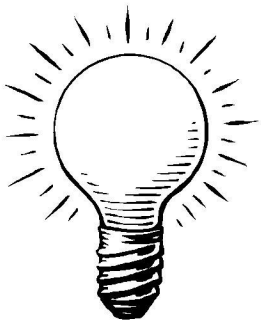
Solar Garden lights

This Science Project was done by:

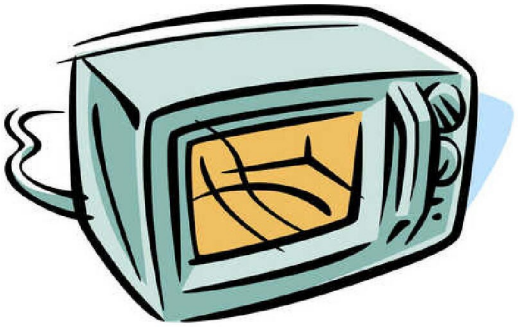
.....

(With a little help from Elizabeth's dad)

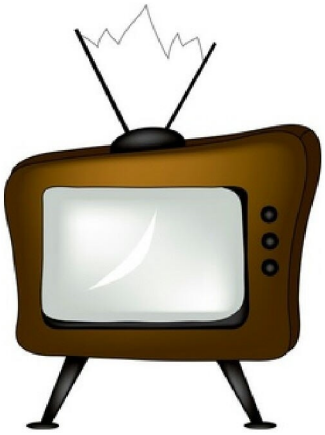
Electricity



- Do you remember about electricity? We use it to power loads of things – you can't see it but it can do work.



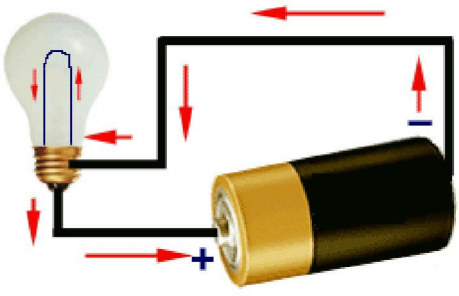
Which of the things in your house use electricity?

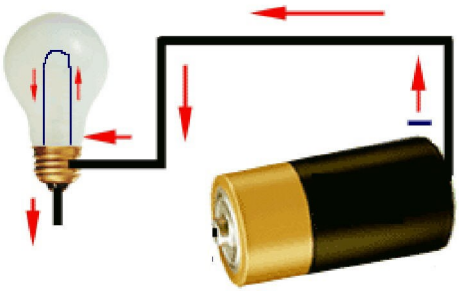


- To do anything useful, electricity has to flow round in a circle.
  - We call that a "circuit".

- The easiest circuit to see is using a battery:
  - A battery has a + end and a – end.
  - The electricity has to flow all the way from one end to the other.

Do you remember why this circuit works….





.. But this one doesn't?

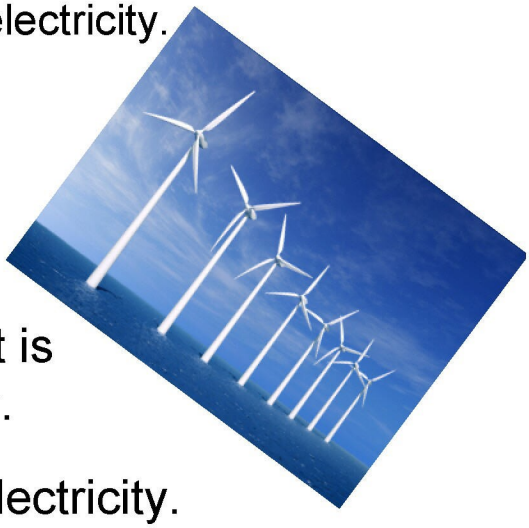
What's missing here?

If we use a battery for our electricity we have to keep replacing the battery or recharging it.

It would be useful if batteries could recharge themselves!

- You can't make energy.
- You have to turn one type into another:
  - Batteries change chemical energy into electricity
  - You can turn other types of energy into electricity
  - Wind, heat, sunlight, falling water, lots of thing that have energy in them can be turned into electricity.

Can you remember something that can turn wind energy into electricity?



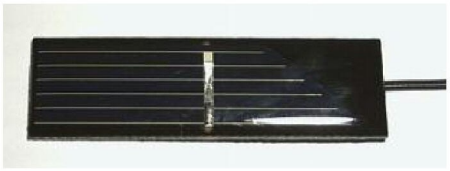
- Energy from sunlight is called "solar" energy.
- Solar panels turn light into electricity.

This solar panel is massive!

Small solar panels can power things like calculators

We could connect a solar panel to a bulb to make a solar powered light

Why might this not be very useful?



+

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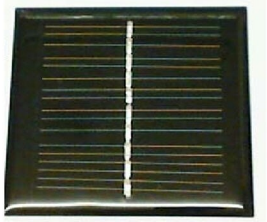
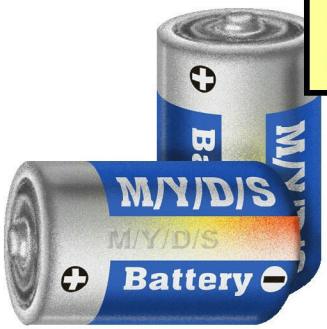
When do solar panels provide electricity?

- We are going to use a rechargeable battery and a solar panel.
  - The solar panel will turn sunlight into electricity
  - We can use the electricity to recharge the battery
  - The battery will store the electricity until we need it
  - When it gets dark we can use the power stored in the battery to light a lamp.



Solar panel turns light into power during the day but we don't need a light on when it's day time!

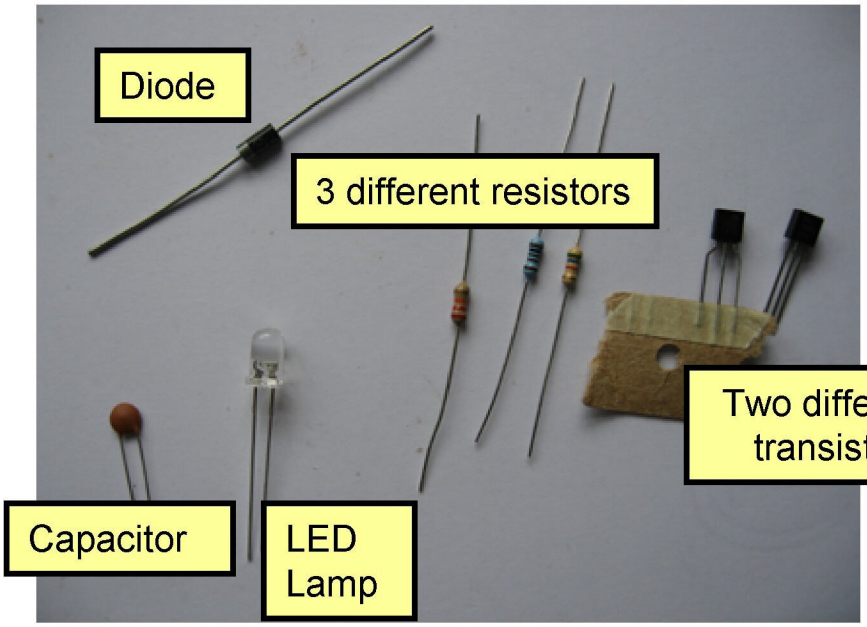


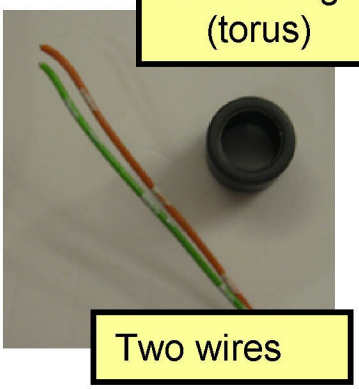
Batteries store the power until we need it

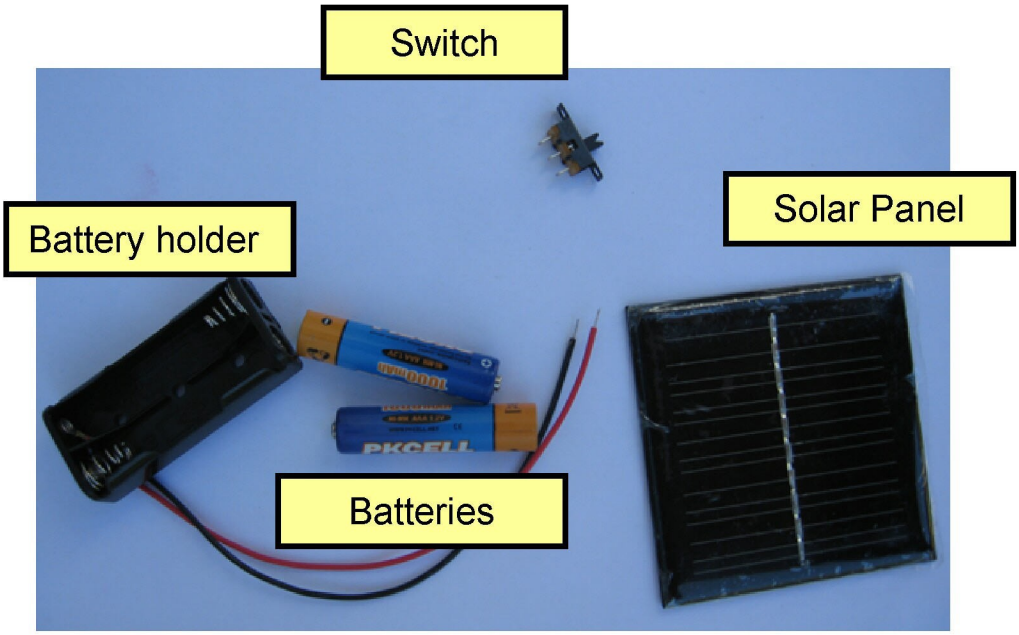
We'll make a circuit that uses power from the battery to light an LED light when it gets dark

The things we need:

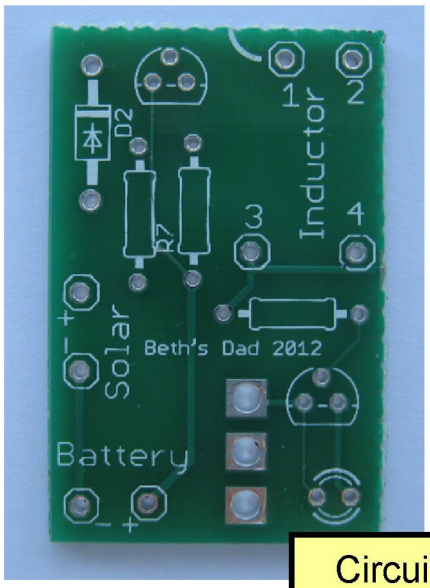
- Let's get the things we need.
  - You should have a tray with your name on.
  - See if you can find these things:







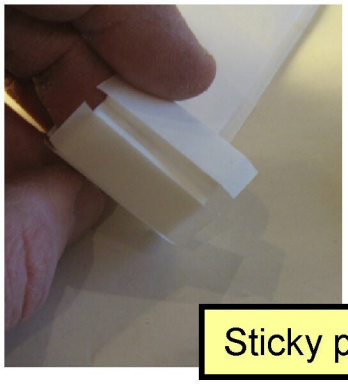
More bits:



Circuit Board

Jar & Lid

Some plastic jewels



Sticky pads

Lid & Solar Panel:

Drill a hole in the jar lid:

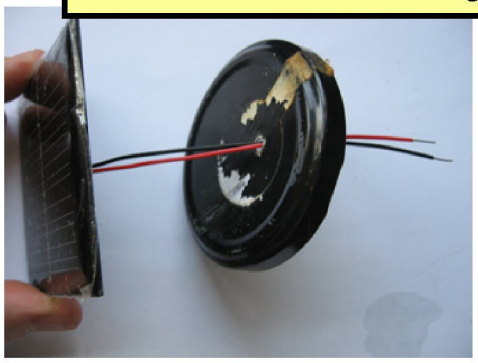
DANGER!

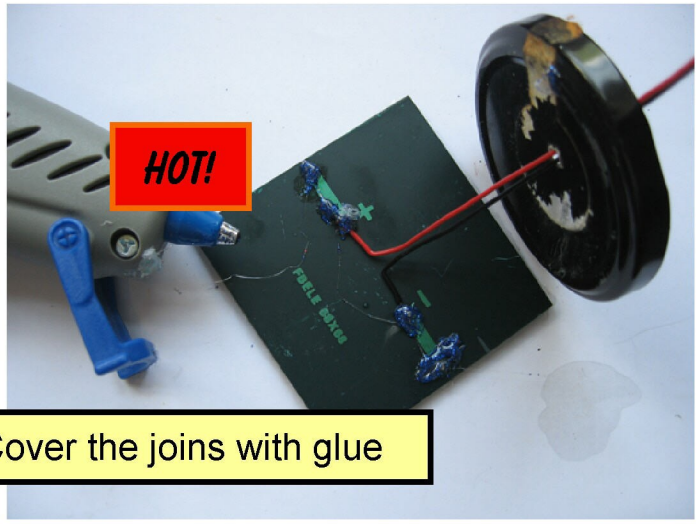
This arm pulls down

Clamp it down well!

Smooth it down with a file.

Feed the wires through



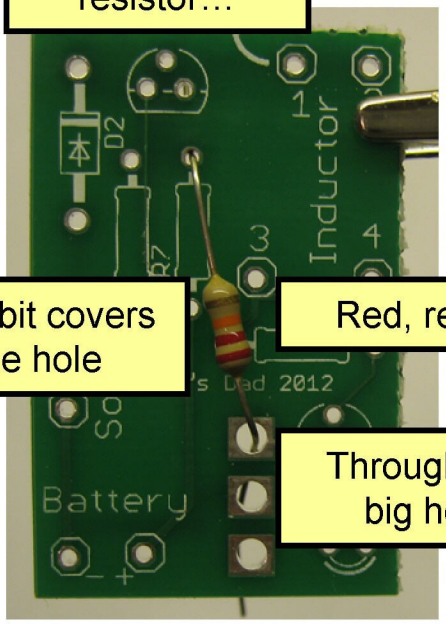


Cover the joins with glue

Stick the lid on the back of the panel

Add Some Parts to the Board:

Add the first resistor…

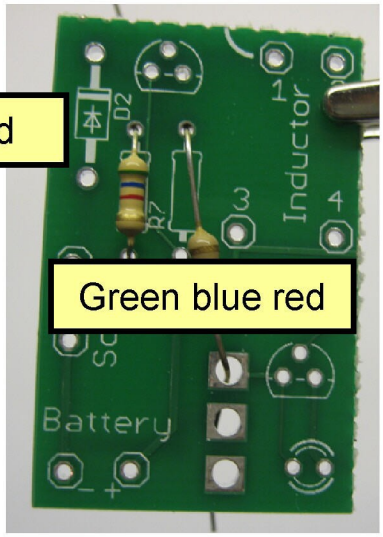


This bit covers the hole

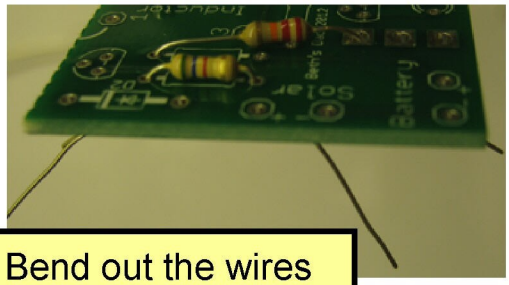
Red, red, orange

Through this big hole

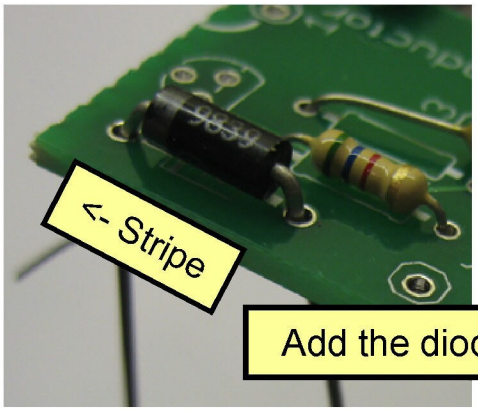
…and the second



Green blue red



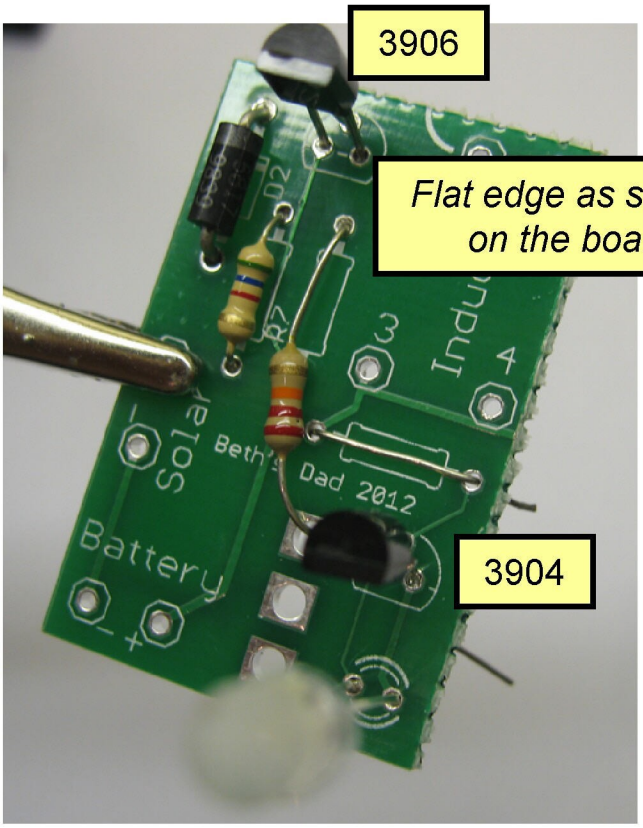
Bend out the wires to hold them



<- Stripe

Add the diode

3906



Flat edge as shown on the board

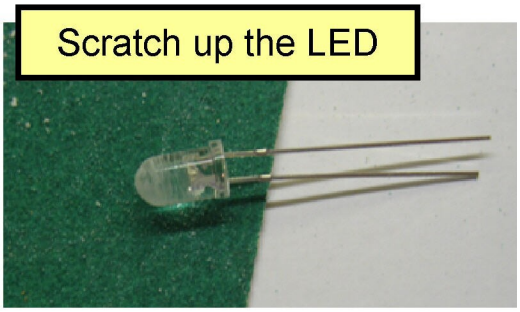
3904

Now add the transistors. The 3906 goes at the top and the 3904 (on the paper) goes at the bottom.

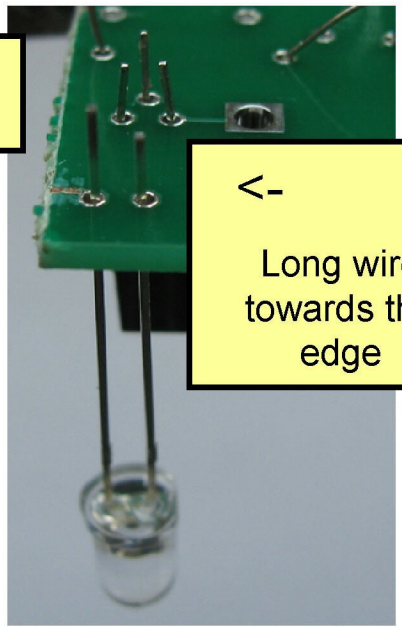
They go the way round that is printed on the board.

Solder!

Scratch up the LED

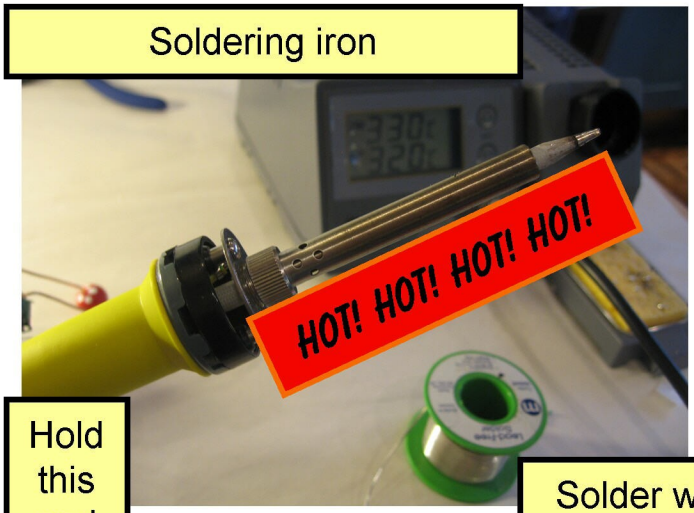


Add it to the board



<- Long wire towards the edge

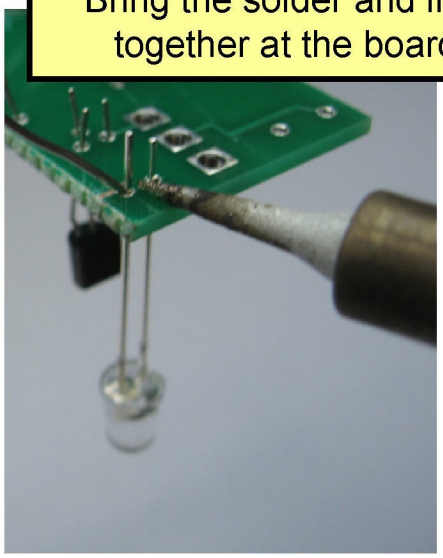
Soldering iron



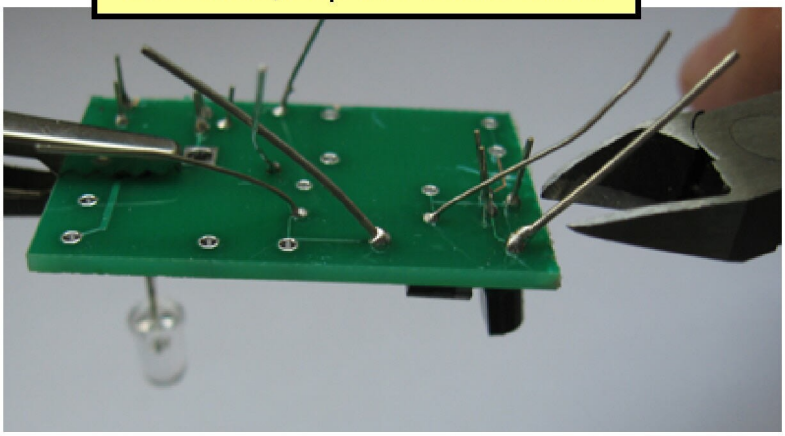
Hold this end

Solder wire

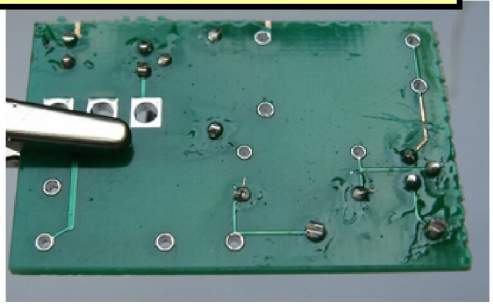
Bring the solder and iron together at the board



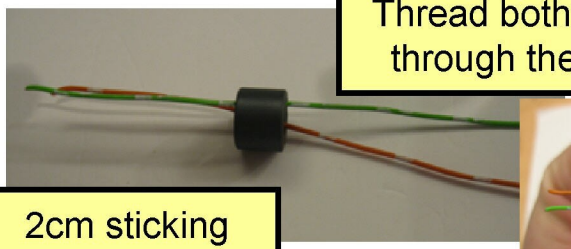
Once all the parts are soldered, clip the leads short



Nice & Neat

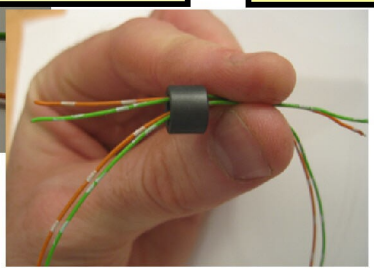


Make the torus

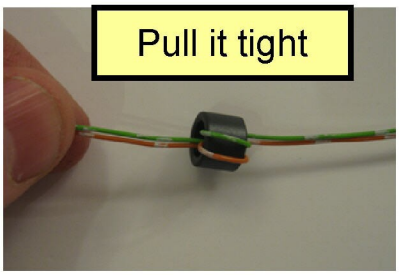


Thread both wires through the ring

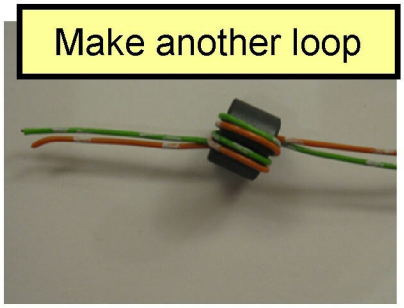
2cm sticking out



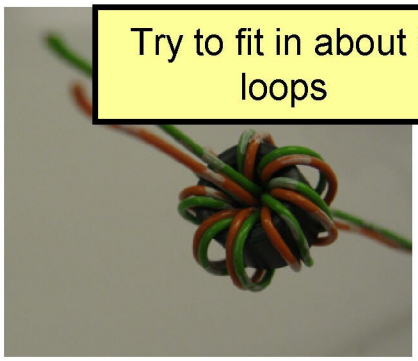
Loop the other end through



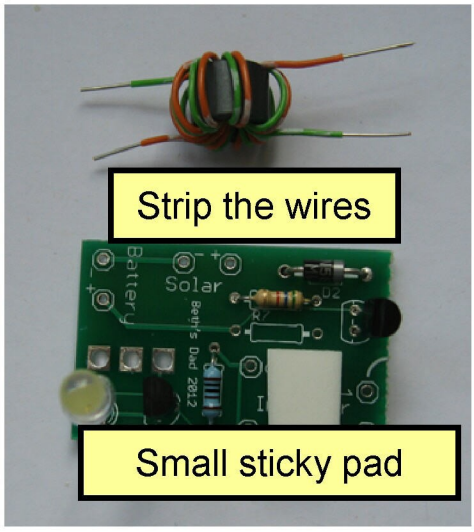
Pull it tight



Make another loop

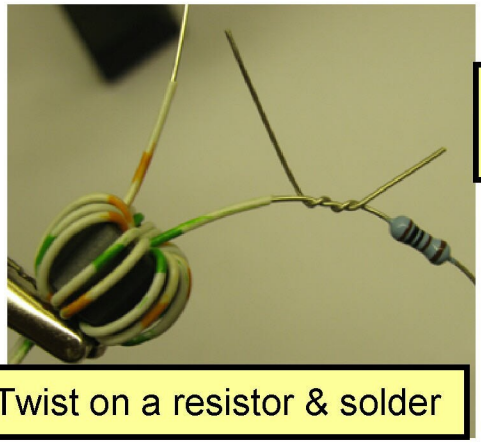


Try to fit in about 8 loops

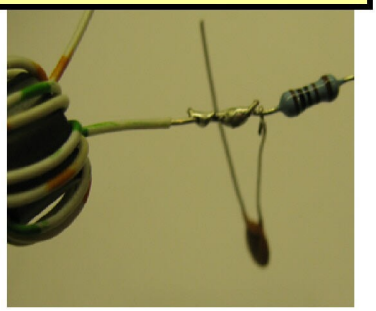


Strip the wires

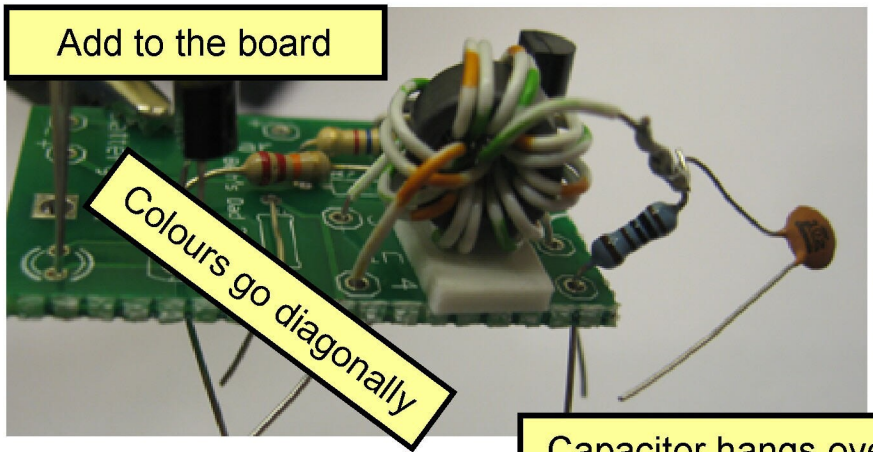
Small sticky pad



Twist on a resistor & solder



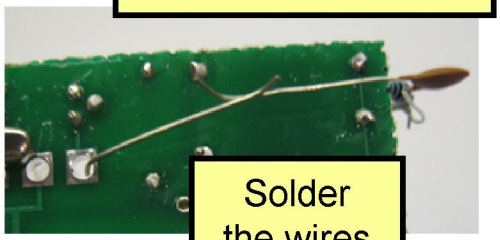
Add capacitor at the join



Add to the board

Colours go diagonally

Capacitor hangs over

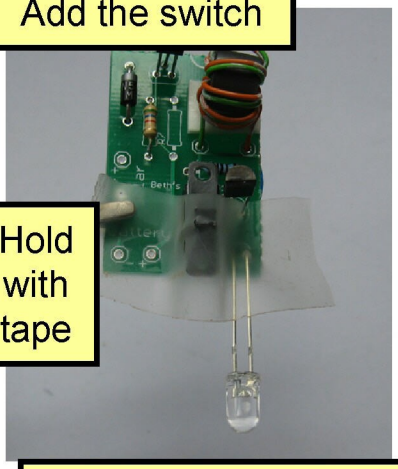


Finally, join the capacitor up at the bottom

Solder the wires

Switch and Power:

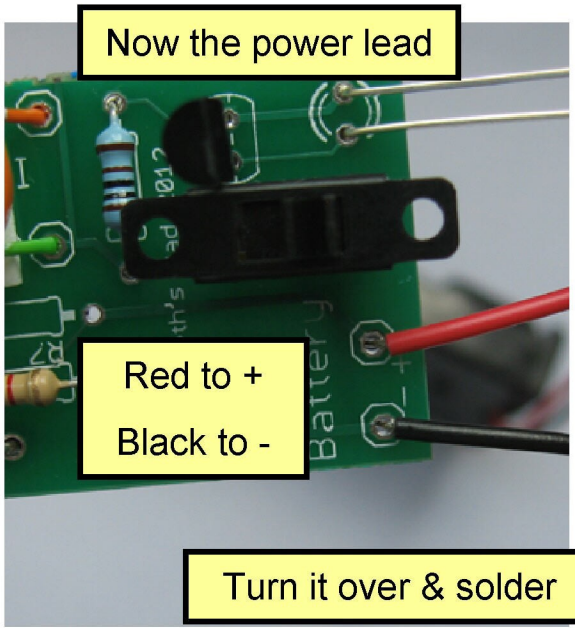
Add the switch



Hold with tape

Turn it over & solder

Now the power lead

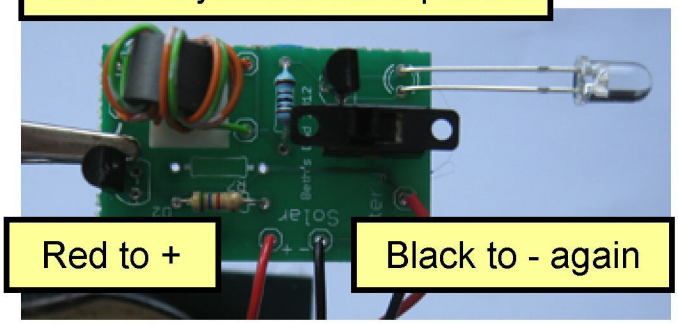


Red to +

Black to -

Turn it over & solder

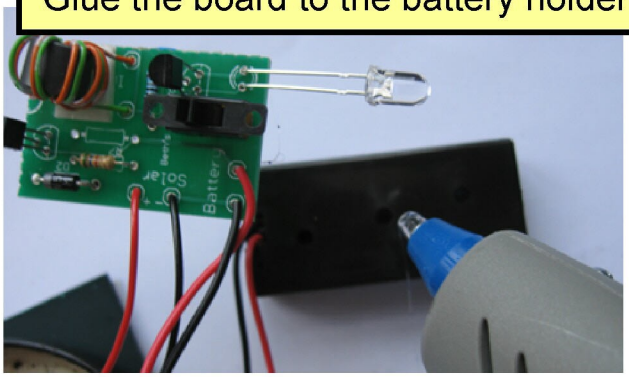
Last we join the solar panel



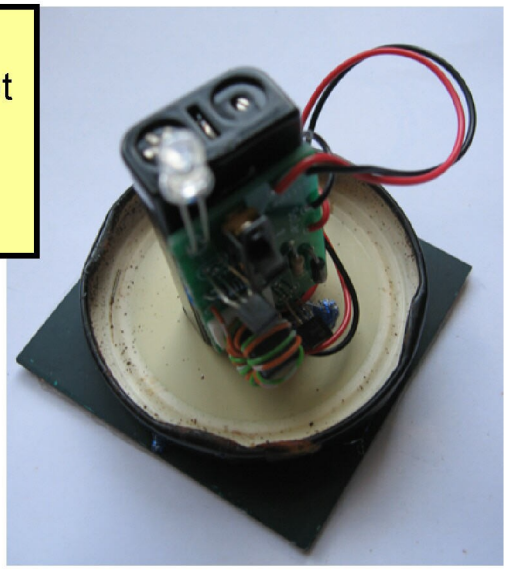
Red to +

Black to - again

Glue the board to the battery holder



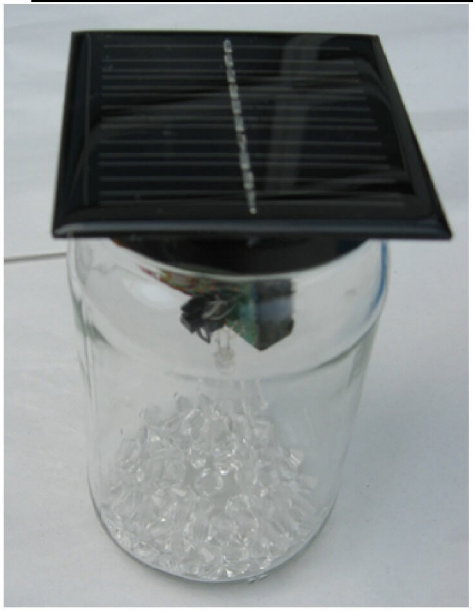
Now glue the whole lot to the bottom of the jar lid.



Decorate

Add some jewels to the jar

Screw on the lid



Paint & Use!