BOLDPORT CLUB

The Monarch

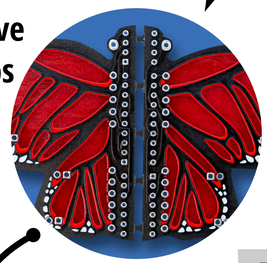
boldport.com/monarch

Designed by Boldport, manufactured by Eurocircuits

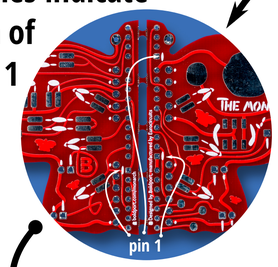
EURO CIRCUITS

Start

Break the two halves and remove excess tabs

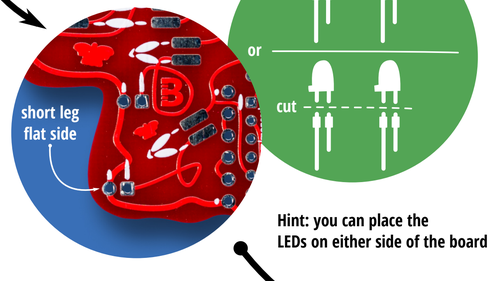


Place the three IC sockets. The small lines indicate the position of pin number 1



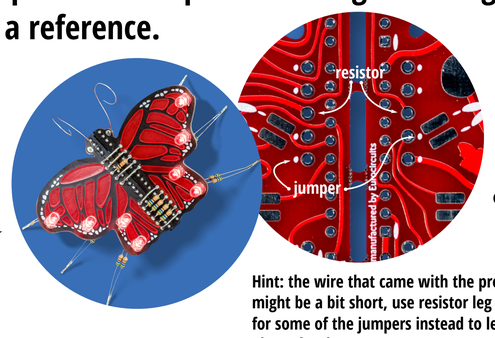
Now solder the sockets leaving a gap between the socket and the board

Prepare the LEDs



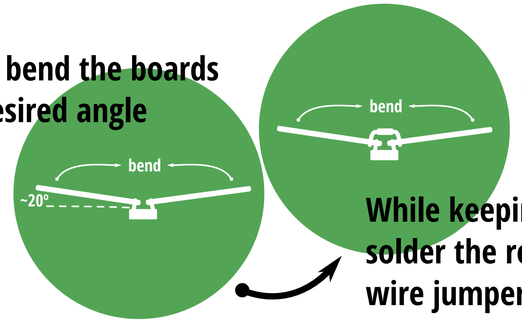
Hint: you can place the LEDs on either side of the board

Prepare the components using this image as a reference.



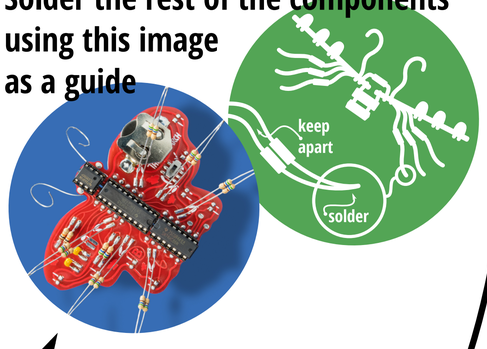
Hint: the wire that came with the project might be a bit short, use resistor leg clippings for some of the jumpers instead to leave plenty for the antennae

Gently bend the boards to a desired angle

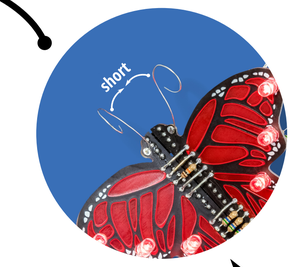


While keeping the angle, solder the resistors and wire jumpers.

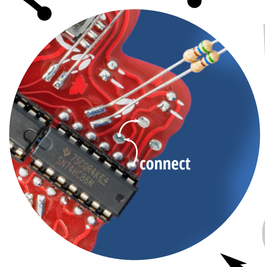
Solder the rest of the components using this image as a guide



Insert battery, turn switch on and touch the antennae together to activate the circuit!



Yay!



We left one XOR gate's inputs 'floating', unconnected, so that it could be used by you to try different LFSR arrangements. Leaving inputs floating is not good practice since it could lead, in this case, to higher power consumption under some conditions. We recommend using a short wire to connect the inputs to ground as shown.

The circuit will work without this modification.

Nothing's happening!

Did you notice that sometimes no LEDs are on when you switch the power on? Memory elements such as flip-flops have an undetermined on-state, so sometimes it happens that all of them start 'off'.

The problem is that an LFSR doesn't work when all registers are 'off' and a reset to a determined state on power-on was too much for this project.

What to do? Just try again until at least one LED is on when you turn the switch.

This circuit uses an LFSR or 'linear feedback shift register'. With the right feedback through XOR gates we can get all possible states of the amount of retistors, minus one. So here, 2^8 - 1, or 255. A 'formula' that exhibits this behaviour is called a 'maximal length polynomial'.

LFSRs are used as pseudo-random number generators. The output is random, but predictable. A true random number generator on the other hand is unpredictable.