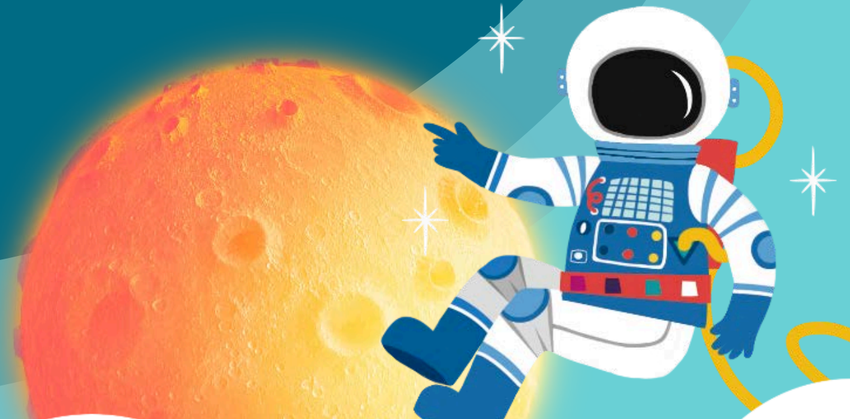
Hand-Crank Generator

Experiment Objectives

1. Learn how to assemble a generator science experiment.
2. Understand what a generator is.
3. Inspire children's interest in science through hands-on experiments and cultivate scientific thinking.



Introduction

Question Time

Students, do you know what kind of generator is used when the power goes out in restaurants or shopping malls?

Generator

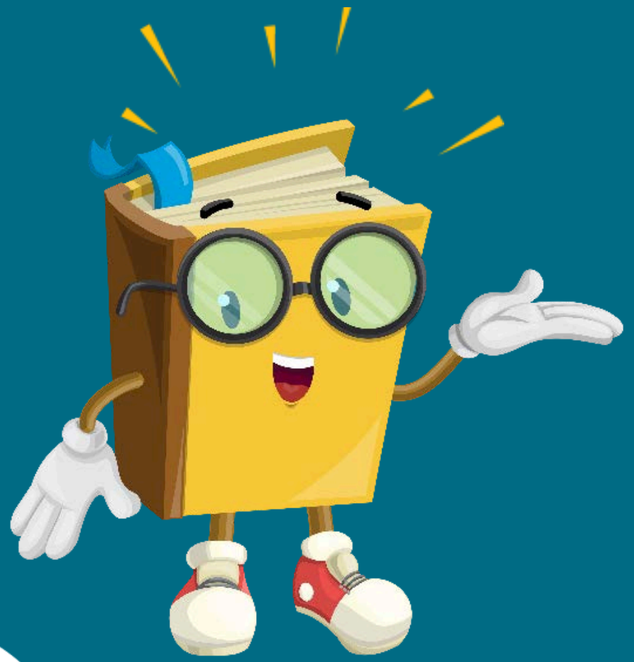
A generator is a mechanical device that converts other forms of energy into electrical energy. It is driven by turbines, steam engines, diesel engines, or other power machines, which convert energy from water flow, air flow, fuel combustion, or nuclear fission into mechanical energy. The generator then converts this mechanical energy into electrical energy.

Generators are widely used in industrial and agricultural production, national defense, science and technology, and daily life.

Although there are many types of generators, their working principles are all based on the laws of electromagnetic induction and electromagnetic force. Generally, they are constructed using suitable magnetic and conductive materials to form magnetic and electrical circuits that interact through electromagnetic induction, thereby achieving energy conversion.

Generator

Hand-Crank Generator



Let's make an interesting experiment today

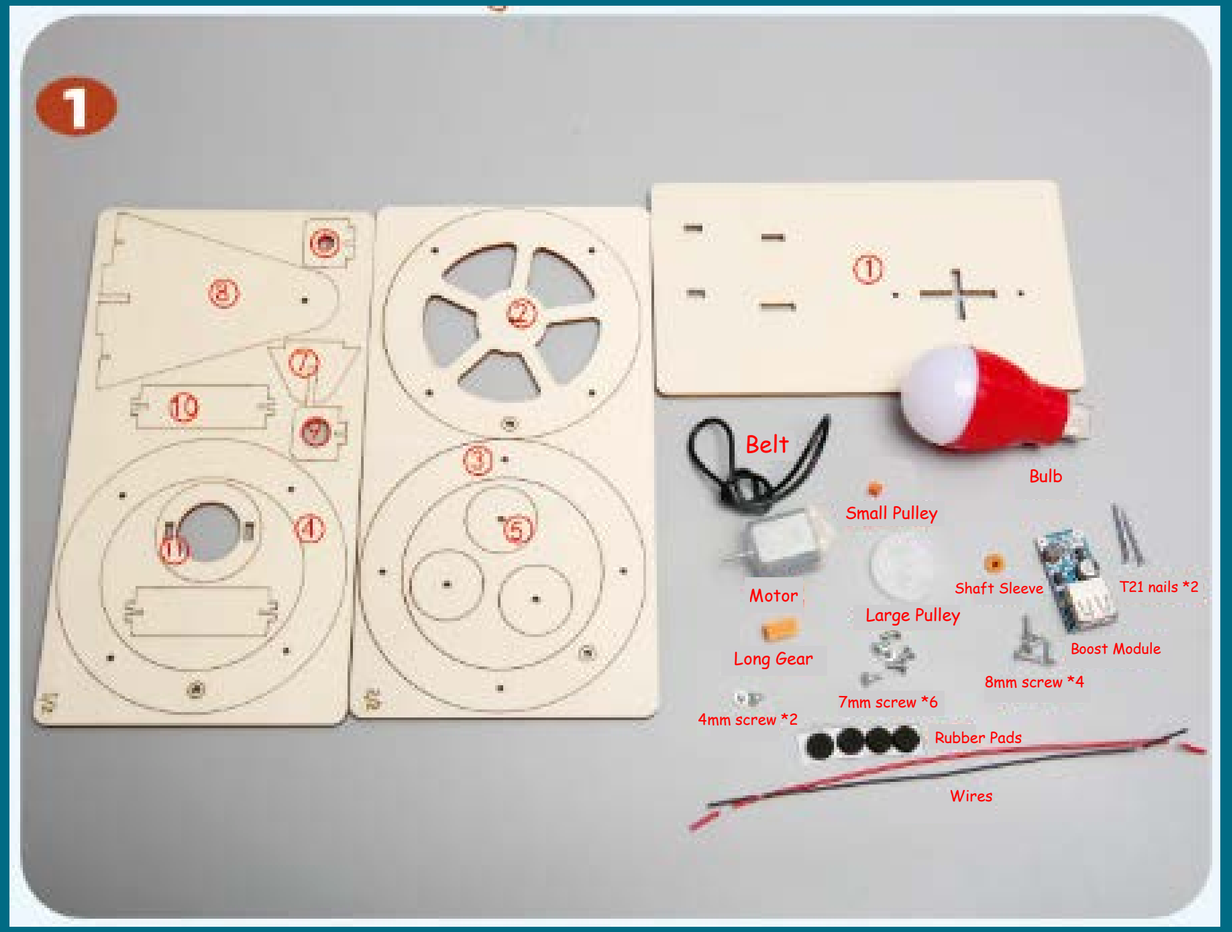
Hand-Crank Generator!

Experiment Steps

Let's begin!

01

Experiment Materials

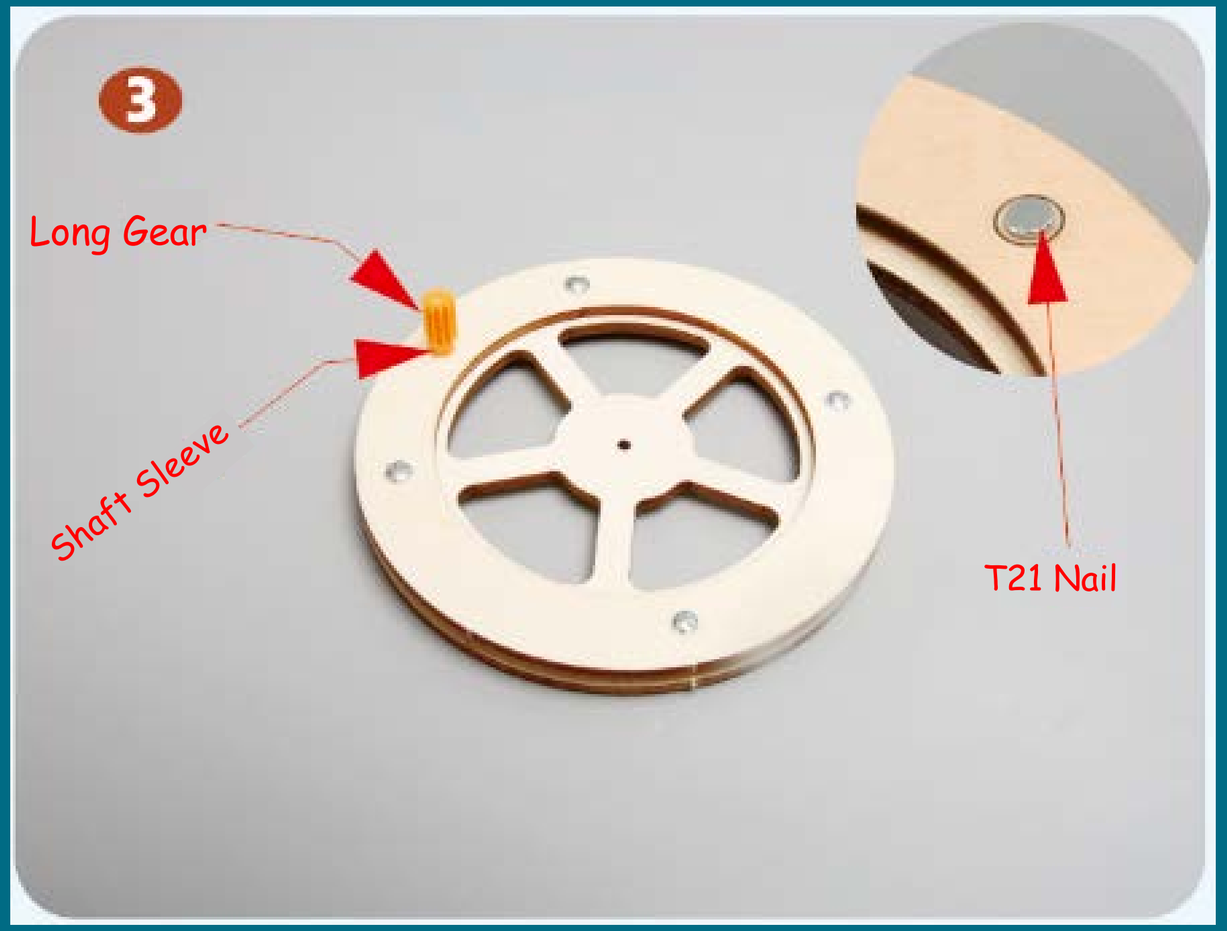


02

Use 8mm screws to fix boards No. 2, 3, and 4 together.
(Note: Board No. 2 should be in the middle.)

03

Install the T21 nail together with long gear & shaft sleeve as shown.



04

Use a T21 Nail to fix board No. 5 in the center of the assembly from Step 3.

05

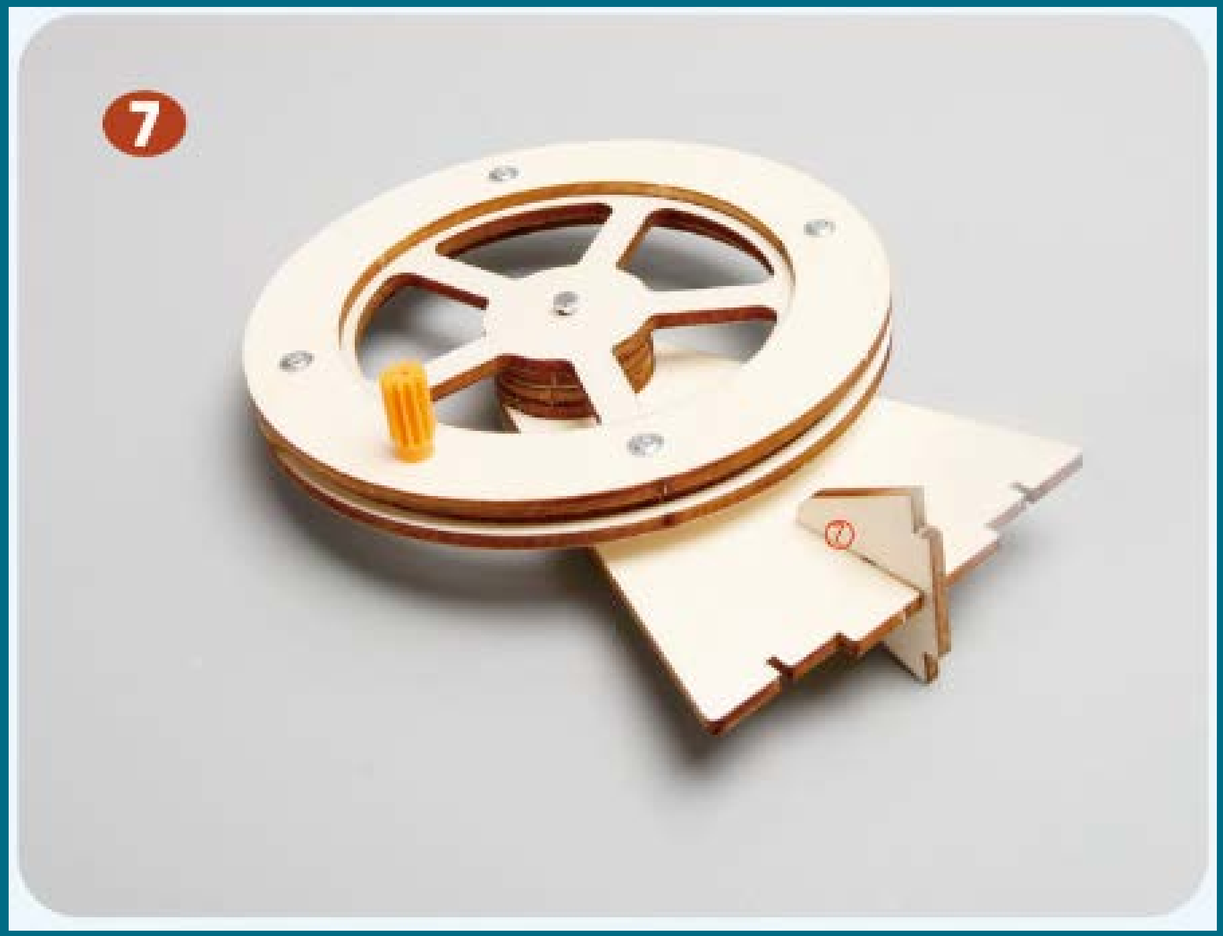
Install board No. 6 as shown.

06

Install the large pulley as shown.

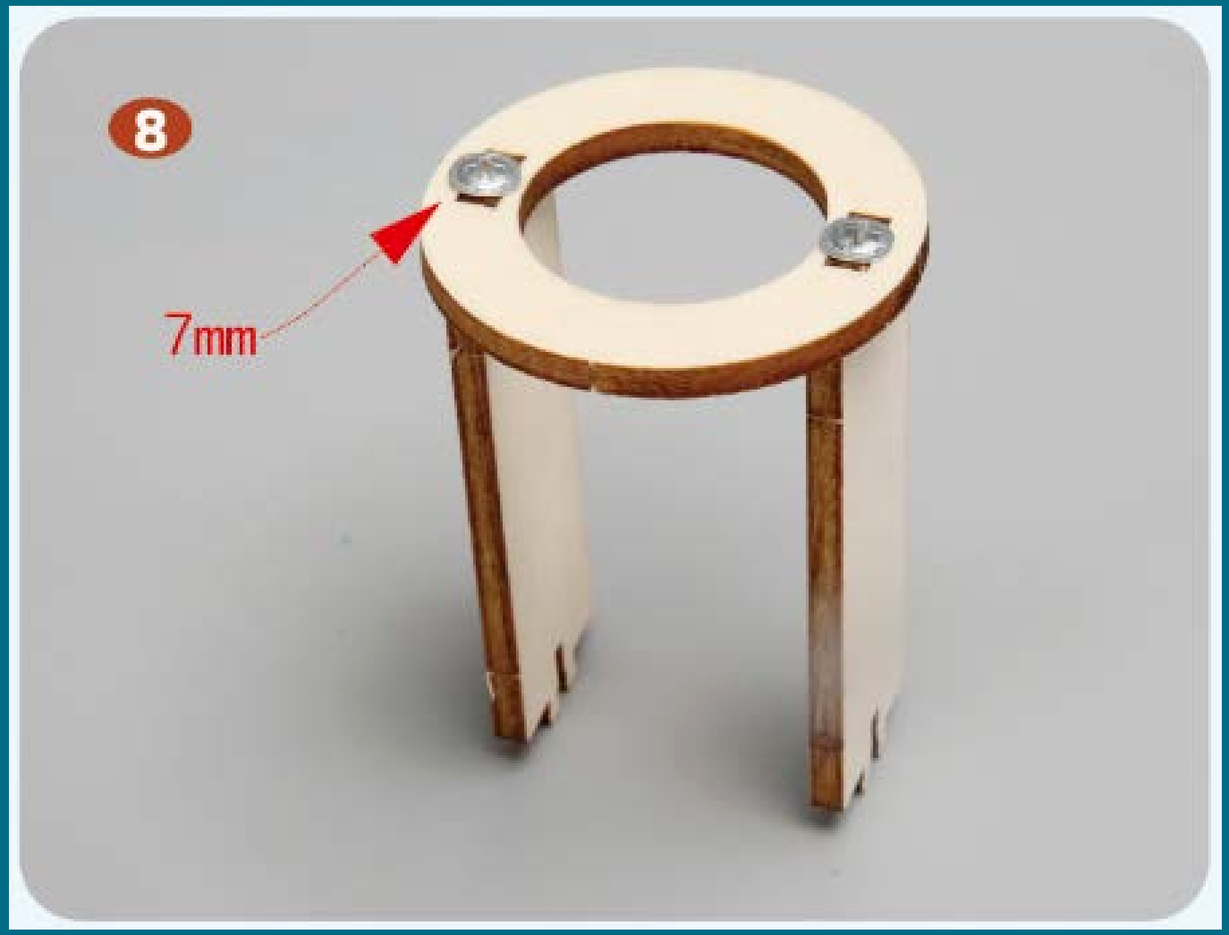
07

Install board No. 7 as shown.



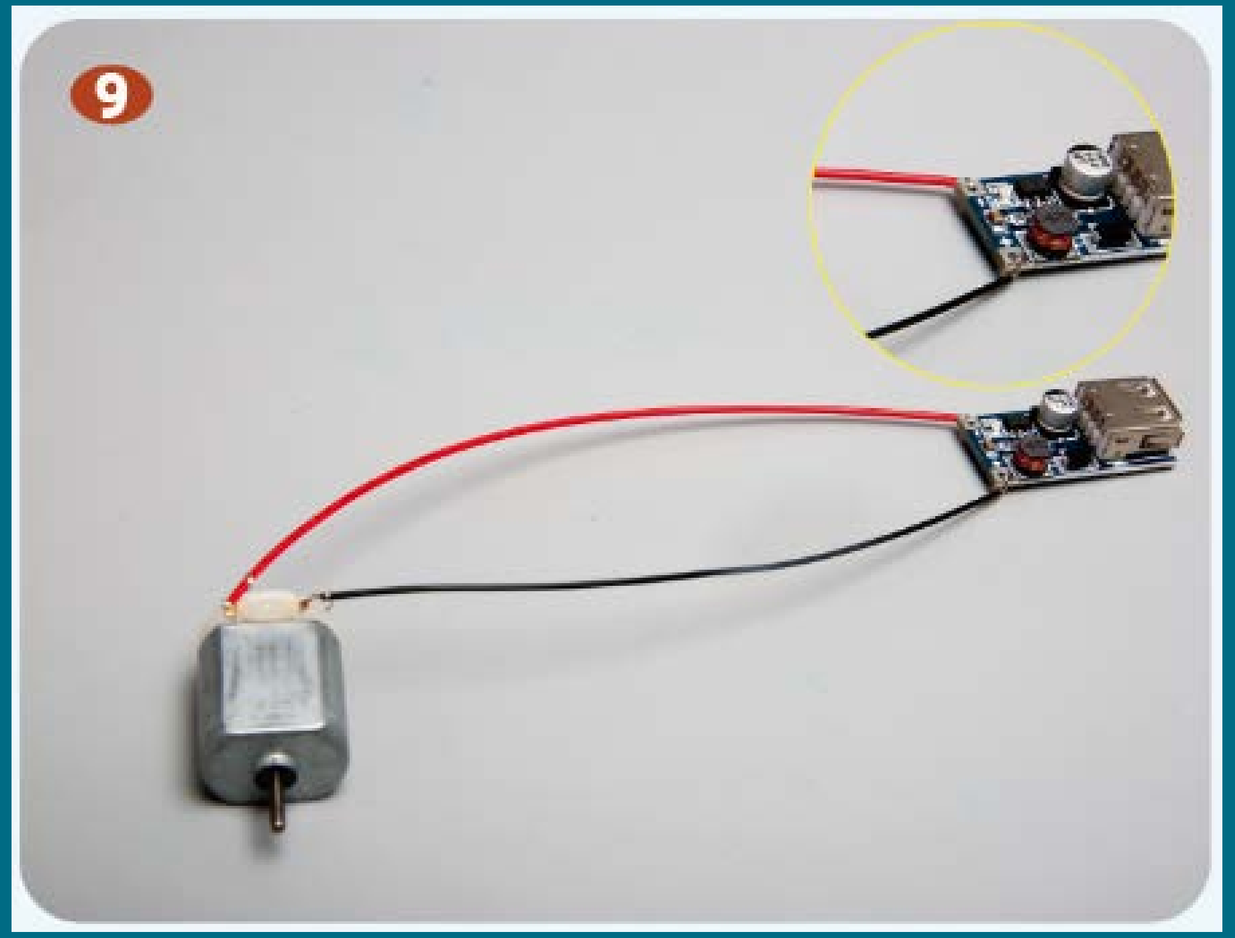
08

Install boards No. 10 and No. 11 as shown, and fix them with 7mm screws.



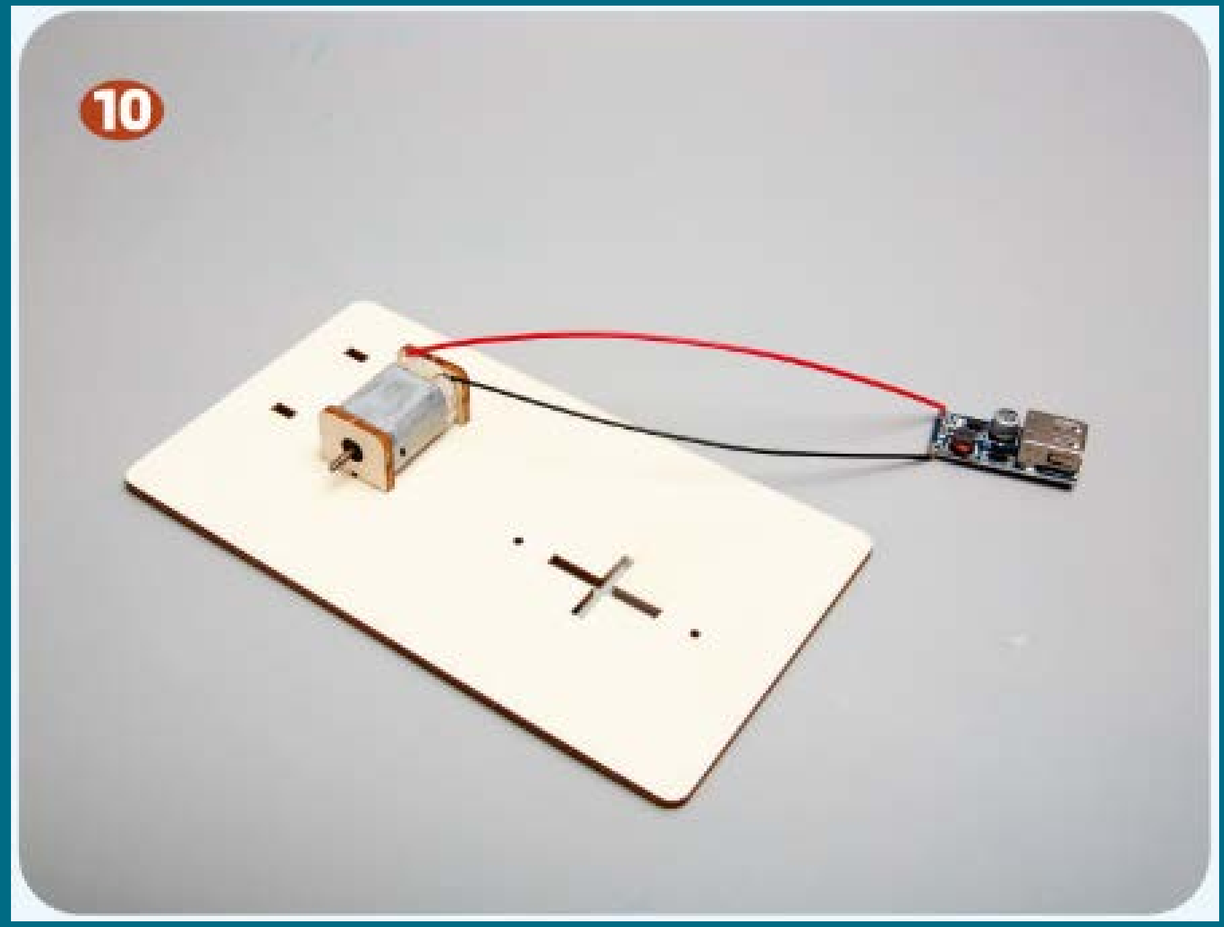
09

Connect the motor and the voltage boost module with wires as shown.



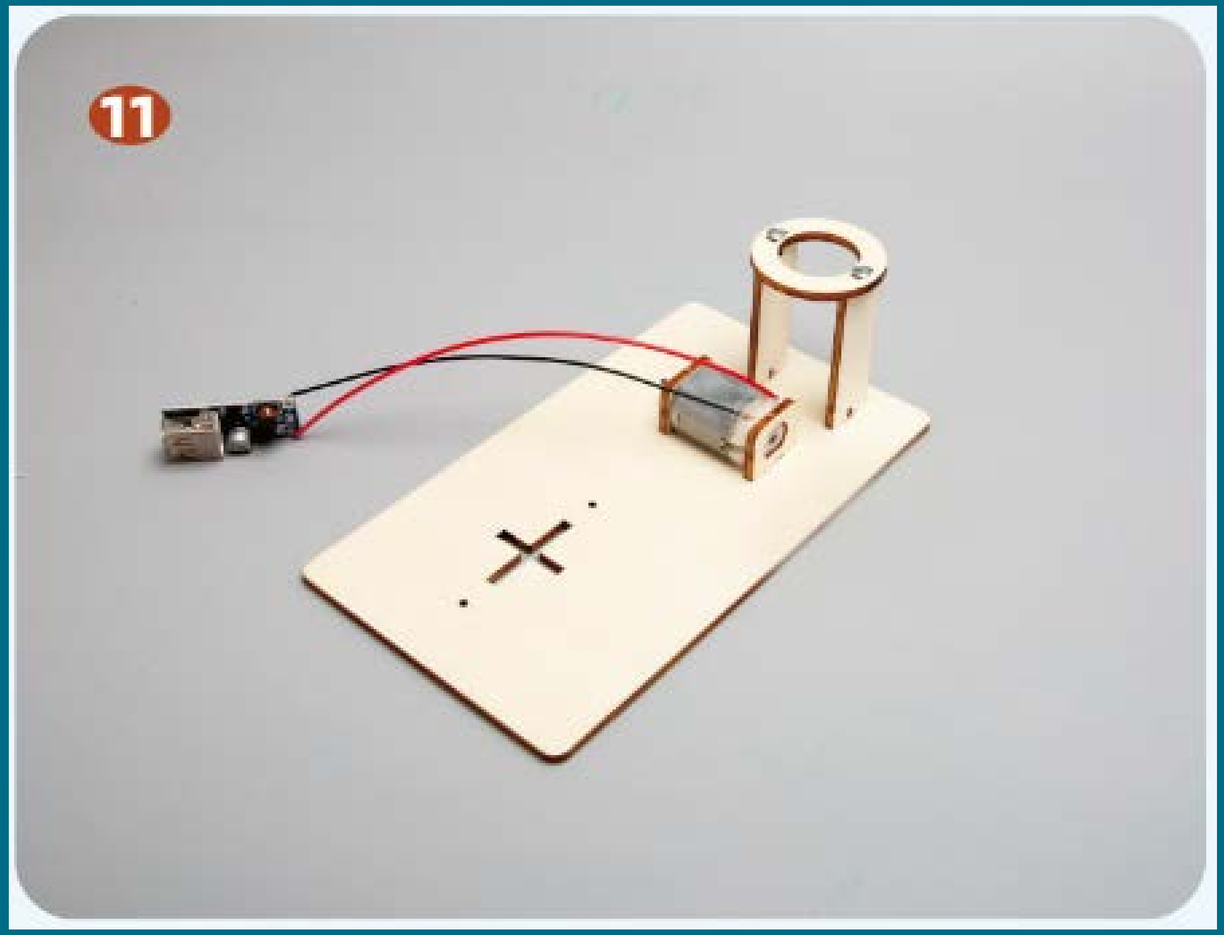
10

Fix the motor onto board No. 1 using 4mm screws.



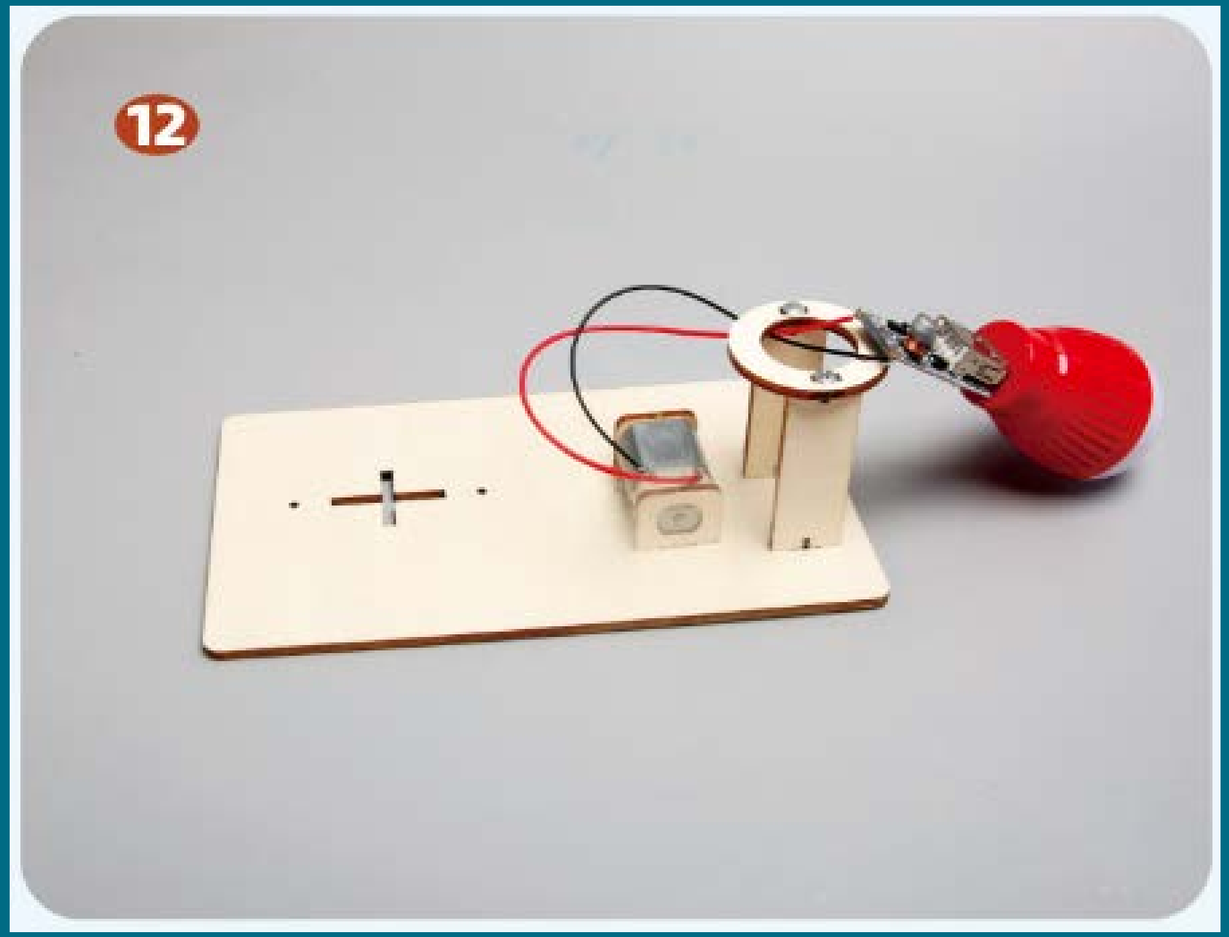
11

Fix the assembly from Step 8 onto board No. 1 using 7mm screws.



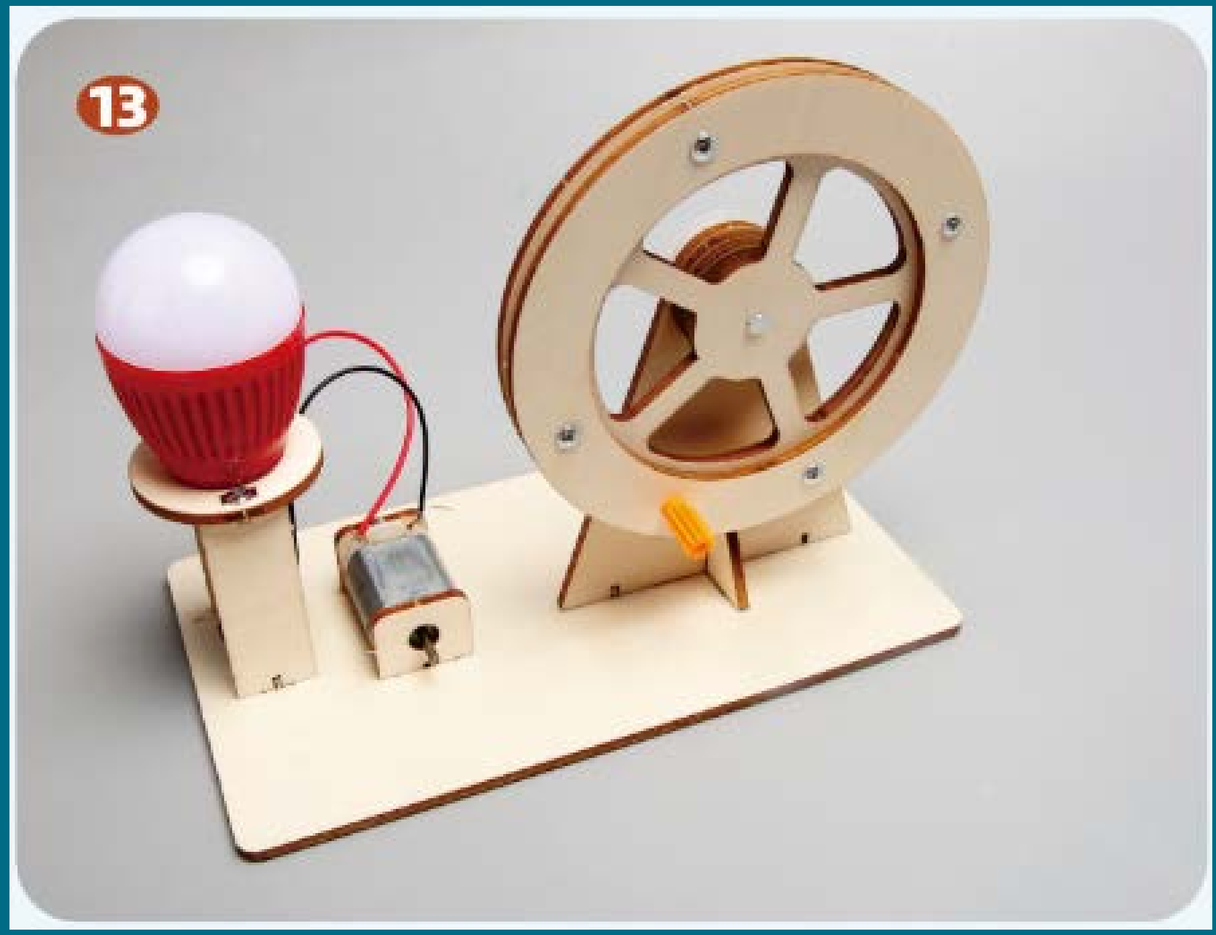
12

Install the light bulb as shown.



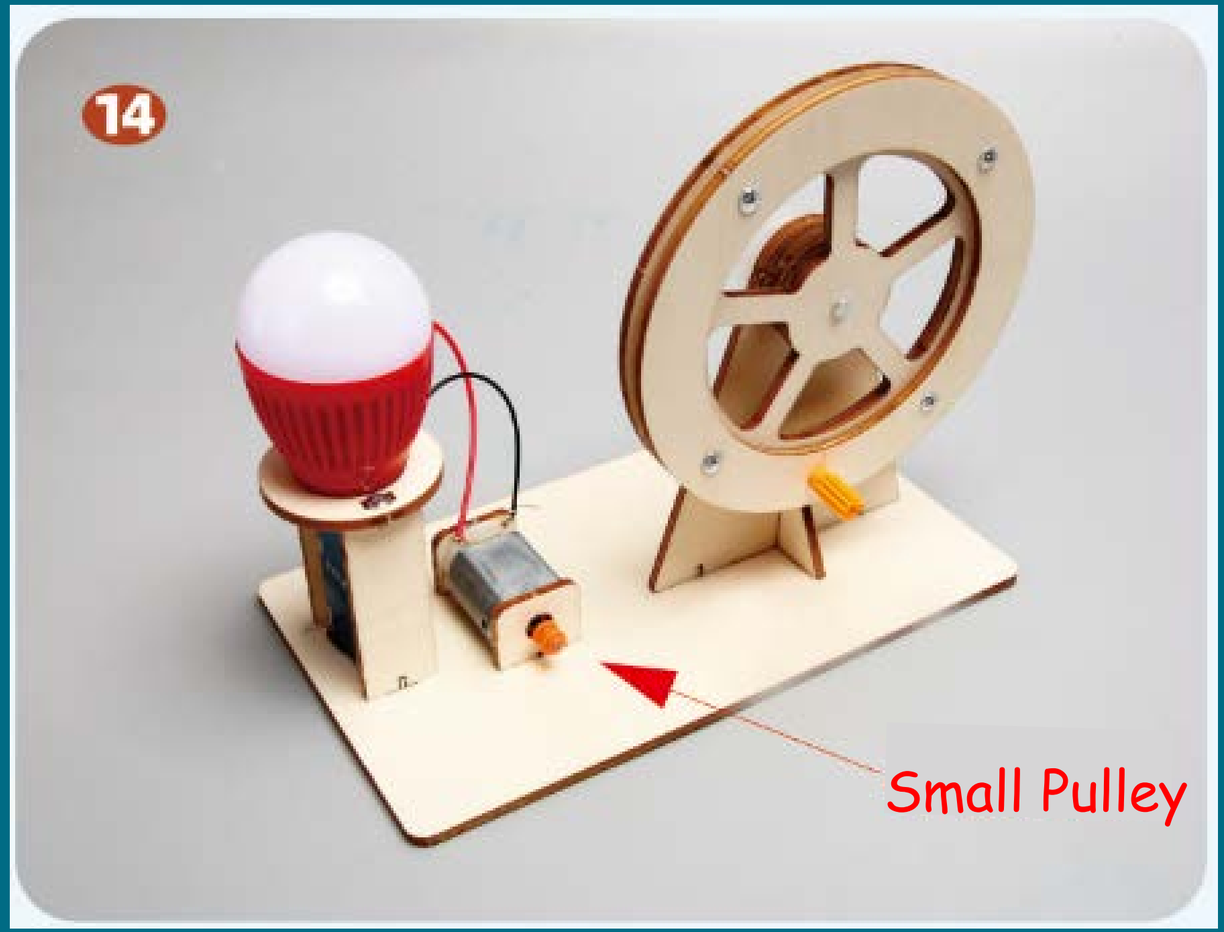
13

Fix the assembly from Step 7 onto board No. 1 using 7mm screws.



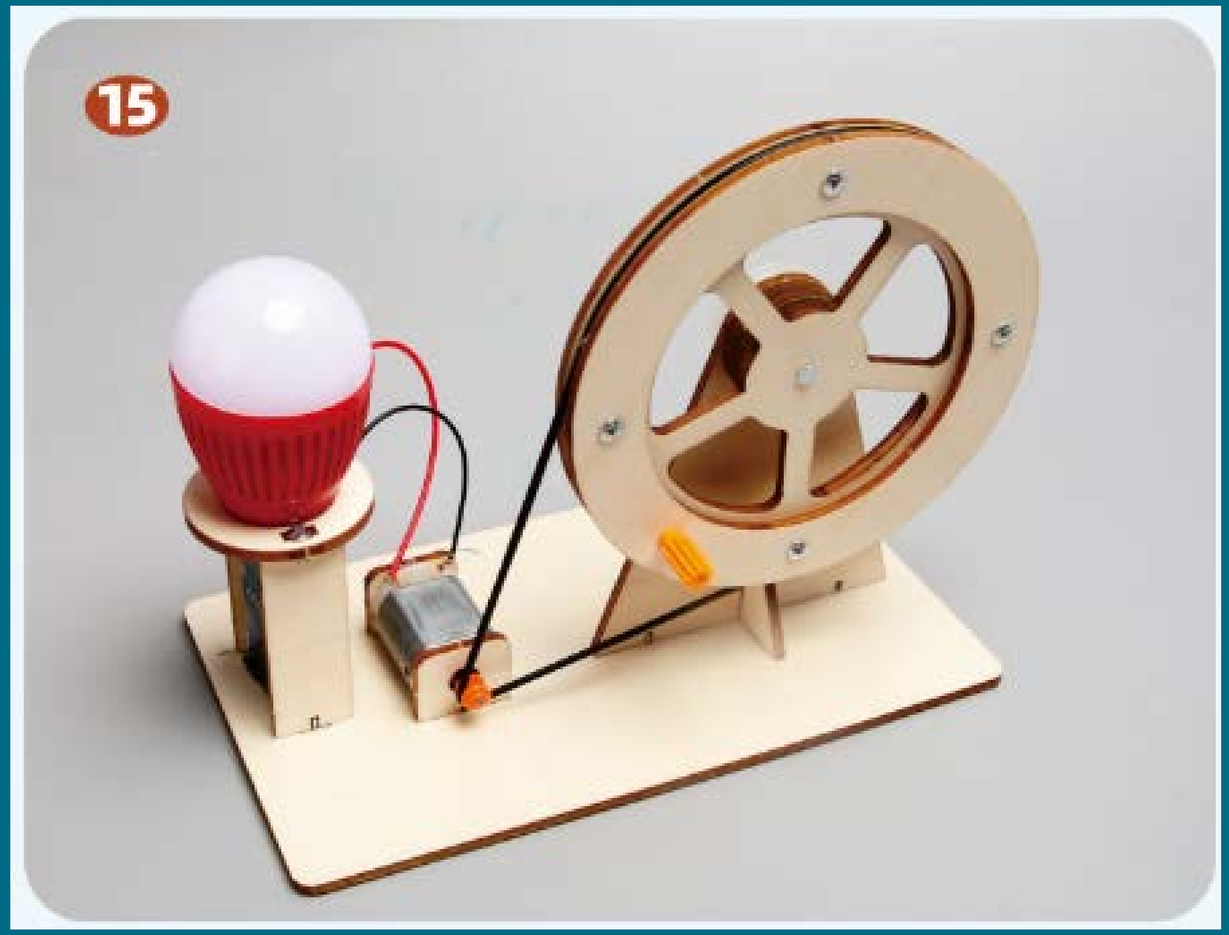
14

Install the small pulley on motor as shown.



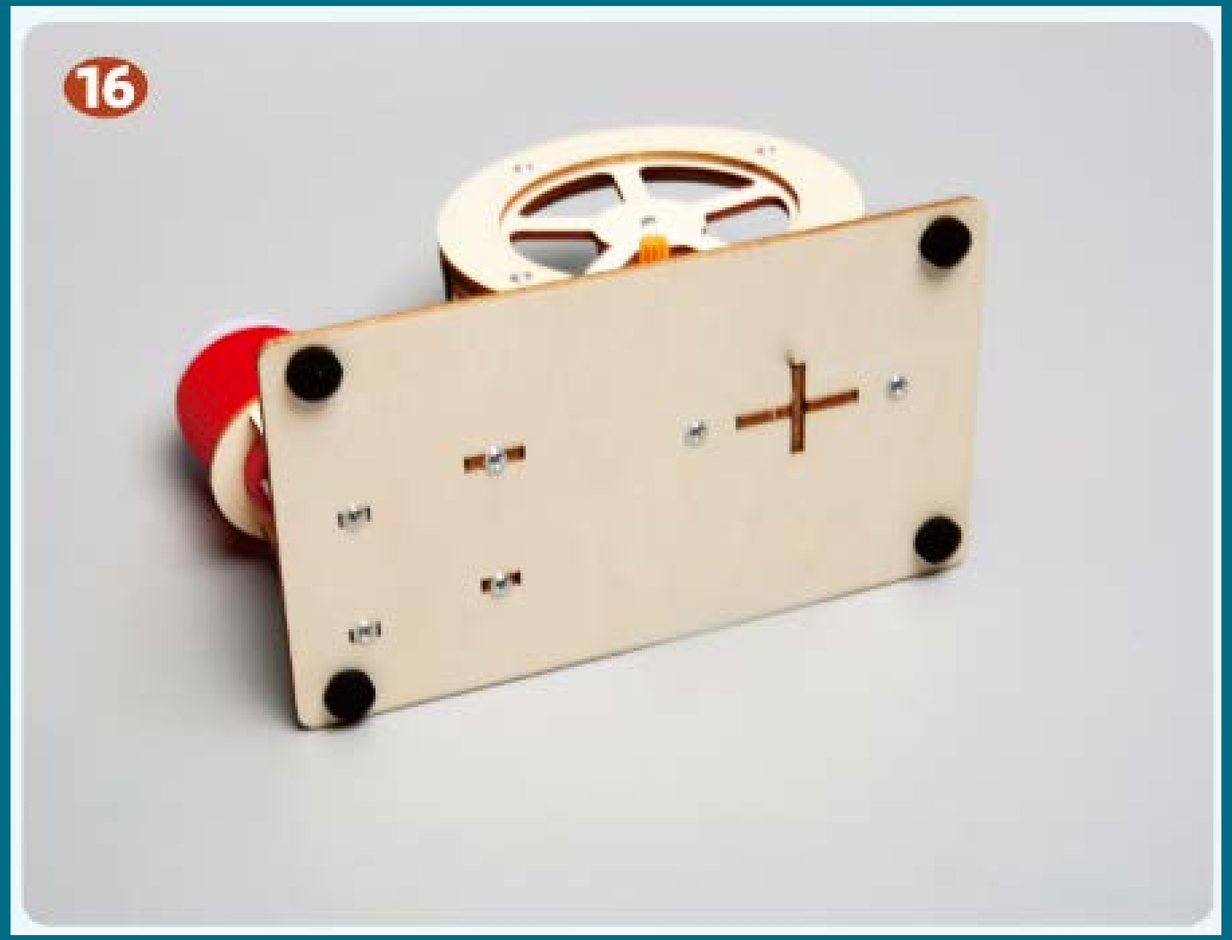
15

Install the rubber belt as shown.



16

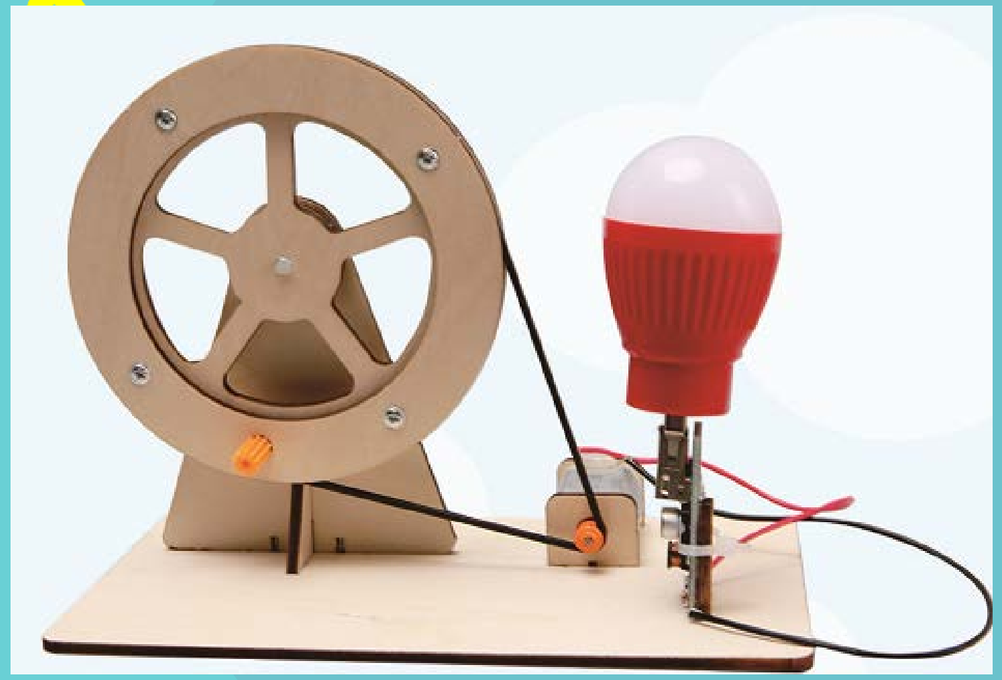
Install the foot pads as shown.
(Assembly complete!)



Experiment Summary

Thinking is important!

Experiment Principle



The principle of the hand-crank generator is electromagnetic induction.
When a coil rotates within a magnetic field, an induced electromotive force is generated.
In a typical hand-crank generator, the main components are the stator and the rotor.
The stator is usually a permanent magnet, and the rotor is a coil.
When the coil is driven by an external force to rotate within the magnetic field, it cuts through magnetic lines of force, generating an induced electromotive force.
If the internal coil is connected to an external circuit through brushes, a closed circuit is formed, and current flows — thus producing electricity.