

S&I Article

# How to Use Magnets to Build Simple Electric Motors?



An electric motor changes electricity into movement. It uses magnets and electric current to make parts spin and create motion.

## Building an Electric Motor

### Materials You'll Need:

- 1 AA or 9V battery
- A piece of insulated copper wire
- 2 small strong magnets (neodymium magnets work best)
- 2 paperclips or a small metal stand
- Electrical tape
- Sandpaper

### Steps to Build the Motor:

1. **Make a Wire Coil:** Wrap the copper wire into a tight coil about 10 times around a small object (like a marker). Leave a few centimeters of straight wire sticking out on both ends – this is where the current will flow in.
2. **Strip the Wire Ends:** Use sandpaper to carefully remove the insulation from the ends of the wire. You need bare copper to make a good electrical connection.
3. **Set Up the Supports:** Bend the paperclips into a shape that can hold up the coil horizontally. Attach them to a base using electrical tape or place them in a stand. These will hold the coil and also act as the electrical contacts.
4. **Position the Magnets:** Place the magnets on a flat surface directly under the center of the coil. They should be strong enough to affect the coil when it carries current.
5. **Connect the Battery:** Tape the battery nearby. Touch each end of the coil to the battery terminals through the paperclip supports. Make sure the bare wire touches the metal part of the clips.

6. **Watch It Spin!** Once everything is connected, give the coil a small push. It should start spinning! The electricity flowing through the coil creates a magnetic field, which interacts with the magnets below to produce motion.

### What's Happening?

When electric current flows through the wire coil, it generates a magnetic field. This magnetic field pushes against the field of the magnets, causing the coil to spin. As it spins, the direction of the magnetic force keeps changing, which helps the coil keep moving. This is the basic idea behind how all electric motors work!

### What do we learn from this experiment?

- **Energy Conversion:** Shows how electrical energy changes into mechanical energy.
- **Electromagnetism:** Electric current in a coil creates a magnetic field that interacts with magnets to cause motion.
- **Magnetic Forces:** Attraction and repulsion between magnets produce rotation.
- **Scientific Inquiry:** Involves testing ideas and analyzing results.
- **Hands-On Engineering:** Provides experience in building and troubleshooting.
- **Physics Laws:** Applies Fleming's left-hand rule to explain motion direction.
- **Interdisciplinary Connections:** Demonstrates electric motors' role in everyday technology.

### Applications of Electric Motors:

- Home Appliances: Power washing machines, refrigerators, mixers, and hair dryers for easier chores.

- **Transportation:** Drive electric cars, bikes, scooters, buses, and trams as clean alternatives to engines.
- **Industrial Use:** Operate conveyor belts, robotic arms, pumps, and heavy machinery for manufacturing.
- **Medical Equipment:** Enable precise movement in MRI machines, surgical robots, and infusion pumps.
- **Electronics and Gadgets:** Used in smartphones (vibration), drones, toothbrushes, and printers.
- **Energy and Renewables:** Power wind turbines and solar trackers for clean energy.
- **HVAC Systems:** Drive fans and pumps for heating and cooling.

These applications show how electric motors are essential in daily life, industry, healthcare, and clean energy.

### Electric motors for the Innovative minds

Electric motors are very useful in student-level innovations because they make projects hands-on and exciting. For example, motors can power homemade cars, boats, or fans to show how electricity creates movement. Projects like scribble-bots, bristle bots, and simple robots use motors to draw, move, or dance, making science fun and creative.

By changing the number of magnets or batteries, you can test how speed and direction change, encouraging experimentation and problem-solving. Electric motors help turn science ideas into real, working models for learning and innovation.

## Word Search 2601 - Polynomials

P	D	T	E	E	R	G	E	D	T	R	L	A	R
O	T	Q	G	O	C	A	I	D	O	N	X	T	I
X	R	O	N	O	I	T	I	D	D	A	R	N	C
P	I	C	R	A	T	A	A	S	Q	C	A	E	G
O	N	M	R	L	A	O	R	U	U	O	T	N	R
L	O	R	B	E	R	L	E	B	I	E	I	O	O
Y	M	E	I	L	D	A	A	T	N	F	O	P	U
N	I	T	N	B	A	I	B	R	T	F	N	X	P
O	A	C	O	A	U	M	O	A	I	I	A	E	I
M	L	U	M	I	Q	O	X	C	C	C	L	N	N
I	I	B	I	R	I	N	M	T	T	I	G	I	G
A	T	I	A	A	I	O	C	I	X	E	H	U	I
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C	O	N	S	T	A	N	T	N	N	T	X	C	O

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|-------------|------------|
| CONSTANT    | BINOMIAL   |
| MONOMIAL    | RATIONAL   |
| SUBTRACTION | POLYNOMIAL |
| TERM        | EXPONENT   |
| QUADRATIC   | VARIABLE   |
| COEFFICIENT | HEXIC      |
| TRINOMIAL   | AREA-BOX   |
| ADDITION    | DEGREE     |
| QUINTIC     | CUBIC      |
| GROUPING    |            |

*(Answers on Back Cover Inside)*