

## Activity Guide

# Solar Fan

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Topic: Maker

Level: Intermediate

Duration: 120 mins

Age Range: 12+



## ACTIVITY DESCRIPTION

Photovoltaic Power Generation Solar energy, wind energy and water energy are currently the cleanest energy sources in the world, and they will not cause pollution to the environment. Wind energy and water energy can only be fixed in specific places to achieve energy conversion, and solar energy can achieve energy conversion as long as there is sunlight, there is no place limit, so it is very convenient to use Photovoltaic power generation is based on the principle of photovoltaic effect, using solar cells to directly convert solar energy into electrical energy. The photoelectric conversion material of the solar panel is mainly crystalline silicon, which generates current after encountering light.

## LEARNING OUTCOMES

Young People Will:

- Research the flow of electricity and report findings back to the group
- Create test circuits and learn how to adopt a tinkering mindset
- Create prototype plans and discuss with group for feedback
- Learn how to customise the visual design of the machine

## COMPETENCIES

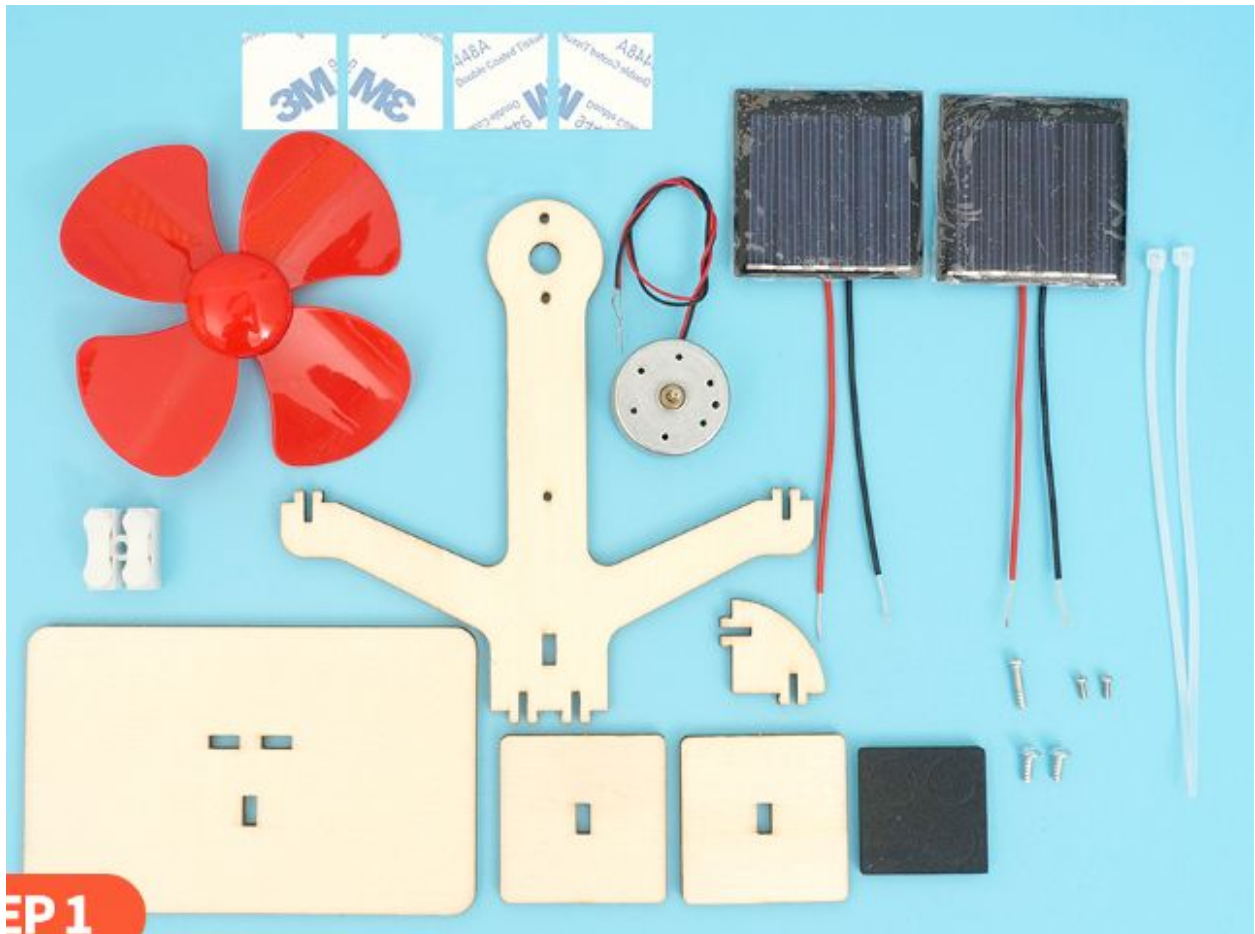
Young People Will Develop 21st Century Skills:

- Collaboration
- Communication
- Creativity and innovation
- Critical thinking and problem solving

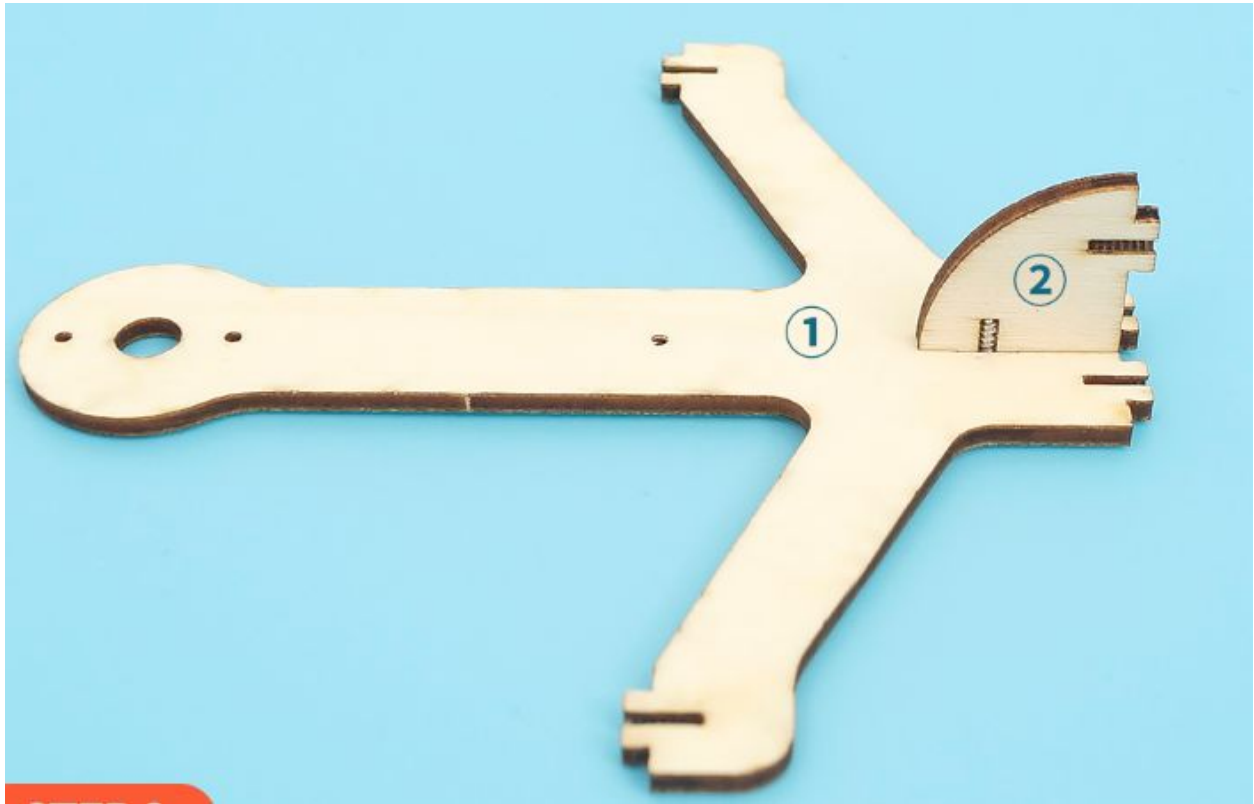
# Step-by-Step Instructions

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**Step 1:** Prepare all the assembly materials.

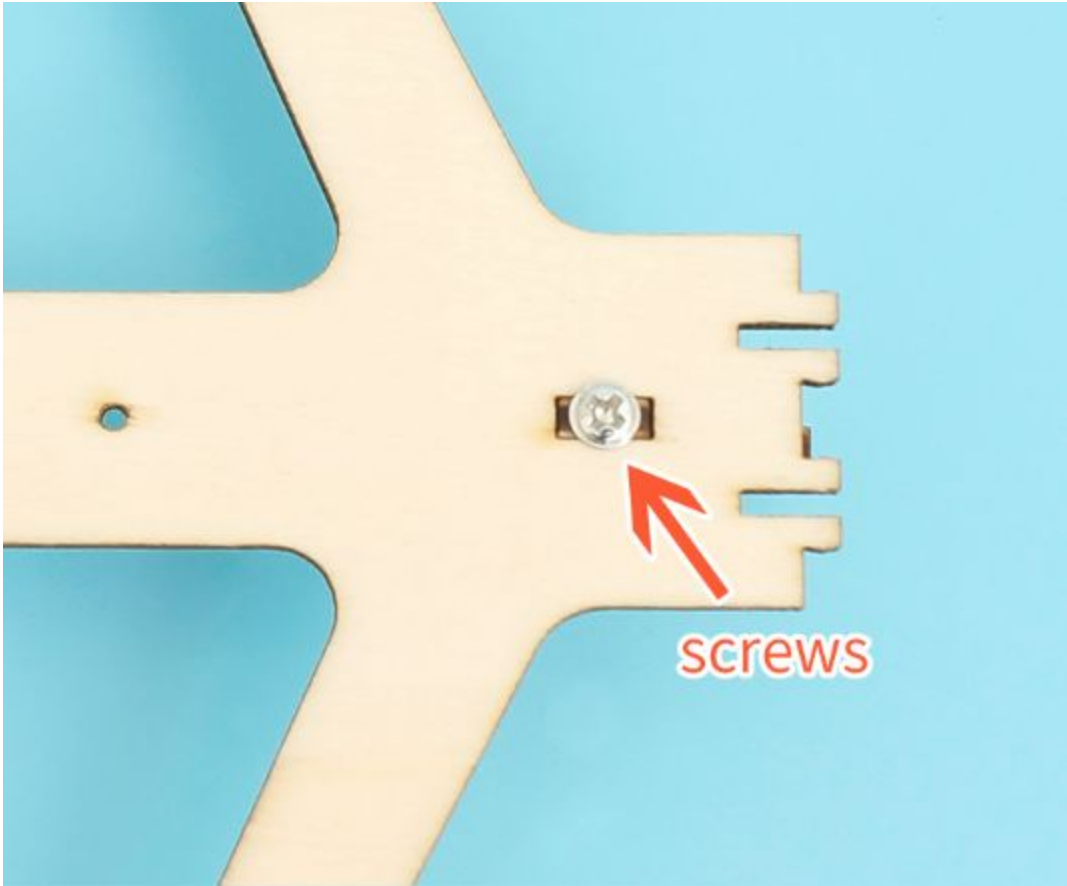


Step 2: Locate the motor No.



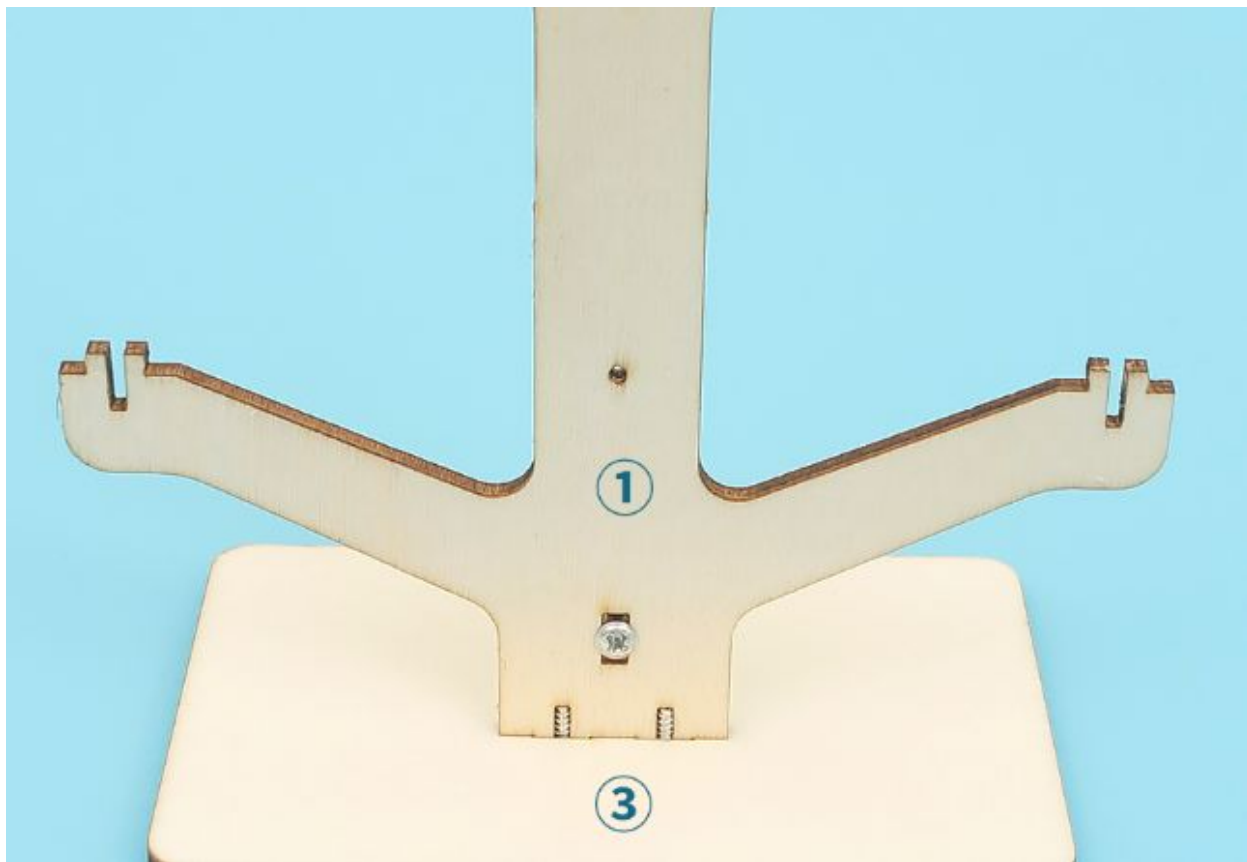
Install the No. ② wood on the No. ① wood, and then fix the No.2 book from the other side of the No. G) wood with 7mm long screws

### Step 3: Motor Connection



Fix the No. ⑧ wood with a 7mm long screw.

## Step 4:



Install the No. G bracket on the No. ⑥ base plate, and then fix the No. ⑥ bracket from the bottom of the base plate with a 7mm long screw

## Step 5: Battery Box Connection



Fix the bracket Q) from the bottom of the base plate with a O

Install the No. @ wood on the No. G) bracket with 7mm

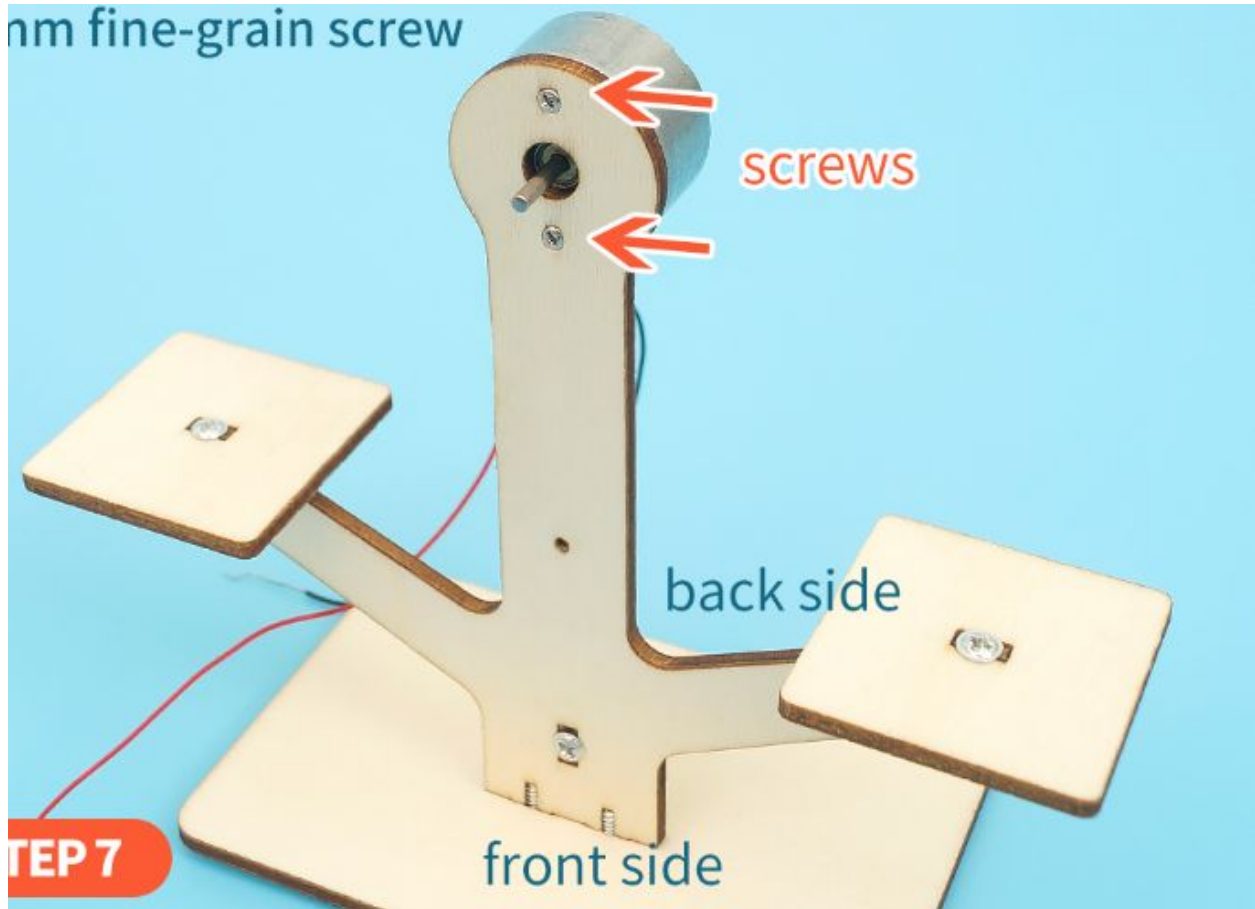
## Step 6: Motor Housing



Install the No. @ wood on the No. G) bracket with 7mm long screw.

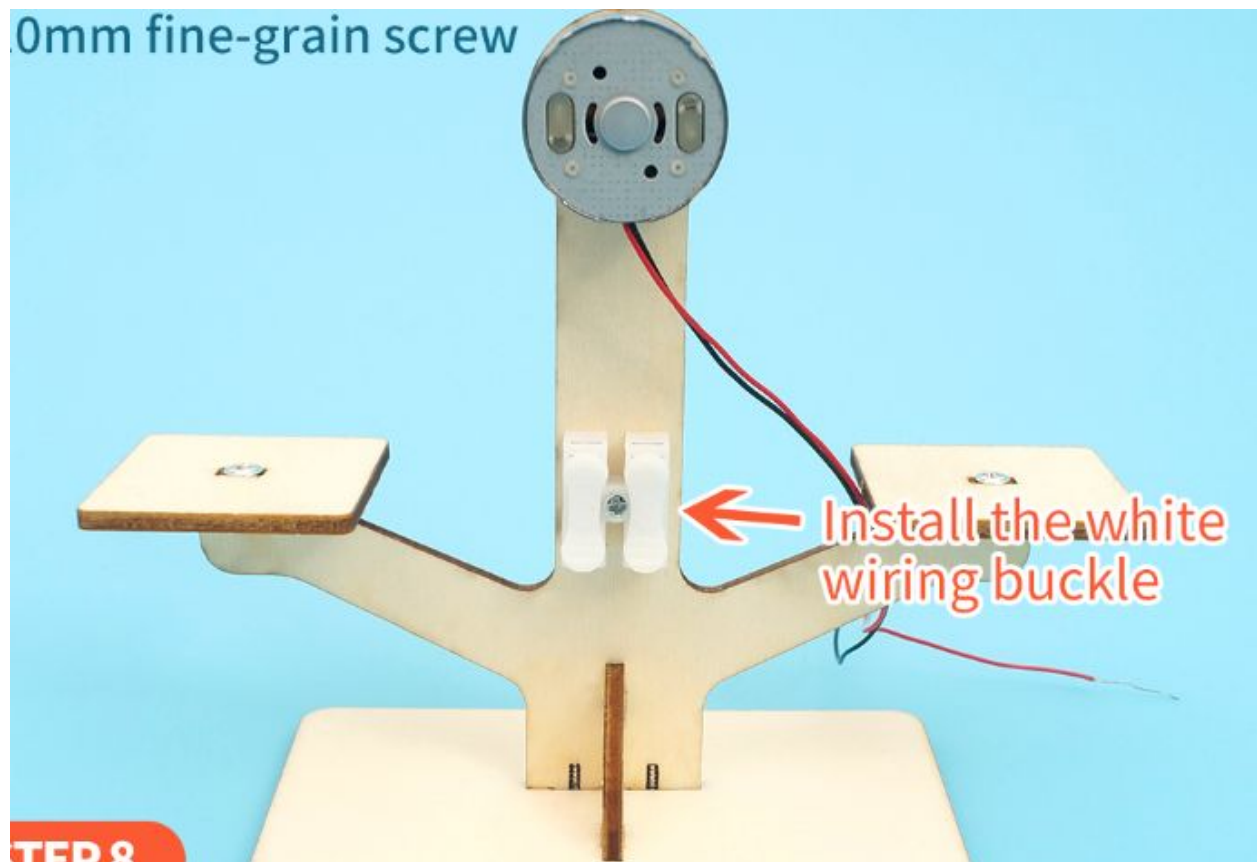
## Step 7: Turbine Connection





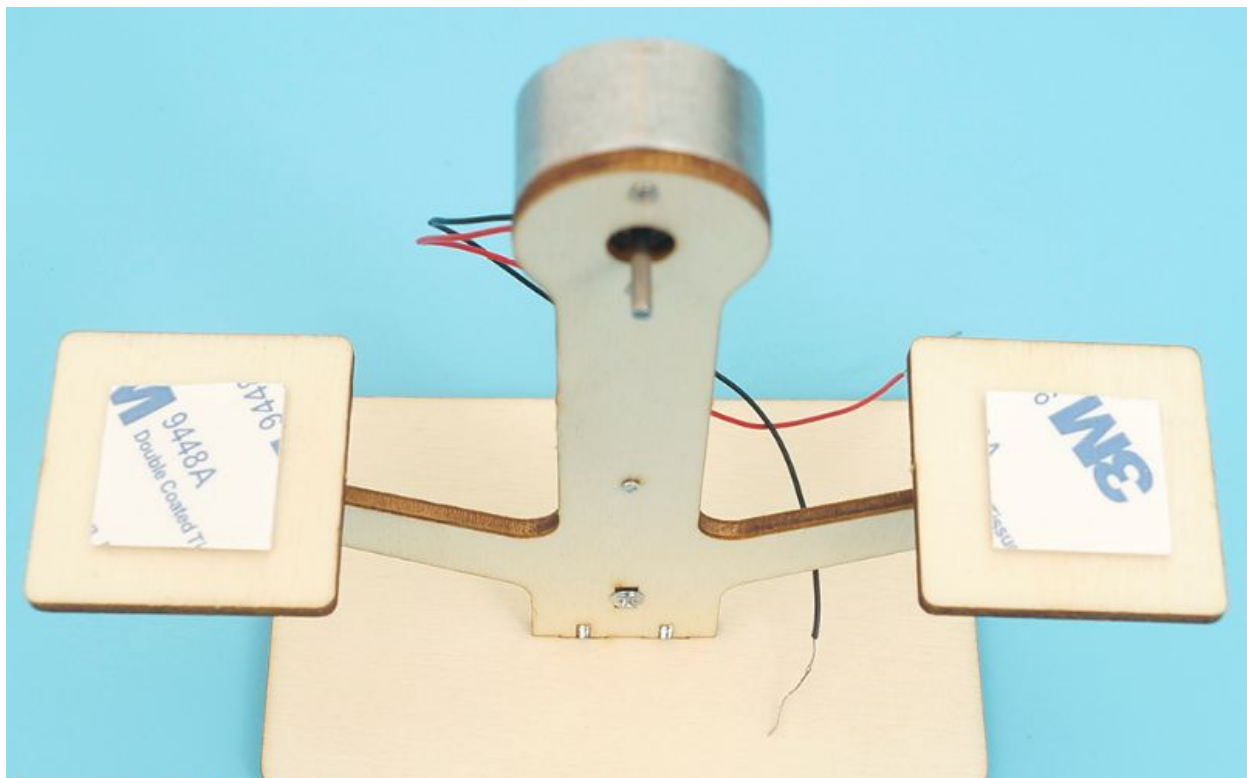
Install the motor on the top of No. Q) wood with 4mm long fine-grain screws. Pay attention to the front and back directions when installing.

## Step 8: Turbine Connection



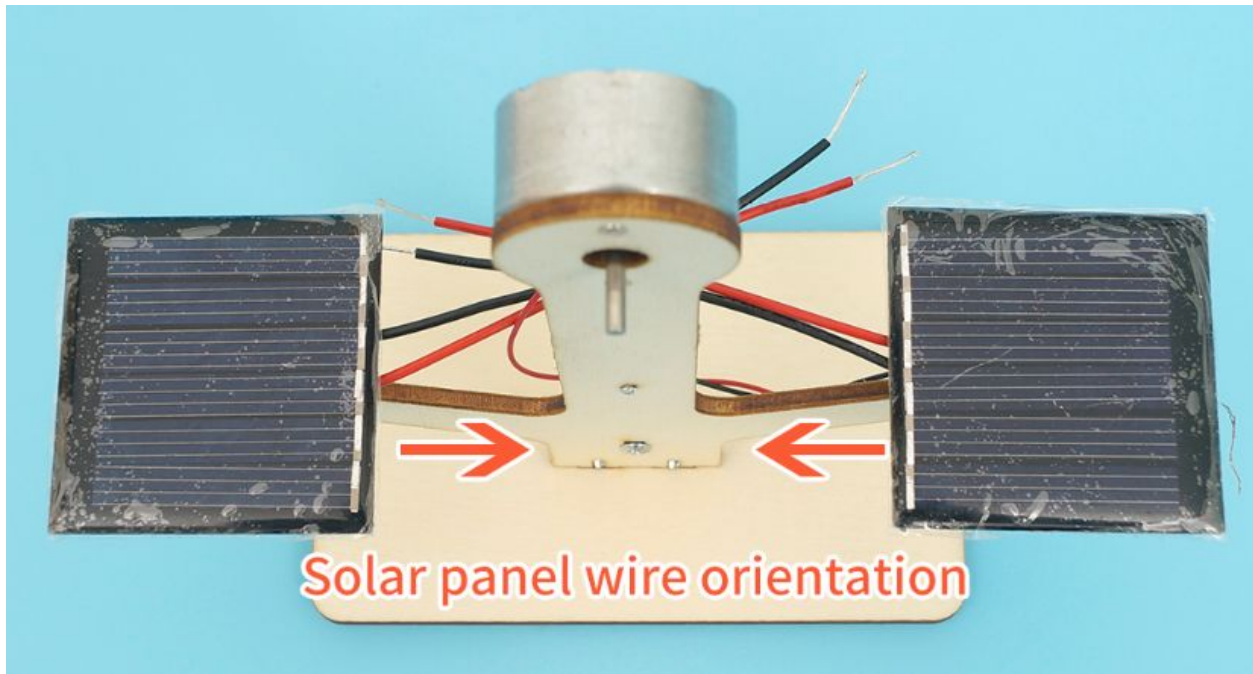
Use 10mm long screws to install the wiring buckle on the back of bracket No.

## Step 9



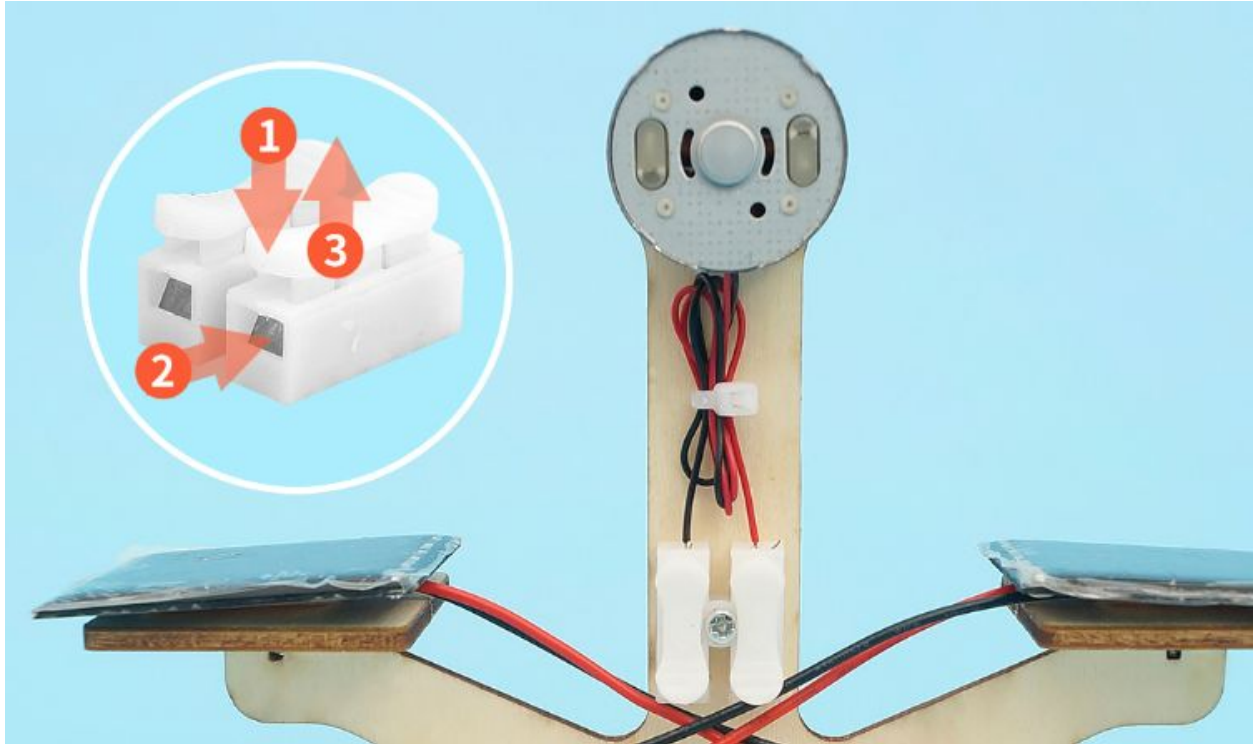
Stick the double-sided adhesive in the middle of No.4 wood board, stick 2 sides, overlap and stick.

## Step 10



Stick the solar panel to the No. C4) wooden board, pay attention to the orientation of the solar panel wire, and do not stick it wrong.

## Step 11



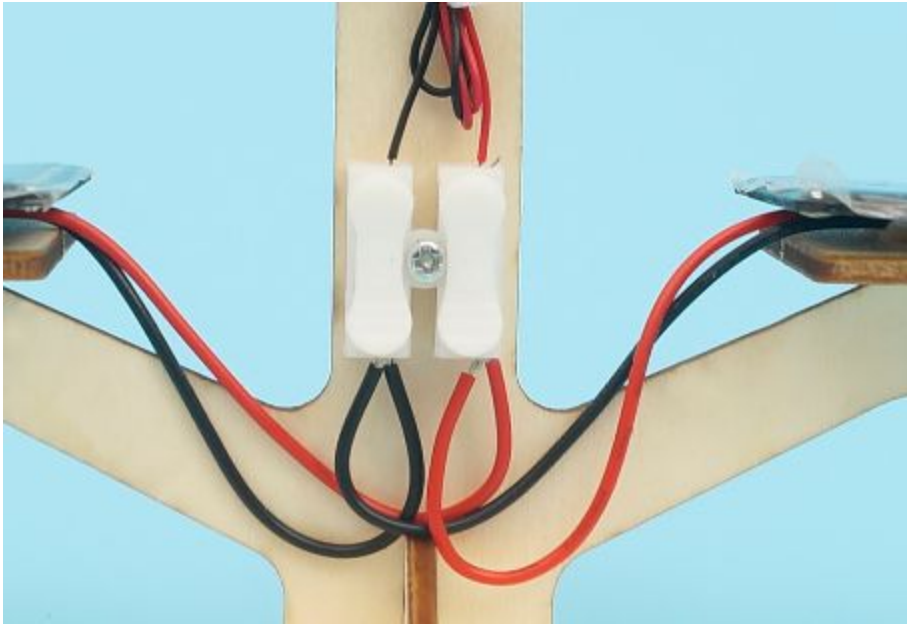
First, snap the wire core of the motor into the white wiring buckle, and then use the cable tie to arrange the long motor wire. How to use the wiring buckle: "13

First press the buckle by hand and don't put it 1

Extend the metal wire core to the metal sheet inside "131 Release the buckle, the metal piece automatically

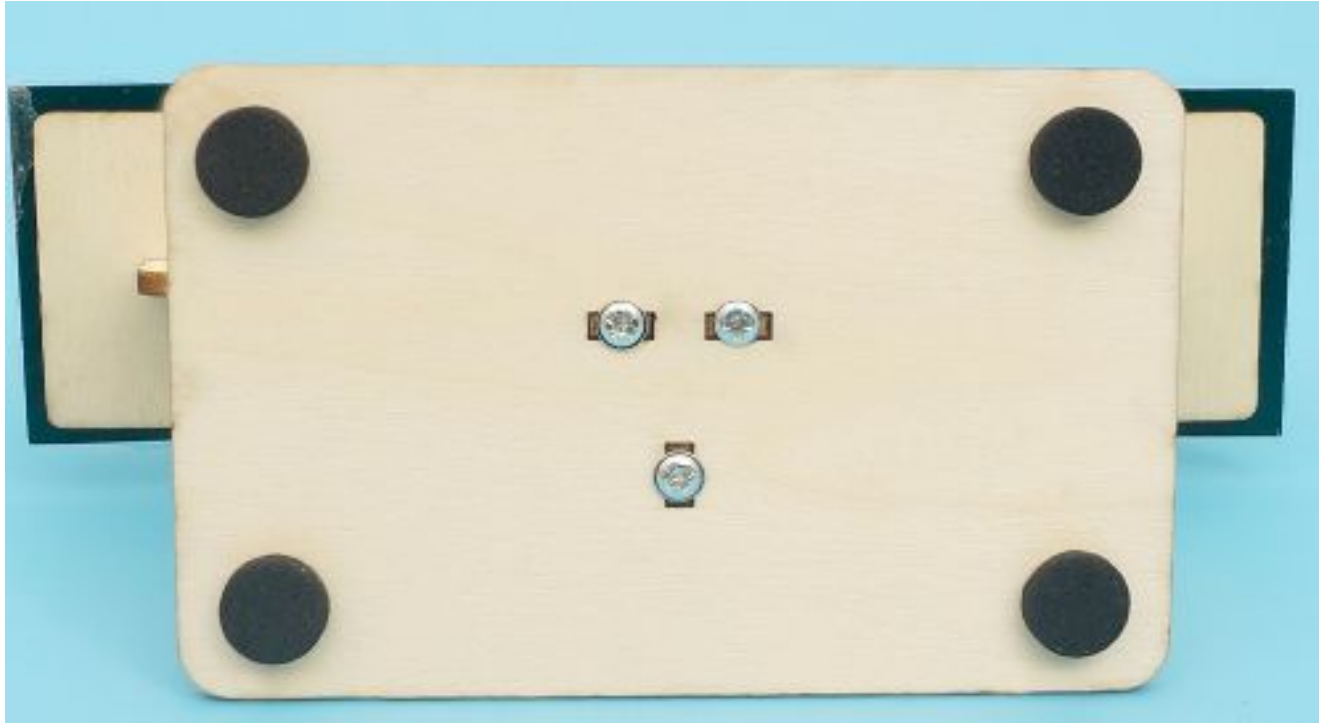
Catches the wire core and the wiring is completed.

## Step 12



First, insert the core of the solar version of the red wire into the corresponding red port of the wiring buckle, and then snap the core of the solar black wire into the corresponding black port of the wiring buckle.

### Step 13



Glue four black feet to the four corners on the bottom of the base plate.

## Step 14



Install the propeller on the motor, and the solar fan is completed!



## Usage Notice

The solar fan will not rotate under the LED and fluorescent lights. This is not to say that the solar panel does not generate electricity, but that these two lamps have no heat and the generated electricity is very weak, which can be basically ignored. Solar fans can only rotate under sunlight or tungsten filament lights. When the temperature is below 15 degrees Celsius, the sunlight may be weak and may not be able to rotate.

## Troubleshooting

1. Why doesn't the solar fan turn
  - a. The solar fan can only rotate normally when it is outdoors and the sunlight is strong.
  - b. The solar fan cannot work on cloudy days.
2. Why does the fan run in reverse?
  - a. There is no corresponding connection between the red and black wires of the motor and the red and black wires of the solar panel, which will cause the fan to reverse.
3. The fan does not rotate under the sunlight.
  - a. It may be that the core connected to the wiring buckle is not connected properly. Please check again.

## Scientific Knowledge

What are the advantages and disadvantages of solar photovoltaic power generation?

The solar photovoltaic power generation process is simple, with no mechanical rotating parts, no fuel consumption, no emissions including greenhouse gases, no noise, no pollution; solar energy resources are widely distributed and inexhaustible. Therefore, compared with new power generation technologies such as wind power generation, biomass power generation and nuclear power generation, photo-voltaic power generation is a renewable energy power generation technology with the most sustainable development ideal characteristics, and has the following main advantages.

1. The solar energy resources are inexhaustible. The solar energy irradiated on the earth is 6000 times greater than the energy consumed by human beings. And solar energy is widely distributed on the earth, as long as there is light, you can use the photovoltaic power generation system, not restricted by factors such as region and altitude.

2. Solar energy resources are available everywhere, and can be powered nearby, without long-distance transmission, avoiding the loss of electrical energy caused by long-distance transmission lines.
3. The energy conversion process of photovoltaic power generation is simple, which is the direct conversion from light energy to electrical energy. There is no intermediate process {such as conversion of thermal energy into mechanical energy, mechanical energy into electromagnetic energy, etc.} and mechanical movement, and there is no mechanical wear. According to thermodynamic analysis, photovoltaic power generation has a high theoretical power generation efficiency, which can reach more than 80%, and the technology development potential is huge.
4. Photovoltaic power generation itself does not use fuel, does not emit any substances including greenhouse gases and other exhaust gases, does not pollute the air, does not generate noise, is environmentally friendly, and will not be forced by the impact of the energy crisis or instability of the fuel market It is a new type of renewable energy that is truly green and environmentally friendly.
5. The photovoltaic power generation process does not require cooling water, and can be installed on the desert Gobi without water. Photovoltaic power generation can also be easily combined with buildings to form a light-building integrated power generation system, which does not require separate land occupation and can save valuable land resources.
6. Photovoltaic power generation has no mechanical transmission parts, simple operation and maintenance, and stable and reliable operation. A set of photovoltaic power generation systems can generate electricity as long as there are solar cell modules, and the widespread use of automatic control technology can basically achieve unattended operation and low maintenance costs.
7. The working performance of the photovoltaic power generation system is stable and reliable, and the service life is long {more than 30 years}. The life of the crystalline silicon solar cell can be as long as 20 to 35 years. In the photovoltaic power generation system, as long as the design is reasonable and the type selection is appropriate, the life of the battery can also be as long as 10 to 15 years.
8. Solar cell module has a simple structure, small size and lightweight, which is convenient for transportation and installation. The construction period of the photovoltaic power generation system is short, and the load capacity can be large or small according to the electricity consumption, which is convenient and flexible, and is easy to combine and expand.
9. Solar Cell is a promising new power source with three advantages: permanence, cleanliness and flexibility. Compared with thermal power generation and nuclear power generation, solar photovoltaics do not cause environmental pollution; solar cells can be large, medium and small, as large as one million kilowatts of medium-sized power plants, as small as an independent solar power system for one household, These characteristics are unmatched by other power supplies.

Solar photovoltaic power generation also has disadvantages. This solar energy photovoltaic power generation can only generate electricity during the day, but not at night. Affected by the weather, except for the sky, the power generation is very low in other weather conditions. In the manufacturing process of solar photovoltaic panels, high pollutants are generated and a large amount of energy is consumed.

#### FURTHER TRAINING, SUPPORT & HARDWARE

If you would like to learn about future support, send an email to [info@techspace.ie](mailto:info@techspace.ie)

- Training Courses: Download the TechSpace training brochure from [www.techspace.ie](http://www.techspace.ie)
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