



TITLE:

Power your STEAM project with a micro-solar panel

GRADE LEVEL: 6TH TO 9TH GRADE

STEAM AREAS: SCIENCE, TECHNOLOGY, ARTS

MATERIALS NEEDED:

- 1 x Micro-solar panel 5 V 80*45mm;
- 1 x Solar charger module (or Mini Solar Lipo Charger Board Lithium Battery Charge);
- 4 x Electric wires;
- 2 x 2 Pin Single Header Connect Wire Female;
- 1 x Mono-chromatic LED;
- 1 x Resistance;
- 1 x Soldering iron;
- Some tin;
- 1 x Insulating tape;
- 1 X LiPo Battery Lithium-Ion Polymer Battery 3.7V (mAh) with JST-PHR-2 Connector;

OBJECTIVES:

- To charge small electronic projects with the sunlight
- To use renewable energy sources in STEAM projects and prototypes

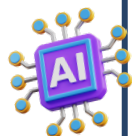
PREMISE:

Brief description of the Solar charger module (or Mini Solar Lipo Charger Board Lithium Battery Charge): the electronic component has 4 entries: USB, SOLAR, CONNECTOR and SYS OUT. Furthermore, there is a blue onboard LED that flashes when the module is working.

PROCEDURE:

1. With a soldering iron, solder with tin two electric wires to the positive and negative connectors that you find in the backside of the mini-solar panel. The length of the electric wires depends only on the kind of project that you wish to produce. If you don't have a soldering iron simply attach the electric wires (the conductive material inside the plastic) with some insulating tape, and be careful to don't move them too much, because they can easily detach.

2. Attach the other two ends of these two electric wires to a 2 Pin Single Header Connect Wire Female. You can use some insulating tape for this task, just attaching the conductive material inside the wires together. Once this connection is ready, insert the 2 Pin connector attached to the CONNECTOR section of the Solar Charger Module. In this way your mini-solar panel can detect the sunlight and bring it to the circuit.



PROCEDURE:

3. You can avoid task 1 and 2 simply by buying a solar panel that has a micro-usb and inserting it in the USB entrance on the Solar Charger Module. But it is less fun!

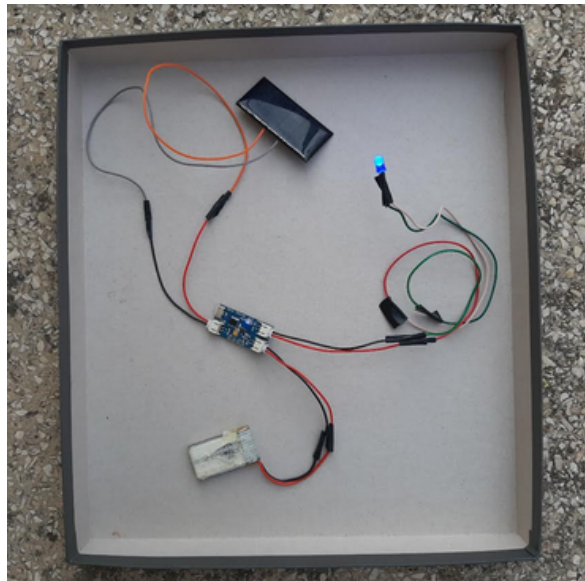
4. Insert the other 2-pin JST Connectors Female of the Lipo battery 3.7 V inside the BATT IN section of the Solar Charger Module. Bring this circuit under the sunlight and the blue light on the module turns on to indicate that the Lipo battery is on charge!

5. At the same time, you can also switch on an LED. Firstly, prepare the LED circuit. Based on its colour, calculate which resistance The LED needs using a 3.7 Lipo battery. You can use an online calculator that make this task very fast, e.g. <https://ledcalculator.net/>

6. Attach the resistance to the cathode of the LED with some isolating tape. Then attach the remaining 2 electric wires, one to the resistance and the other one to the anode of the LED, always with some isolating tape. Finally, attach the end part of this circuit with another 2 Pin Single Header Connect Wire Female, and insert it in the SYS OUT section of the Solar Charger Module. If the circuit is under the sunlight, it will turn on the LED.

7. Once the Lipo battery is charged and you don't have any sunlight, detach the battery from the Solar Charger Module. Detach also the LED circuit and insert its wire inside the JST-2 Connector of the Lipo battery. Now your circuit (Lipo+ LED, without the Solar Charger Module) is ready to work also during the night!

8. Have fun making your STEAM project utilizing this eco-sustainable circuit!



ASSESSMENT:

- Assign points from 1 to 3 at these abilities:
 - Solder with tin;
 - Read the components specs;
 - Follow instructions;
 - Debug mistakes;
 - Design a personalized project that incorporate the eco-sustainable circuit.

REFERENCES:

- This project is done by Giada Totaro