

Motor Construction

Please see the How to Build Electric Motor videos in the Unit 2 Folder. Video is linked to each step below.

Base

The base is made of an approximately 1 foot piece of 2X4 and 2 smaller blocks of wood with the dimensions $\frac{3}{4}$ " X $\frac{3}{4}$ " X $3\frac{1}{2}$ ". The 2 smaller blocks of wood are attached to each end of the 2X4 and are used to elevate the knitting needle above the 2X4 block so that the coil does not hit the base as it is rotating. You will need 4 small nails (approximately $1\frac{1}{2}$ " long to attach the small blocks to the 2X4 block. Drill pilot holes so the wood does not split when you hammer the nails.

In the center of each of the small blocks screw in an eye hook. This is what the knitting needle will rotate on. Again, drill a pilot hole to make it easier to screw in the eye hook.

Coil/Knitting Needle

The coil is made out of magnet wire. I let the students decide how much wire they want to use, but I have an upper limit of 30'. I use a 2" diameter glass beaker to loop the wire around to make a symmetrical coil. The coil is also called the armature. Slide the wire off of the beaker and secure the coil with 2 little pieces of electrical tape. Leave approximately 4" of wire at each end to use as the commutator switch.

Mount the coil on a knitting needle. which becomes the motor shaft. I try to make sure that is the same amount of loops on each side of the knitting needle to distribute the weight evenly. This will help the motor run smoothly. Secure the coil to the needle with a small amount of electrical tape.

Run the 4" of wire from the ends of the coil along the sides of the knitting needle. Cut off any excess wire. Strip about an inch of each end of the coil. Insulate the stripped wire from the knitting needle using electrical tape. Tape each end of the stripped portion of wire to the knitting needle making sure the two ends do not touch. This stripped area is called the commutator switch. It changes the direction of the current flow every 180 degree of rotation.

Mount the knitting needle in the eye hooks. The knitting needle shaft should spin smoothly.

Stationary Magnets

The stationary magnets will be mounted on each side of the coil. I use 2 craft sticks on each side of the motor, stapling them to the 2X4 block using a staple gun. Make sure to line the magnets up with the coil of wire and have a North end of the magnet face the South end of the other magnet. (They should attract to each other.)

Test Motor

Use a 6V power supply to test the motor. Use a wire coming from the positive and negative terminals of the power supply. Strip both ends of these wires. Brush the ends of the wires up against the commutator switch on the motor to complete the circuit so that current flows through the coil. Do not press too hard against the wire that it prevents the coil from rotating.