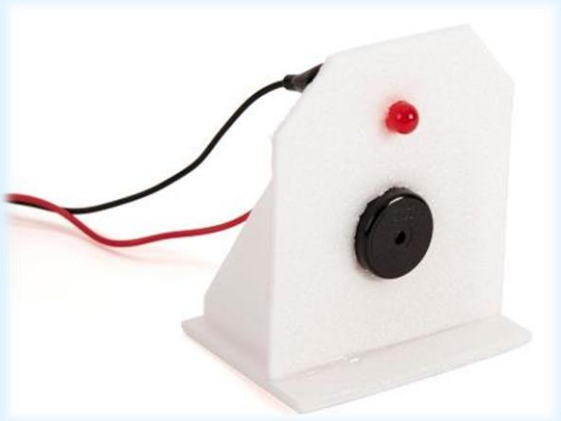
Renewable Energy – Module 5

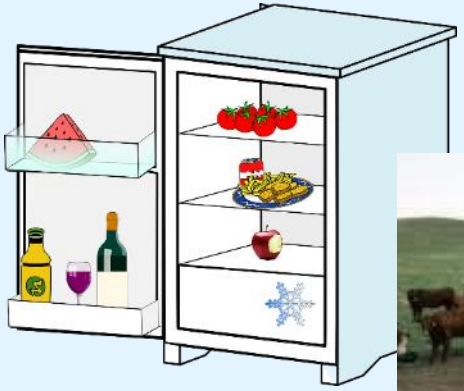
- Use the solar panel to power different devices
- Light an LED
- Sound a buzzer
- Design a sun alarm
- Try and produce wind energy



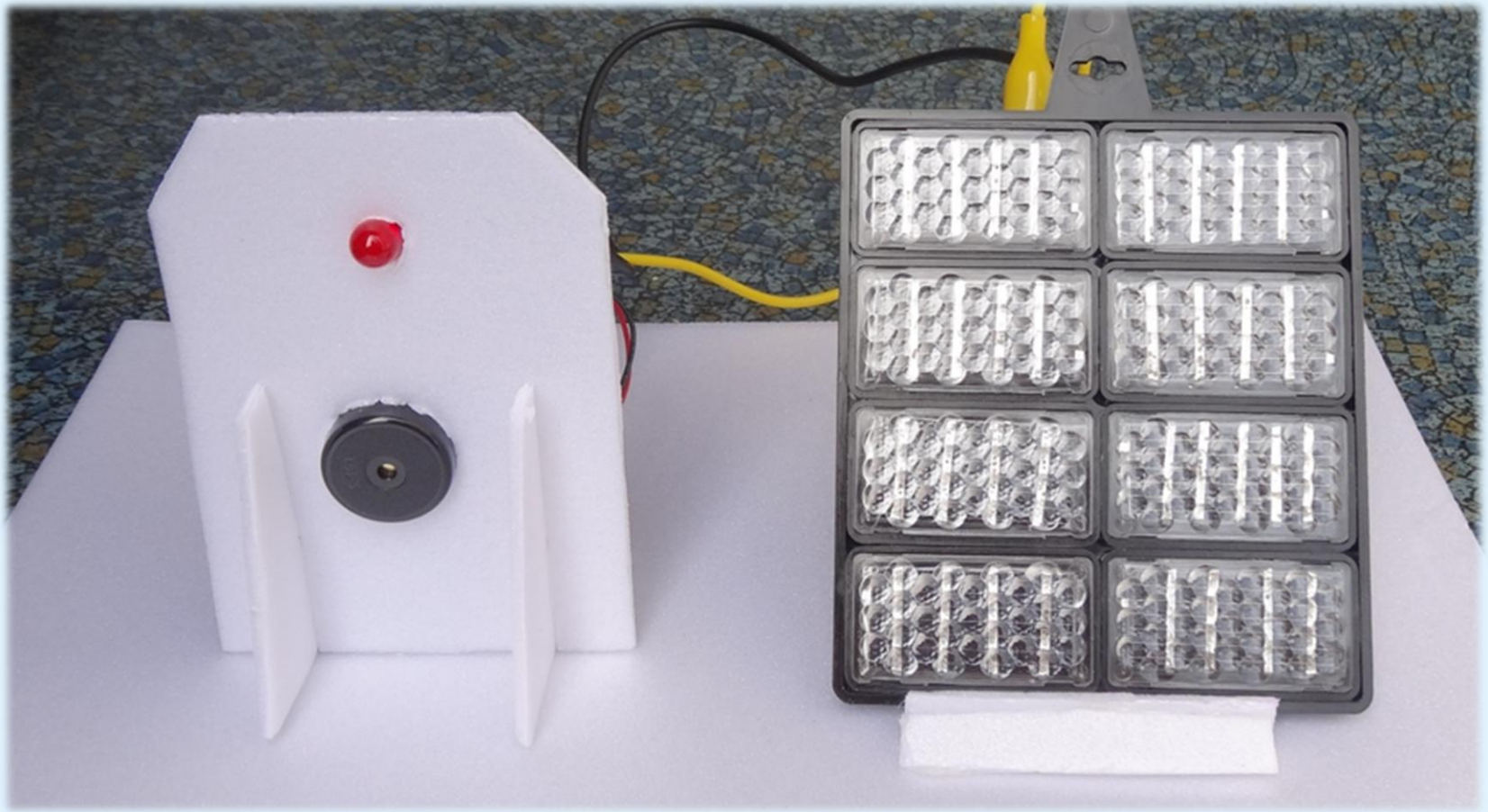
Sun Alarm

What could you use solar PV for?

- Imagine you live in a remote village without mains electricity.
- What could you use solar PV for?



Make a sun alarm



STEM Learning Objectives

- **S**cience – *Electricity:* compare and give reasons for variations in how components function *and* recognise some common conductors and insulators.
- **T**echnology – use electrical systems in your products.
- **E**ngineering – learn to troubleshoot problems.
- **M**aths – measure distances in mm.

Work Safely

Look at the tools and equipment. Can you spot any potential hazards?

Can you think of ways to reduce the risks?

Collect your materials

You will need:

- A solar energy kit (from the spinner completed in module 4)
- Offcuts of polystyrene foam
- A buzzer
- An LED (light emitting diode)
- Two crocodile leads
- A propeller

Assemble your tools

You will need:

- A ruler
- A felt tip pen
- A pencil
- A pair of scissors
- A cool melt glue gun

Technology for Fun

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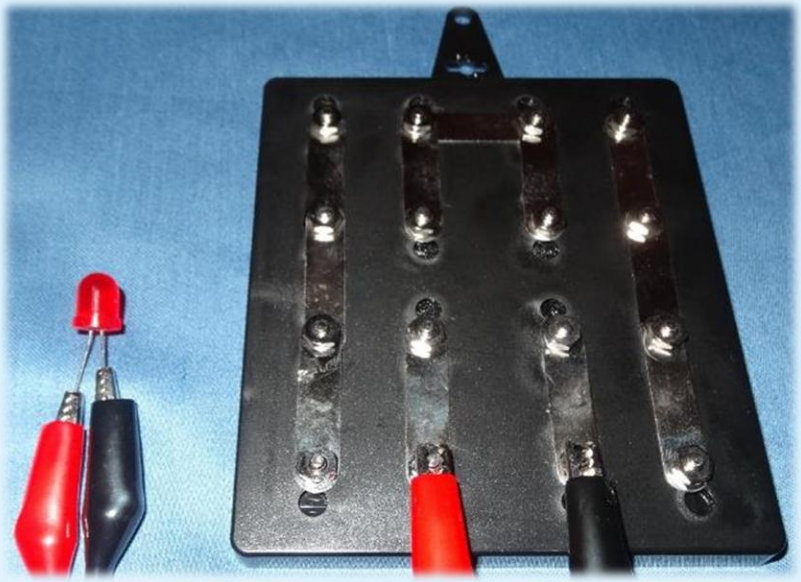
Disconnect the motor

1. Unscrew the two nuts holding the motor contacts onto the solar panel.
2. Take off the nuts and washers.
3. Slide the motor contacts off the studs.
4. Re-fit the washers and nuts so you don’t lose them.

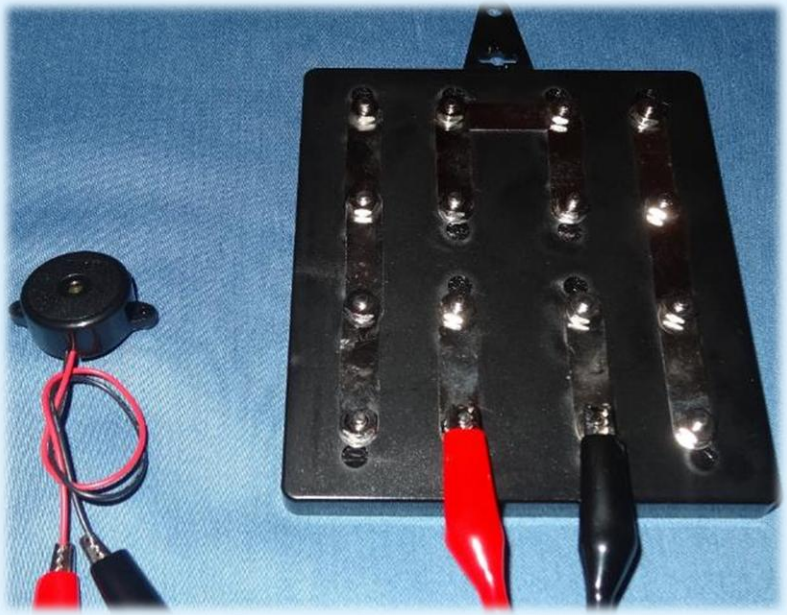
Light up the LED

1. Gently bend the LED legs apart.
2. Connect one crocodile lead from the positive (+) terminal to the long LED leg as shown.
3. Connect the other crocodile lead from the negative (–) terminal to the short leg.
4. Orientate the panel to face the sun and check the LED lights up.
5. What happens if you connect the LED the other way round?



Make the buzzer sound

1. Disconnect the crocodile clip from the long leg of the LED and connect it to the red wire of the buzzer.
2. Disconnect the crocodile clip from the short leg of the LED and connect it to the black wire of the buzzer.
3. Turn the panel to face the sun and see if the buzzer sounds.
4. What happens if the buzzer is connected back to front?
5. Adjust the panel orientation to vary the volume of sound.



Technology for Fun

Make both light & buzzer come on

1. Connect the crocodile clip attached to the red wire of the buzzer to both this and the LED long leg simultaneously.

2. Connect the clip attached to the black wire of the buzzer to both this and the LED short leg simultaneously.

3. Turn the panel to face the sun and see if both the LED and buzzer come on.

4. What happens if you clip onto the plastic sleeve instead of the metal end of the wire?

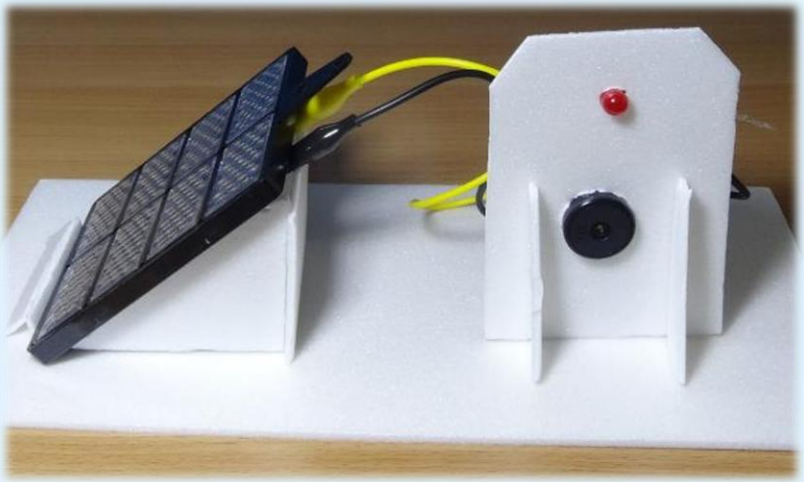
Technology for Fun

Construct a stand

1. Design a way of mounting the LED and buzzer using the polystyrene foam offcuts – an example is shown here.
2. You can use the pencil to pierce a hole to fit the LED – make it a maximum of 8mm diameter so that the LED fits tightly.
3. You can cut out a hole for the buzzer with scissors – make it a maximum of 23mm diameter so that the buzzer fits tightly.
4. Peel the motor stand off the mount and replace it with the stand you have just made.

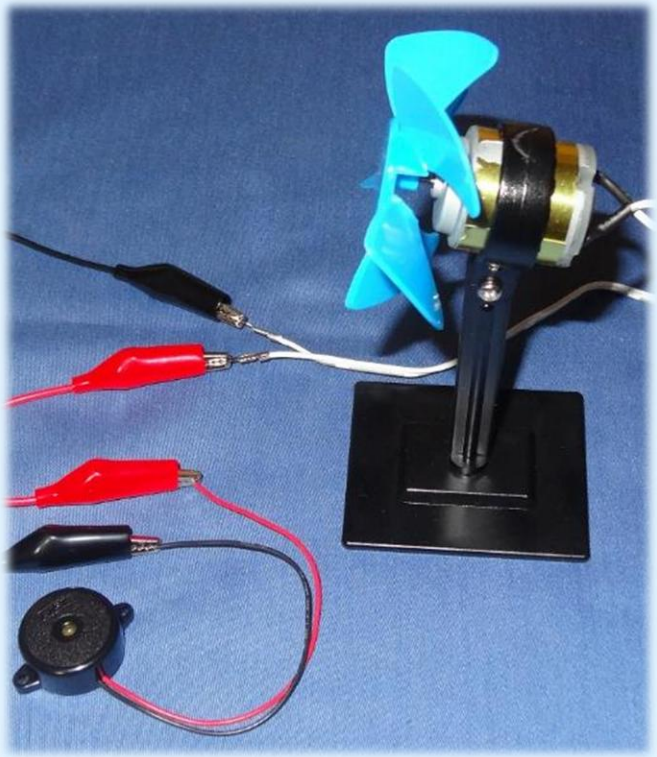
Try out the sun alarm

- Orientate the solar panel to face the sun and try out the sun alarm.
- Can you think of things it might be useful for?
- Could it remind you to put on your sunscreen?
- To put the washing out to dry?
- Anything else?



Try using wind power

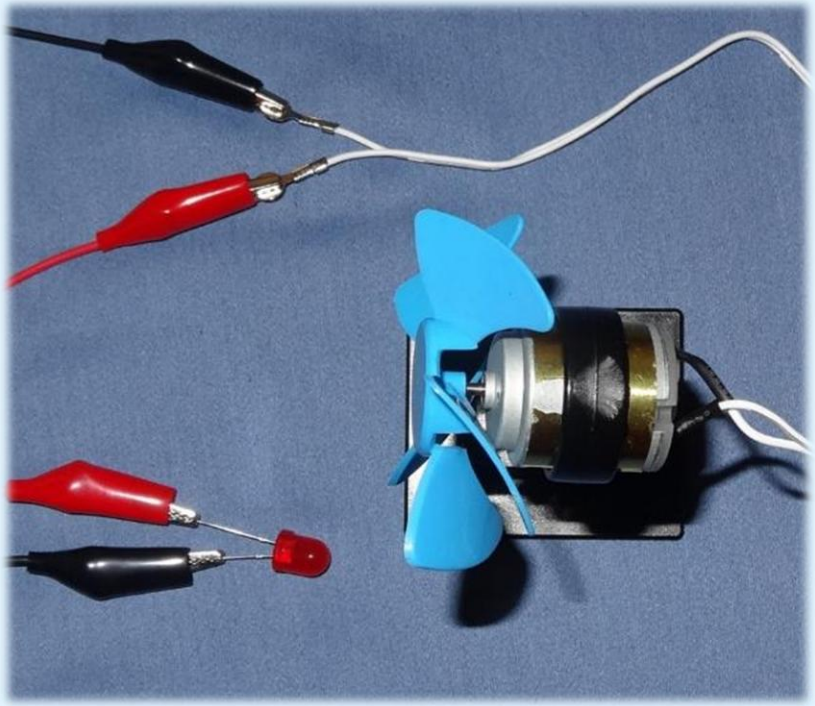
1. Remove the motor pulley and fit the propeller (also turn the motor so the shaft is horizontal).
2. Disconnect the crocodile leads from the solar panel; use them to connect the motor contacts to the buzzer.
3. Ask someone to hold the buzzer to their ear.
4. Ask someone else to blow really hard into the fan to make it spin fast!
5. Can the buzzer be heard? If not try connecting it the other way round.



Technology for Fun

Use wind power to light the LED

1. Disconnect the crocodile clip from the red wire of the buzzer and connect it to the long leg of the LED.
2. Disconnect the crocodile clip from the black wire of the buzzer and connect it to the short leg of the LED.
3. Blow as hard as you possibly can and see if you can get the LED to light up.



What did you learn?

- What might solar PV be useful for if you live in a remote village without mains electricity?
- Does an LED work if connected either way round?
- How about the buzzer?
- An LED converts electrical energy to what kind of energy?
- How about the buzzer?
- Why do you need to connect to the metal ends of the buzzer wires, not onto the plastic sleeve?
- What problems did you encounter and how did you solve them?
- What does STEM stand for?