

Stepper Motors



So far we've programmed hobby motors and servo motors with the Arduinos. Today we're going to use a third type of motors, stepper motors.

Motors

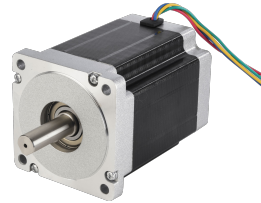
- Devices that convert electrical energy into rotational kinetic energy



**Basic DC
Motors**



**Servo
Motors**



**Stepper
Motors**

So far we've programmed hobby motors and servo motors with the Arduinos. Today we're going to use a third type of motors, stepper motors.

Standard Stepper Motors

- Precise: Can program to rotate to a specific angle or step
- Unlimited rotation in either direction
- High torque at low speeds
- What are some devices that could use stepper motors?

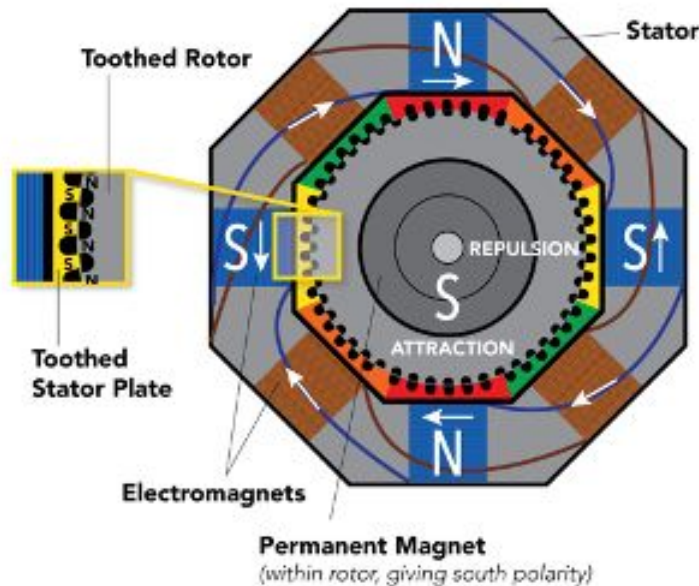


Recap from intro lesson

3d printers, printing presses, analog clocks, feed mechanisms for ATMs and metrocard machines. Note that stepper motors have poor performance at high speeds.

Other disadvantages is that they are often noisy and less energy efficient than servos.

What's Inside a Stepper Motor?



Recap from intro lesson

Stepper motor driver chip controls which of the 4 electromagnets is magnetized at any given moment. In the center is a permanent magnet which has gear teeth that align to one of the 4 electromagnets. As the electromagnets are magnetized, the rotor will spin to align its teeth with the magnet, spinning $\frac{1}{4}$ of one tooth. This allows for extremely accurate rotational angles.

For more, check out this video:

<https://www.youtube.com/watch?v=eyqwLiowZiU>

Work Time!

- Work with your partner to begin the Stepper Motors assignment (posted on Google Classroom)

me after working for 15 minutes



Day 1 Summary

- How can we make the stepper motor spin faster?
- What happens if you change the number of steps?
- What does the negative sign inside of *myStepper.step(-stepsPerRevolution);* do?
- How can we make the stepper motor rotate 90°?

Stepper Motors Day



Work Time!

- Work with your partner to complete the Stepper Motors assignment (posted on Google Classroom)



Summary

- One thing you accomplished
OR
- One bug you overcame
OR
- One idea you have for how to use stepper motors in the future

