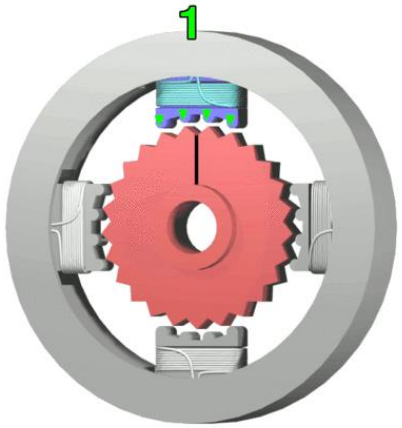
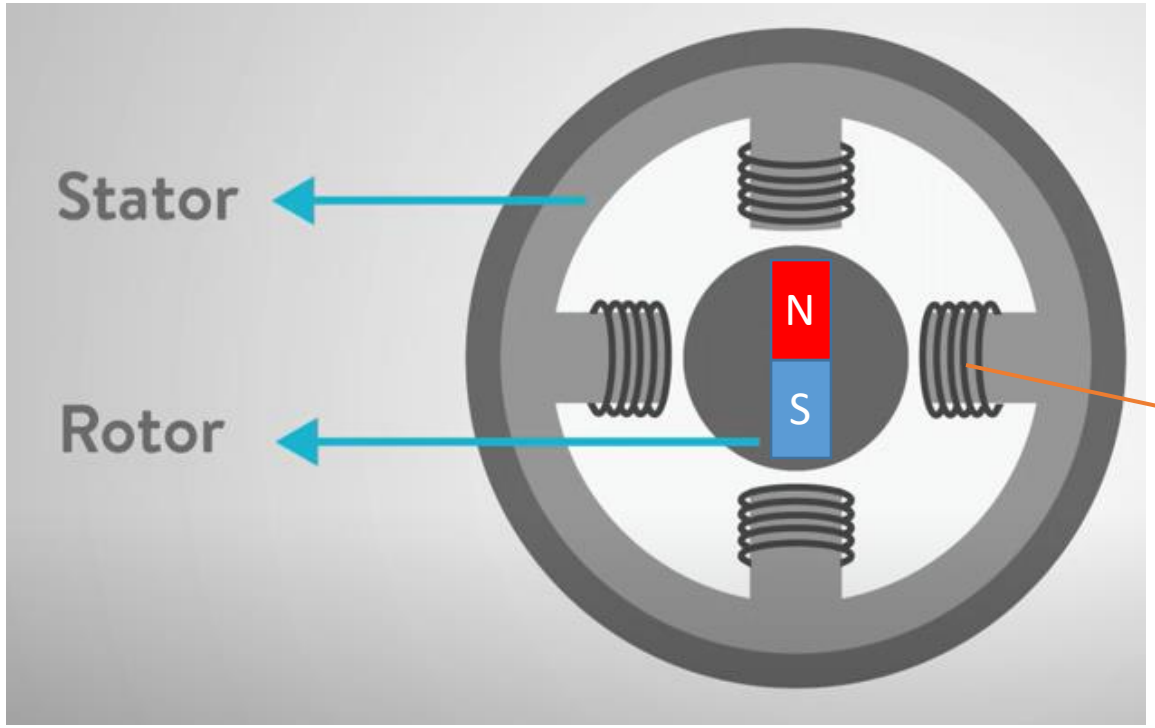
Stepper Motor



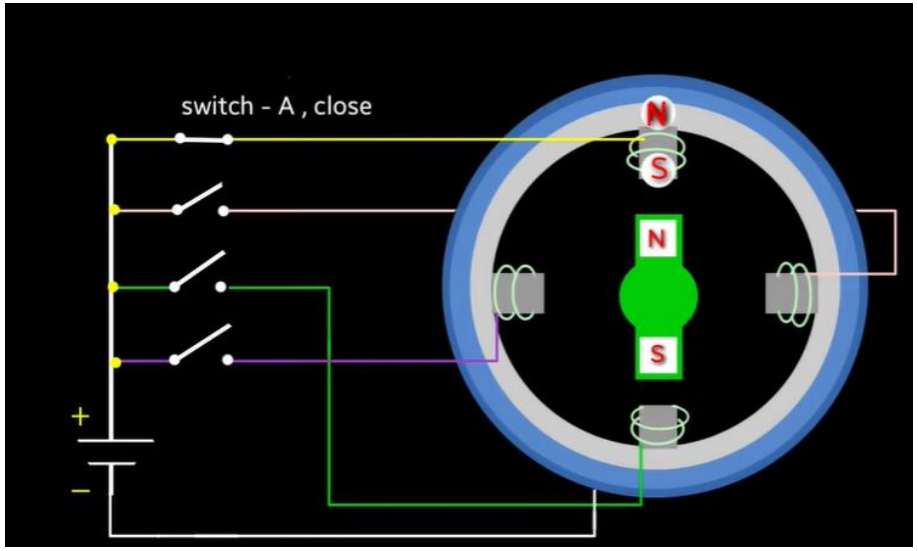
- Stepper motor, is a brushless DC electric motor that divides a full rotation into a number of equal steps.
- The motor's position can be commanded to move and hold at one of these steps without any position sensor
- Stepper motors are the motors that move in discrete steps or convert electrical pulses into rotatory motion.
- They have multiple coils (4coils) that are organized in groups called "phases"(stators named as A,B,C and D).
- By energizing each phase in sequence, the motor will rotate, one step at a time.



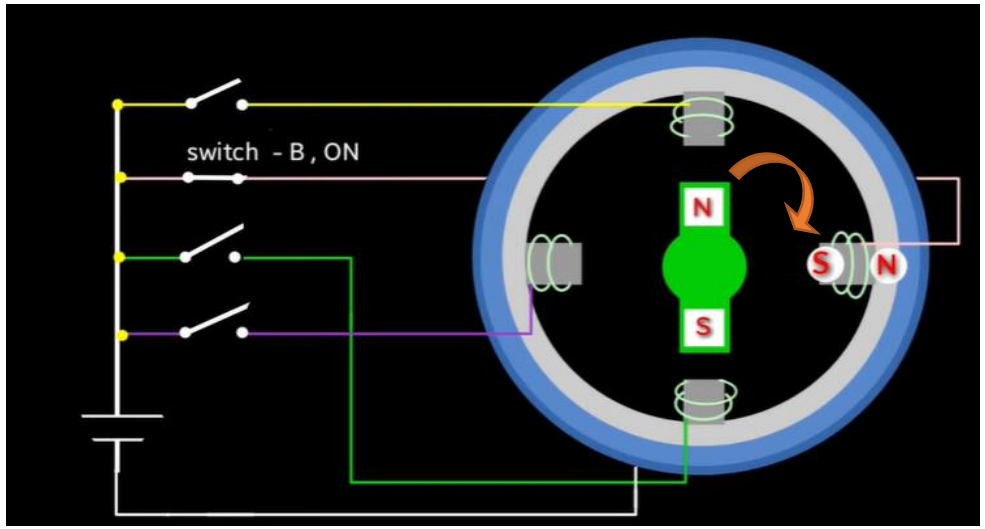
- Stator -> Electromagnet
- Rotor -> Permanent magnet
- Coil -> DC current flows

Working

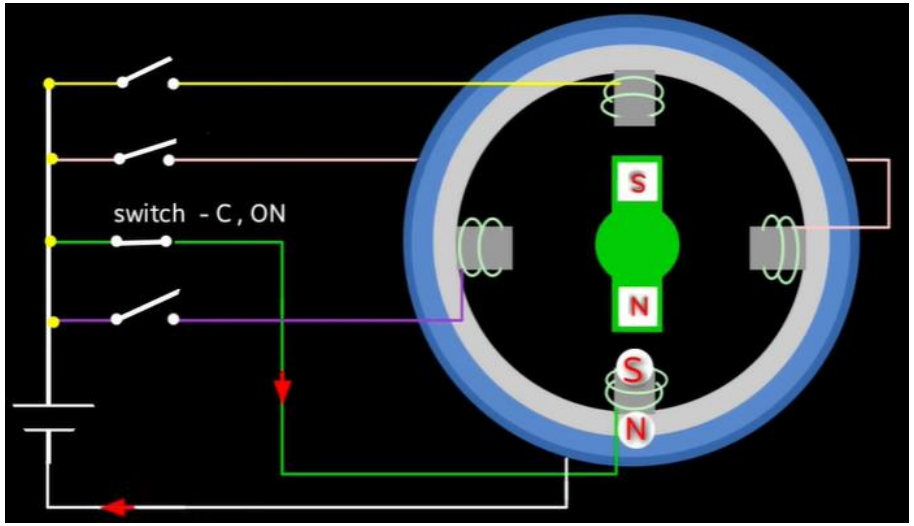
1



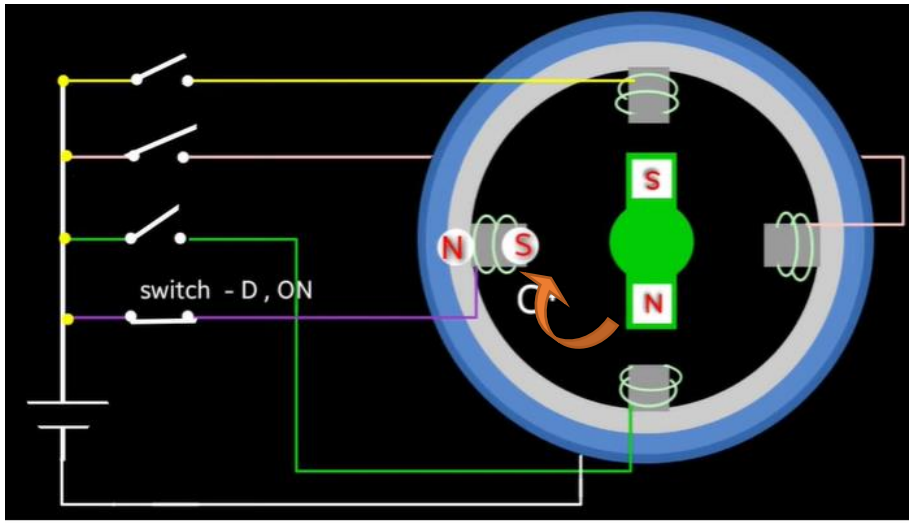
2

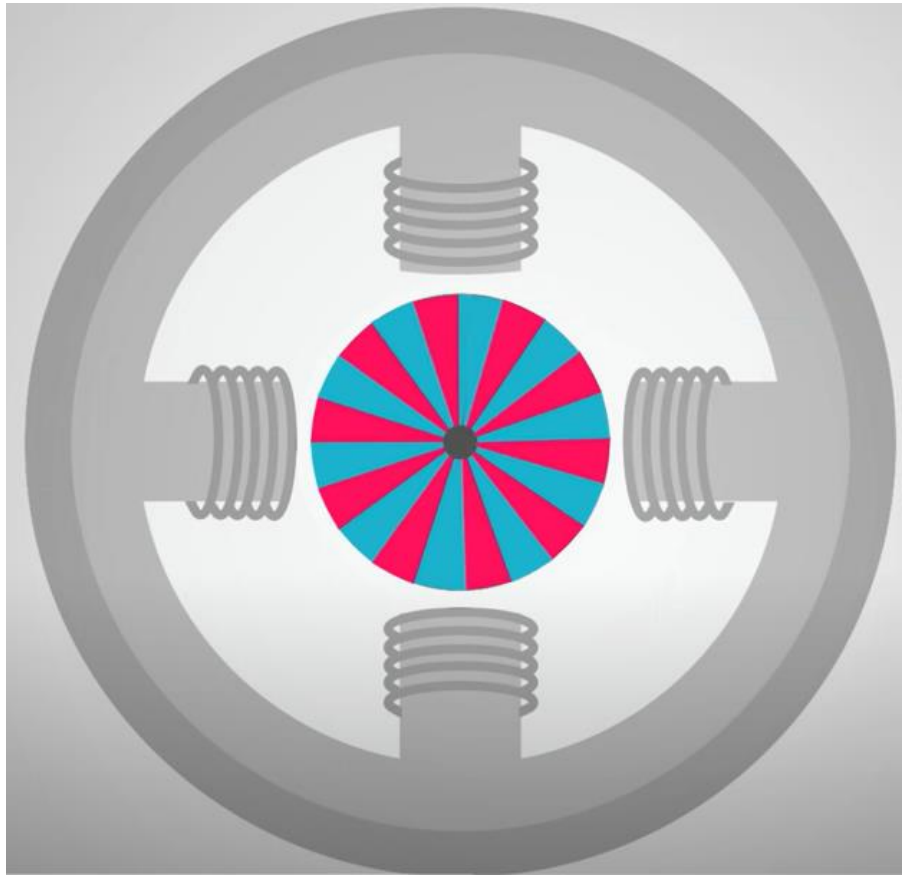


3



4





- Rotation can happen both clockwise and anticlockwise
- If there are only 2 poles, then rotation angle b/w one step to another step (step size) is 90 degree.
- Greater number of poles in rotor facilitate for a lesser degree of rotation or a smaller step size.
- More no. of poles ➔ Smaller angle of rotation

NIFC LINES

For LPC2148/LPC1768

PC0 - P0.8/P0.23 - CN1.9

PC1 - P0.9/P0.24 - CN1.8

PC2 - P0.10/P0.25 - CN1.7

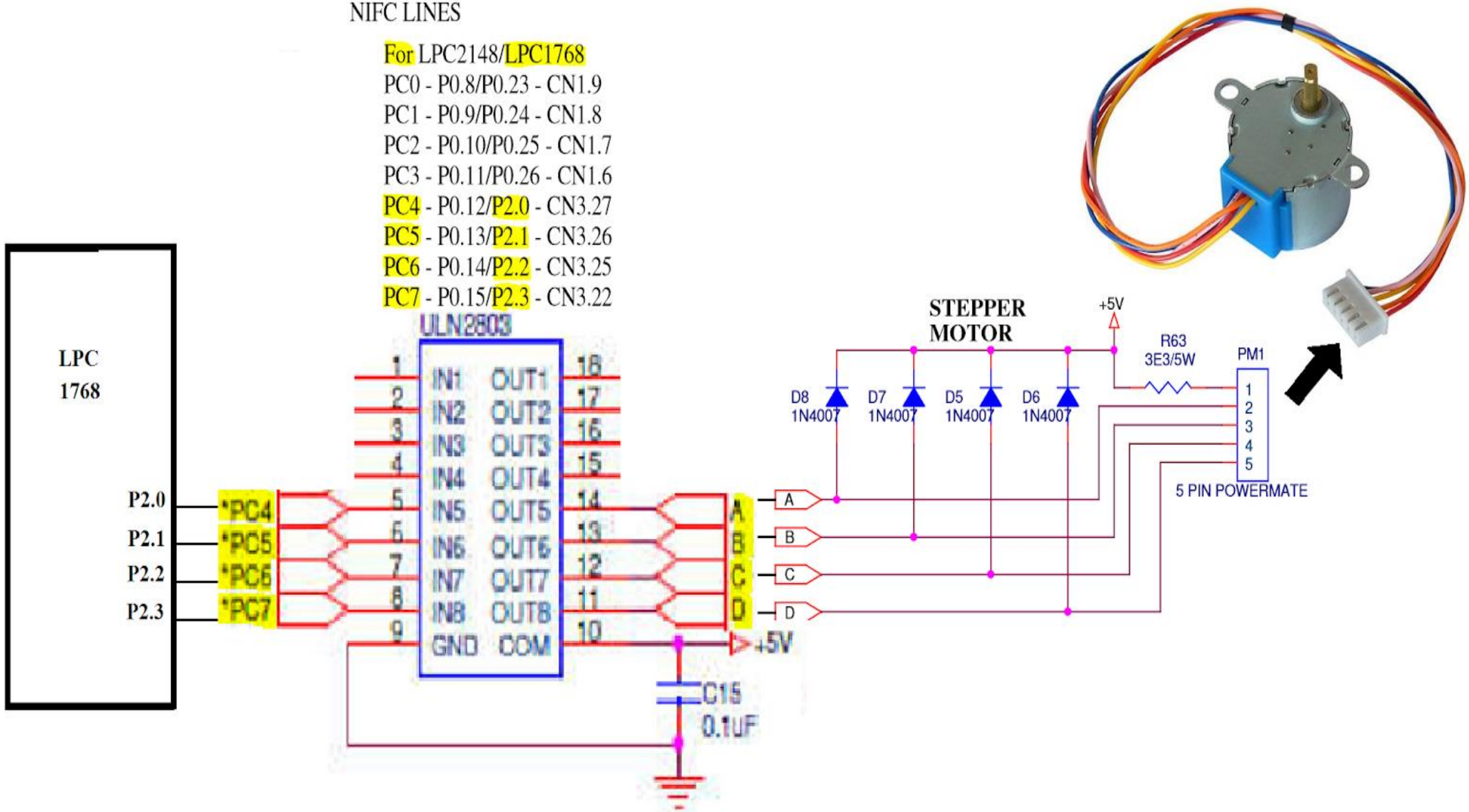
PC3 - P0.11/P0.26 - CN1.6

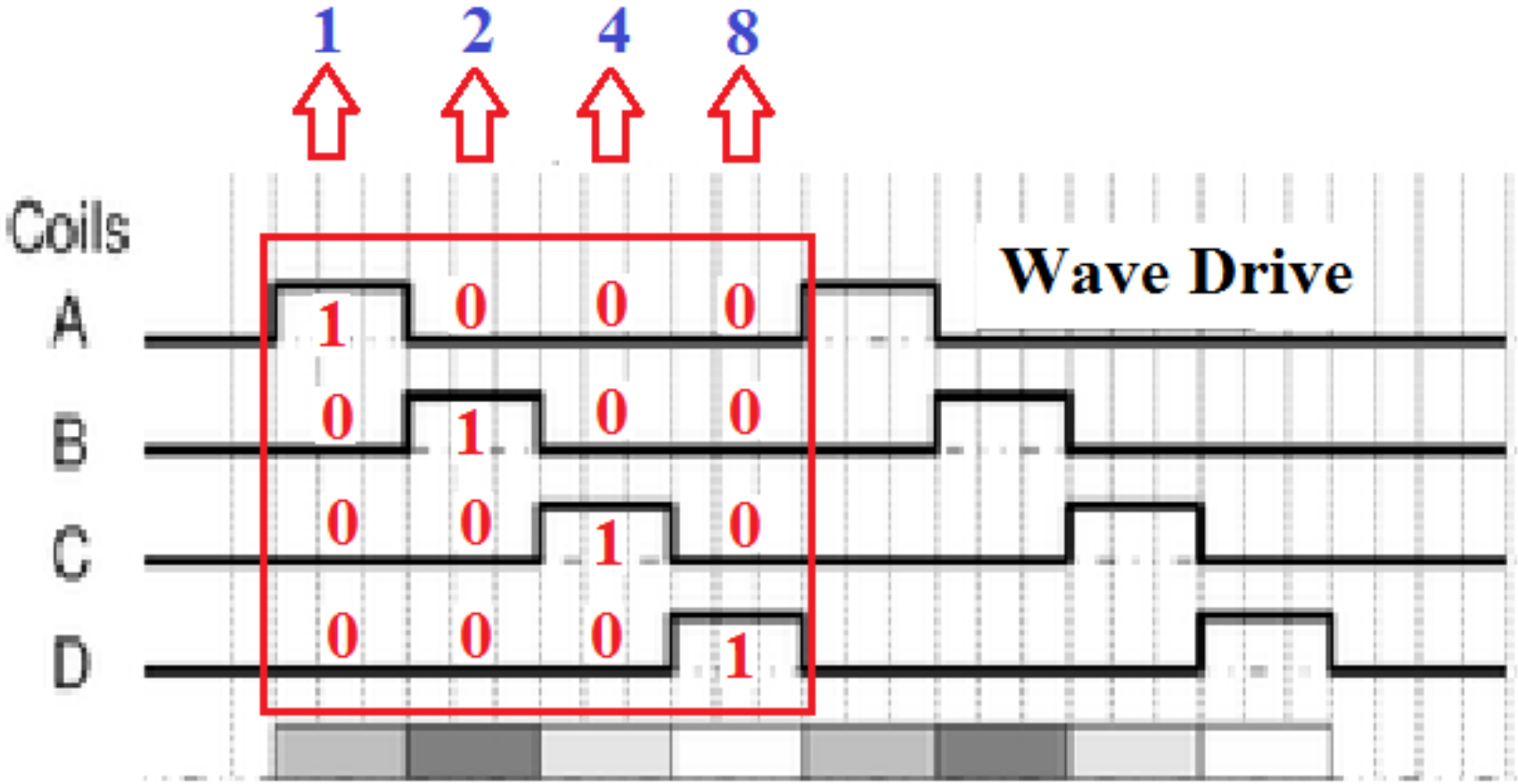
PC4 - P0.12/P2.0 - CN3.27

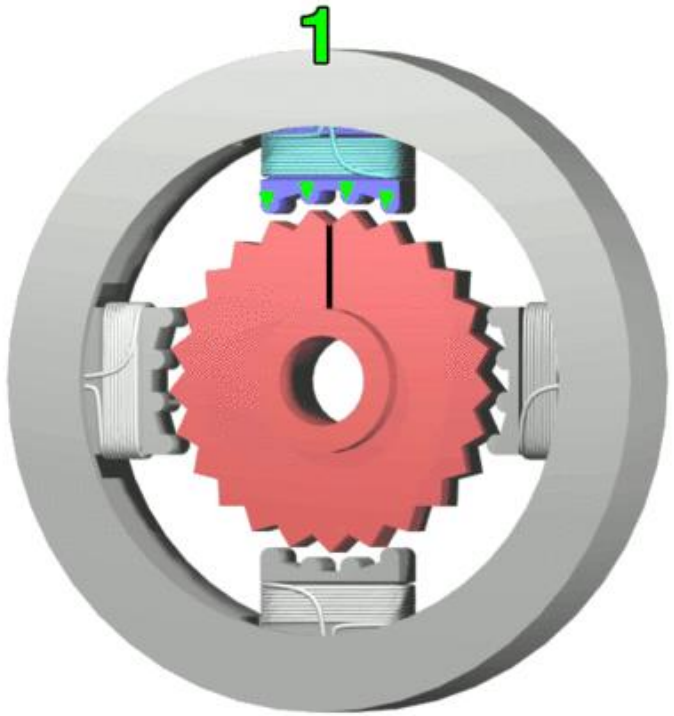
PC5 - P0.13/P2.1 - CN3.26

PC6 - P0.14/P2.2 - CN3.25

PC7 - P0.15/P2.3 - CN3.22







1 step sequence --> 1.8' rotation

4 such step sequence --> 7.2' rotation

Count value for 360' rotation is 360'/7.2'=50

Stepper Motor Interface with LPC1768

```
#include <LPC17xx.H>
void clock_wise(void);
void anti_clock_wise(void);
unsigned long int var1;
unsigned int i=0,j=0,k=0;
int main(void)  {
        LPC_PINCON->PINSEL0 = 0xFFFF00FF; //P0.4 to P0.7 GPIo
        LPC_GPIO0->FIODIR = 0x000000F0; //P0.4 to P0.7 output
         while(1)  {   for(j=0;j<50;j++)
                        clock_wise();
                 for(k=0;k<65000;k++); // Delay to show anti_clock Rotation

                 for(j=0;j<50;j++)
                        anti_clock_wise();
                for(k=0;k<65000;k++); // Delay to show clock Rotation

}}
```

Stepper Motor Interface with LPC1768

```
void clock_wise(void)
{
        var1 = 0x00000008; ;        //For Clockwise
         for(i=0;i<=3;i++)        // for A B C D Stepping
        {
                LPC_GPIO0->FIOPIN = var1;
                var1 = var1<<1;        //For Clockwise
                for(k=0;k<3000;k++); //for step speed variation
         }

}
```

Stepper Motor Interface with LPC1768

```
void anti_clock_wise(void)
{
        var1 = 0x00000100;        //For Anticlockwise
        for(i=0;i<=3;i++)        // for  D C B A Stepping
        {
                var1 = var1>>1;        //For Anticlockwise
                LPC_GPIO0->FIOPIN = var1;
                for(k=0;k<3000;k++); //for step speed variation
        }

}
```