date: 23-01-22**	**Enrolment No: 92100133020**

Aim: To interface Stepper Motor with Arduino

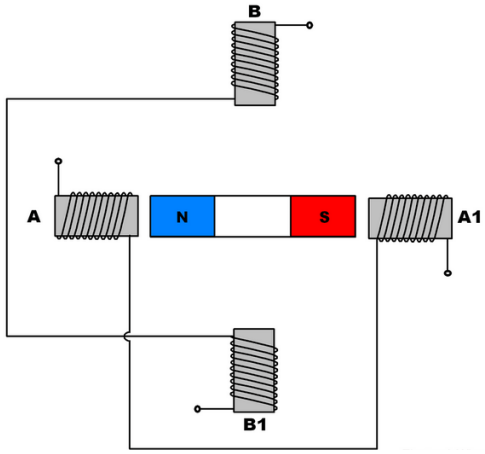
Apparatus: Stepper Motor, Motor Driver, Arduino UNO, USB Cable, Jumper Wires, PC/Laptop.

Theory:

Stepper Motor is a brushless DC Motor. Control signals are applied to stepper motor to rotate it in steps. Its speed of rotation depends upon rate at which control signals are applied. There are various stepper motors available with minimum required step angle. Stepper motor is made up of mainly two parts, a stator and rotor. Stator is of coil winding and rotor is mostly permanent magnet or ferromagnetic material.

Working

Stepper motor rotates in steps. To understand its principle, consider the logical diagram of its construction given below. Two winding, A and B are the stator of motor. Permanent magnet having North and South poles is rotor of the motor. The basic arrangement of stator and rotor in stepper motor is shown in figure below.



Now if we energies winding B, it will create North and South poles on winding B as shown in figure below which will attract opposite poles of magnet towards it. This causes rotor (permanent magnet) to rotate by a step.

STEP ANGLE:

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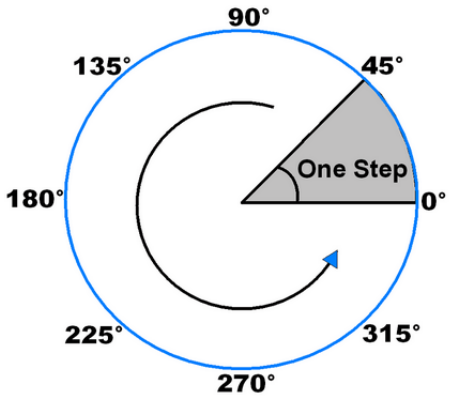
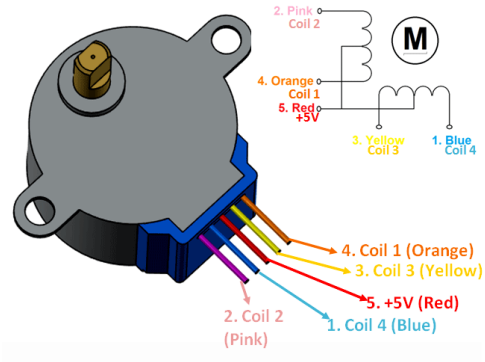
Step angle is the minimum angle that stepper motor will cover within one move/step. Number of steps required to complete one rotation depends upon step angle. E.g. If step angle is of 45° then 8 steps are required to complete one rotation as shown in figure below.



Step Angle : 45°
No. of steps required to complete a rotation : 8

Depending upon stepper motor configuration, step angle varies e.g. 0.72°, 1.8°, 3.75°, 7.5°, 15° etc.

PIN CONFIGURATION OF STEPPER MOTOR



Coil 1	This Motor has a total of four coils. One end of all the coils are connect to +5V (red) wire and the other end of each coil is pulled out as wire colors Orange, Pink, Yellow and Blue respectively
Coil 2	Refer coil 1
Coil 3	Refer coil 1
Coil 4	Refer coil 1

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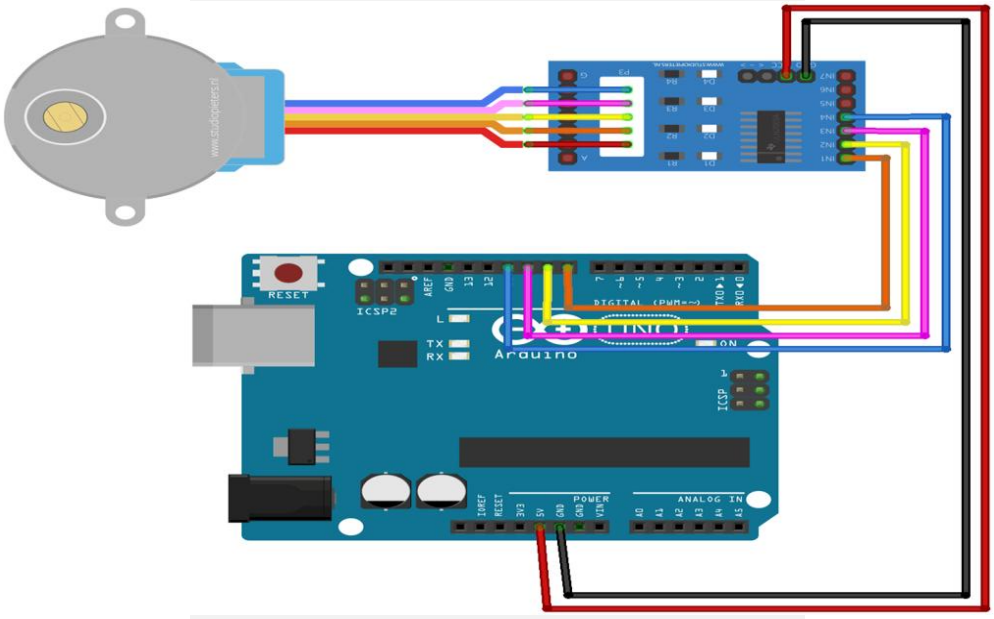
+5V	We should supply +5V to this wire, this voltage will appear across the coil that is grounded.

Interfacing Diagram:



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Code:

```
// Arduino stepper motor control code

#include <Stepper.h> // Include the header file

// change this to the number of steps on your motor

#define STEPS 32

// create an instance of the stepper class using the steps and pins

Stepper stepper(STEPS, 8, 10, 9, 11);

int val = 0;

void setup() {

  Serial.begin(9600);

  stepper.setSpeed(200);

}


void loop() {

  if (Serial.available()>0)

  {

    val = Serial.parseInt();

    stepper.step(val);

    Serial.println(val); //for debugging

  }

}
```

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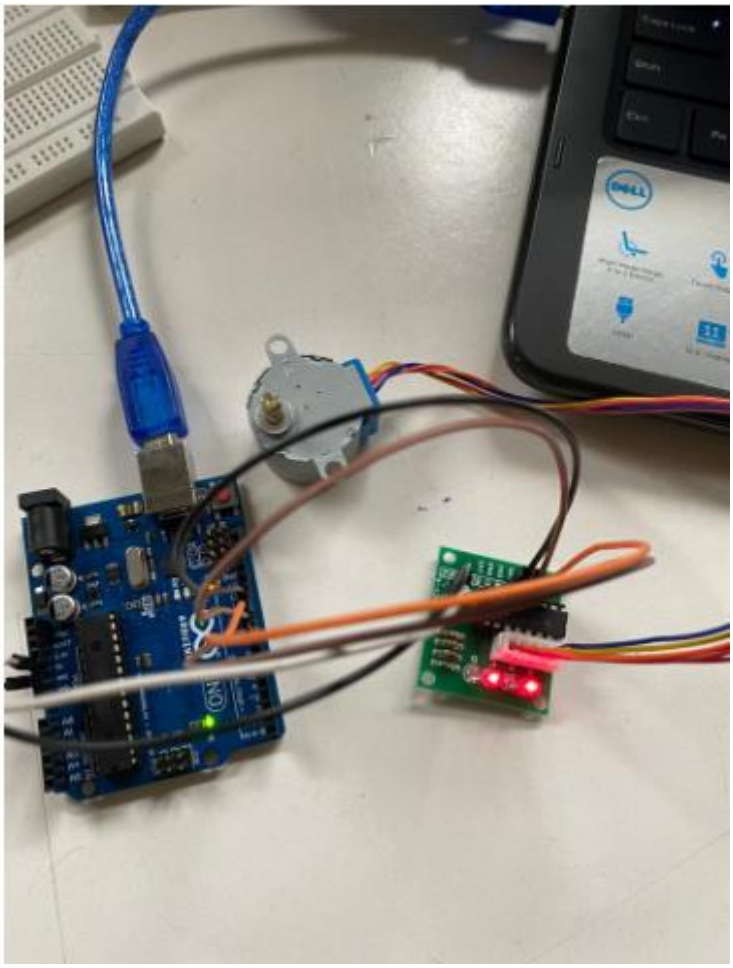
Output:



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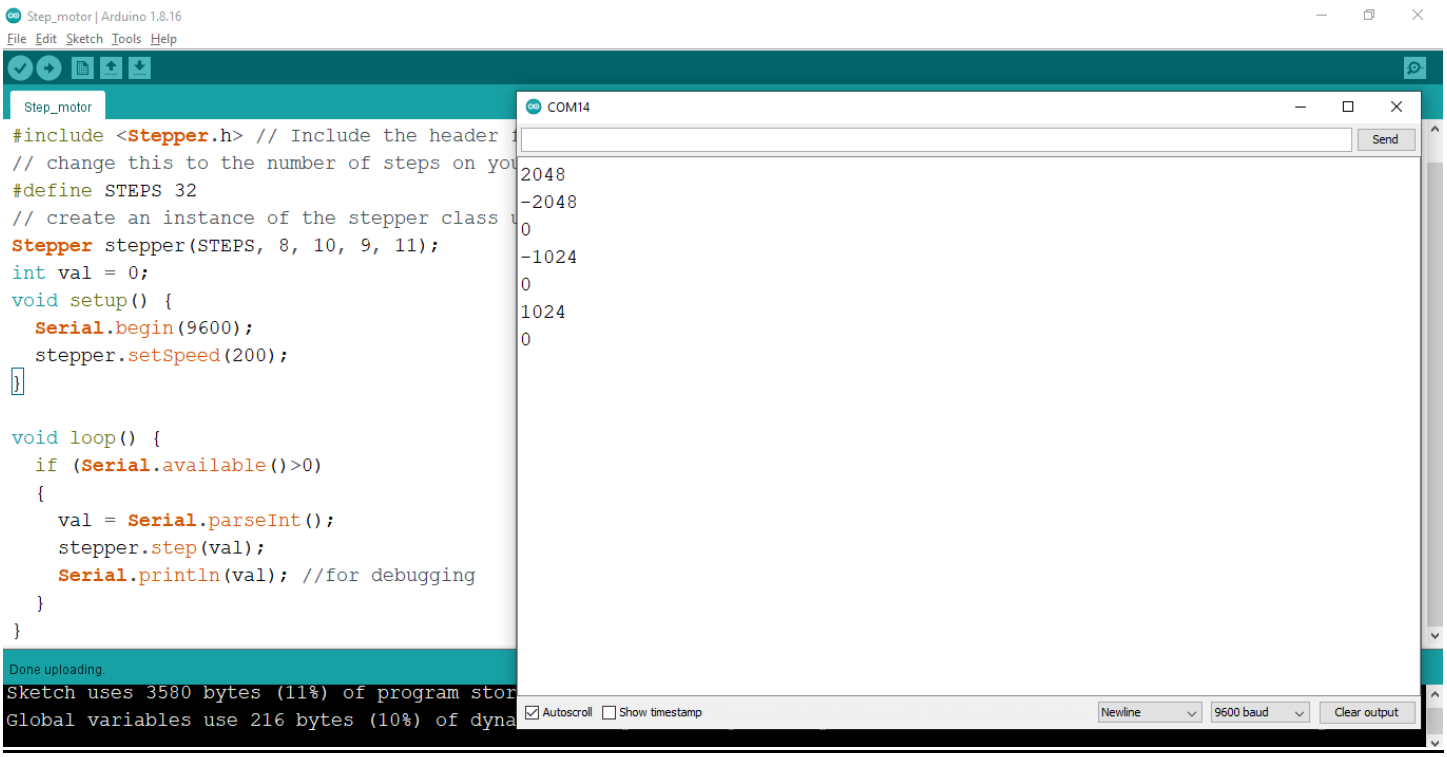
Observations:



Conclusion:

From the above experiment I am able to understand the working of the stepper motor and its theory. Also learnt about what are step angle and its pin configuration. Stepper motor are is used in printers, 3D printing, Textile machines, Laser cutting machines, Printing presses, Diamond Cutting machine, Gaming machines, etc. This type of motor can also be used in all the robots and machines where there is a need of very precise movement.