SOLAR CAR KIT

Solar Energy

Solar panels contain the element **silicon**, which can convert solar energy from sunlight into electrical energy (fast-moving electrons). These energetic electrons can light up lamps, run engines, move electric cars and charge batteries.

In the solar car, **solar energy** is converted to **electrical energy** in the panel, then to **mechanical energy** in the motor and **motion (kinetic) energy** when the wheels start moving.

Build a Solar Car

Construct a mini solar car from the components in the kit and watch it zoom along under the power of the sun.

Materials in the kit

- Solar panel & electric motor
- Components in solar car bag
- Screwdriver (magnetised)

Materials supplied by you

Small hammer

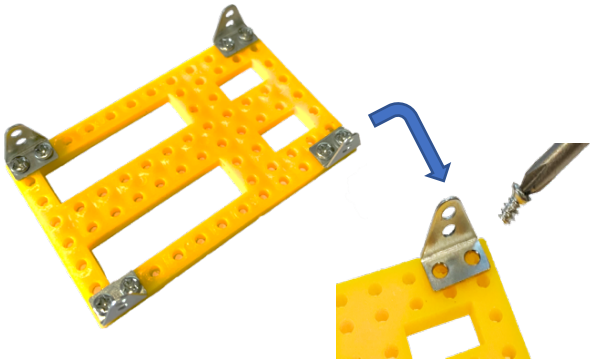
Instructions

Please follow the instructions closely!

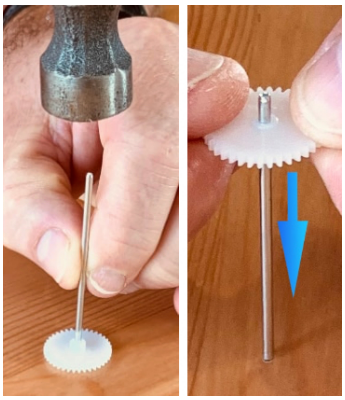
1. Identify and place the components on your desktop:
   brackets (4 small, 1 large)
   screws (12)
   wheels (4)
   axles (2)
   large gear wheel (1)
   small gear wheel (1)
   plastic chassis (1)
   solar panel with wires & electric motor (1)
   double-sided tape (1)
   screwdriver (1)

Please handle the solar panel and electric motor with care. Do not pull on the wires, as the solder connections are fragile.

2. Screw the 4 small brackets to the chassis using the screws and screwdriver. Note that the longer upright of the brackets are seated on the edge of the chassis. Tip: Hold the bracket in position, then add the screws.

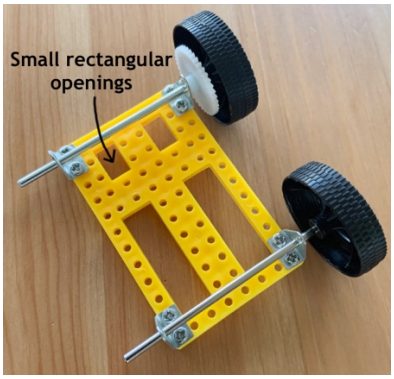


3. Place the large gear wheel on the table with the small rim on the gear wheel facing upwards. Ask an adult to lightly tap the axle into the gear wheel with a small hammer. Carefully push the gear deeper onto the axle, but not too deep, so you have space to fit the wheel.



4. Tap the axles into two wheels.

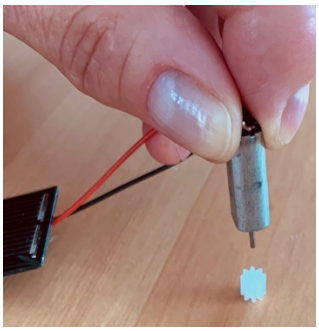
5. Push the axle holding the gear wheel, through the two brackets closest to the two small rectangular openings in the chassis. Use the bracket holes closest to the chassis.



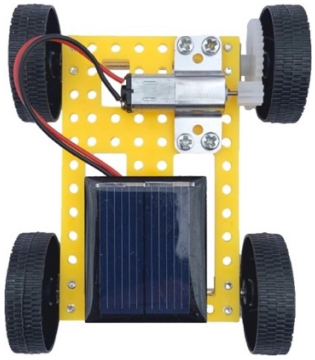
6. Push the second axle into the other bracket set, using, once again, the holes in the bracket closest to the chassis.

7. Tap the other two wheels onto the axles. Push all wheels deeper onto the axles with your fingers. Important! Check that all wheels run freely. If not, adjust the wheel spacing.

8. Place the small gear wheel on the table and push the motor axle into the gear. Handle wires with care.



9. Install the motor: The motor is mounted closest to the large gear wheel. Use the second row of holes from the side – see photo. Screw the large motor bracket loosely to the chassis with four screws. Do not tighten yet. Handle wires with care. Then push the motor in so the teeth on the small gear wheel interlock with the large gear wheel. Check that the small gears do not touch the car wheel. Now, tighten the bracket screws.



10. Stick the panel to the chassis with the double-sided tape. Place your car in the sun on a smooth service (basketball court) and watch it go!

The Science

Gearing down: There are 8 teeth on the small gear wheel and 48 on the large gear wheel. This brings the ratio to 48/8 = 6. So, the motor shaft rotates 6 times to cause 1 rotation of the car's wheels. Why do we do this?

Generating electrical energy:
The solar panel is made of polycrystalline silicon. Silicon has the ability to produce electricity when it is exposed to light from the sun. You will notice that you need a certain light intensity level for the motor to get going. You can try a desk lamp but may find the light is not intense enough.

Go to the basketball court (when the sun is out) and start a solar car race.

Challenges

1. Run your car indoors or in the shade on a sunny day but use a mirror to reflect the sunlight to the solar panel. Then increase the challenge by using two mirrors and two people to keep it moving.

2. Place the solar panel at different angles to the sun to see if you can increase the car's speed.

Instructions & video by Prof Bunsen Science