

Running on Sun: DIY Solar Car

(CBL Module #5 Fall 2022)

Today we will build a solar car powered by the sun! The car can also be powered by a battery. You can switch between energy sources, as needed. This is great opportunity to think about the application and relevance of different types of energy, especially renewable solar energy. The DIY solar cars were purchased from amazon. There are 2 options: (#1 [link here](#); videos are helpful to watch; #2 [link here](#)). This module is expected to take place over 2 weeks. One big picture question to think about: how does light energy ultimately get converted into mechanical energy to make the car move?

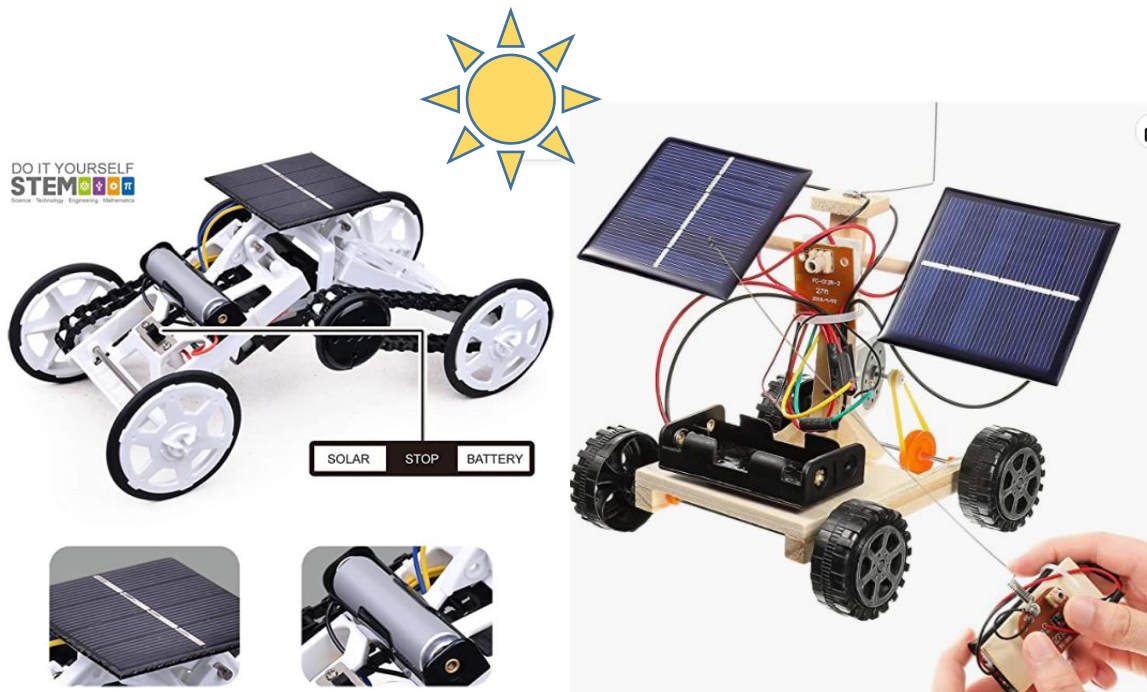


Figure 1. DIY solar car can also be powered by a battery. Left: option #1 can climb over bumps and hills. Option #2 has a remote control operation feature.

Circuits Stuff You'll Learn/Review Today (two types of energy conversion!)

First steps

BEFORE you build the car, measure the voltage and/or current generated by the solar panel provided. Test different conditions: very sunny spot vs less so, covered vs. uncovered, angled directly facing to sun or not. You could also connect the solar panel and or battery – **but never both at the same time** - directly to the motor and watch the effect on the speed of the motors.

Solar panels

- Where do you find solar panels in everyday life? What's the relevance of renewable (solar) energy?
- What are photovoltaics aka solar panels? Fundamentally, a solar semiconductor device known as *PN junction* that converts light energy into electrical energy. (Photons stimulate generating of into charged particles in electron-hole pairs...we'll learn about semiconductors after Thanksgiving!).
- How does a battery produce electrical energy? What materials are inside? Where do you get those materials?
- How do you make a solar cell? What materials does it require and where do they come from?

Motors

- How do motors work? What makes them turn?
- They convert electrical energy into mechanical energy.
- How much current do they draw? How long will your battery last?
- How much power do they consume? How much power do they generate? How efficient are they ($P_{\text{mechanical}}/P_{\text{electrical}} = \text{Efficiency}$)