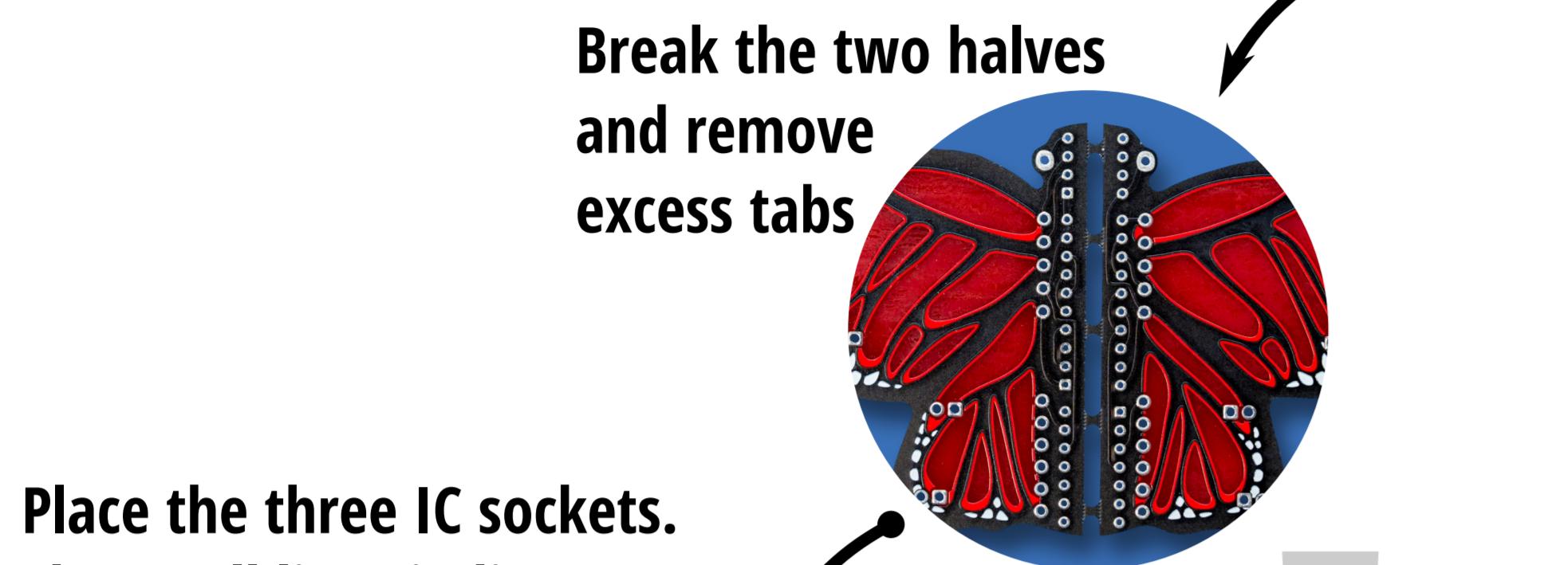




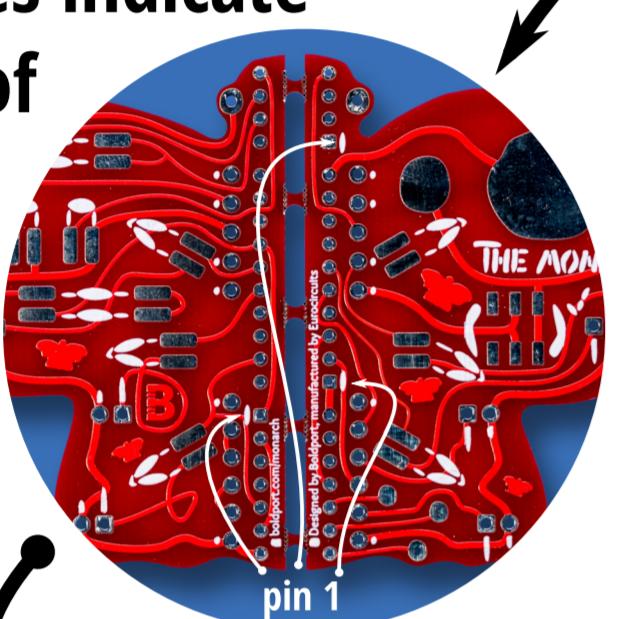
The Monarch

boldport.com/monarch
Designed by Boldport,
manufactured by Eurocircuits

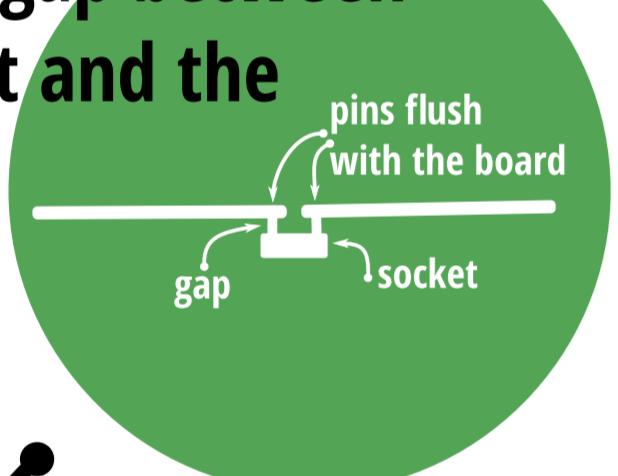
EURO
CIRCUITS



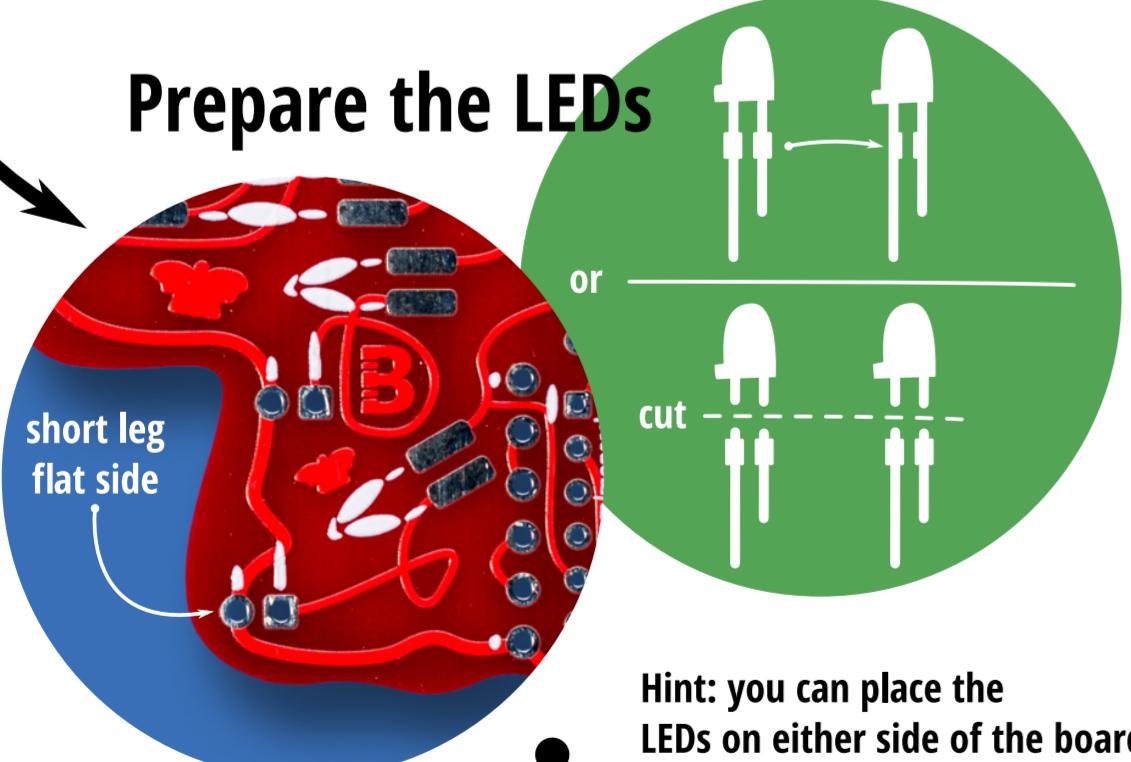
Place the three IC sockets.
The small lines indicate
the position of
pin number 1



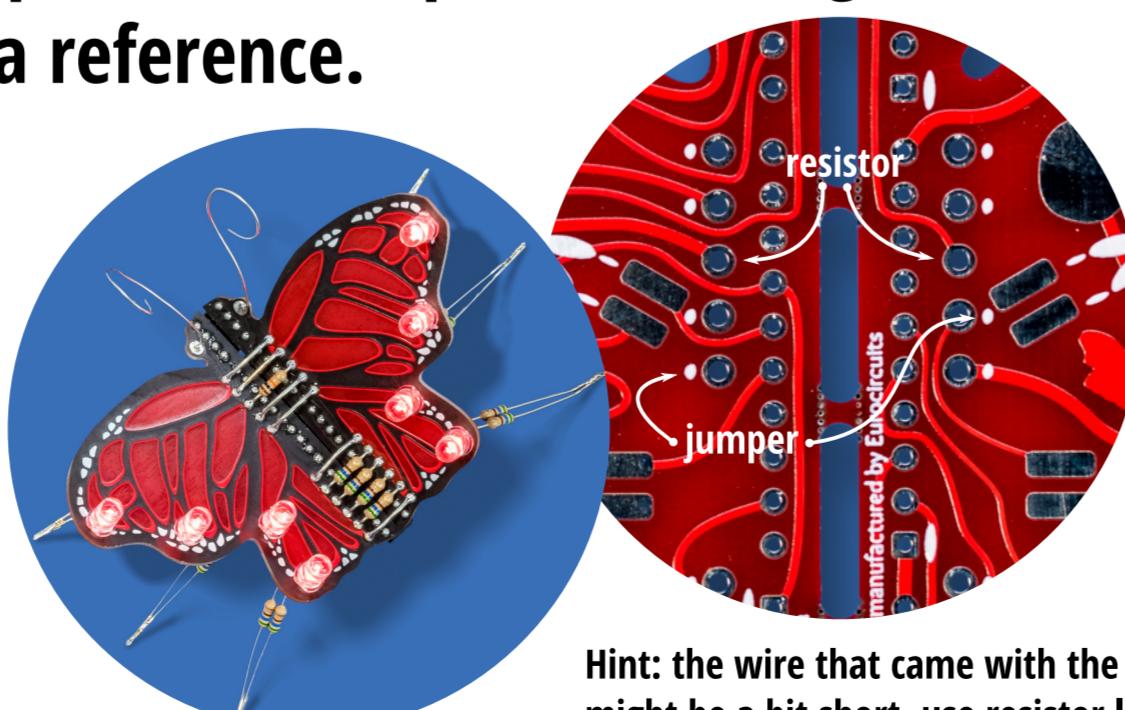
Now solder the sockets
leaving a gap between
the socket and the
board



Prepare the LEDs

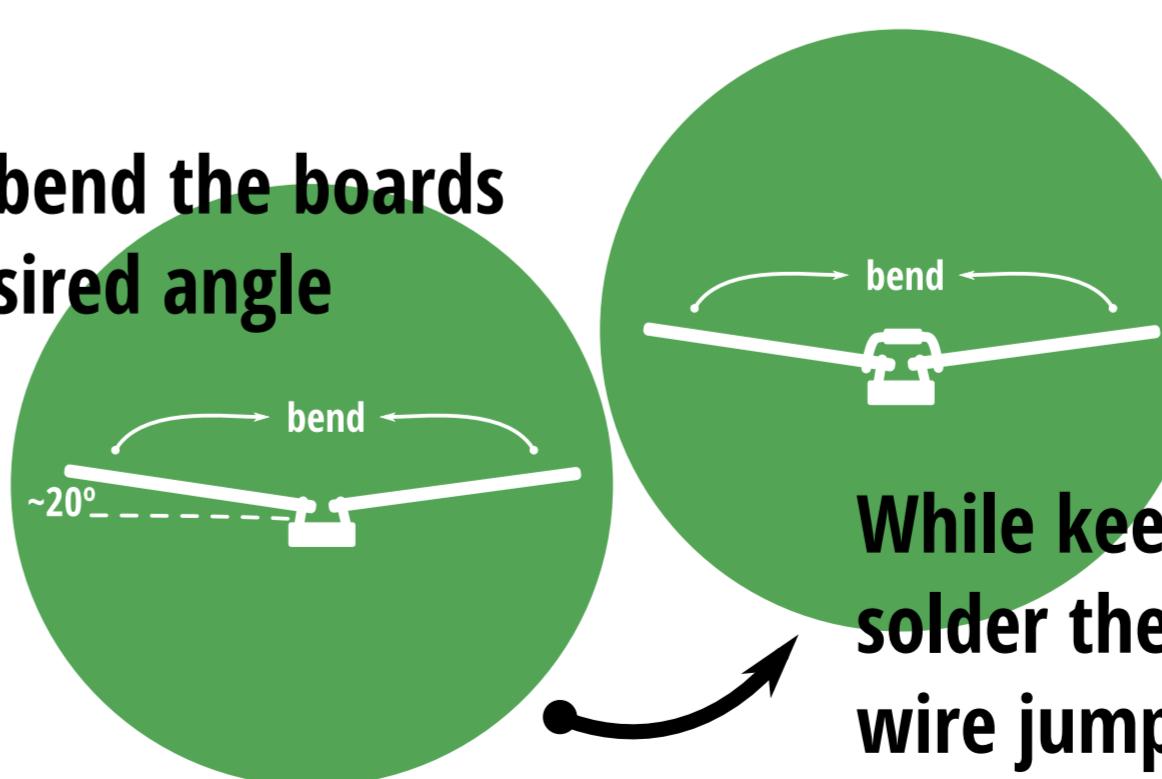


Prepare the components using this image
as a reference.



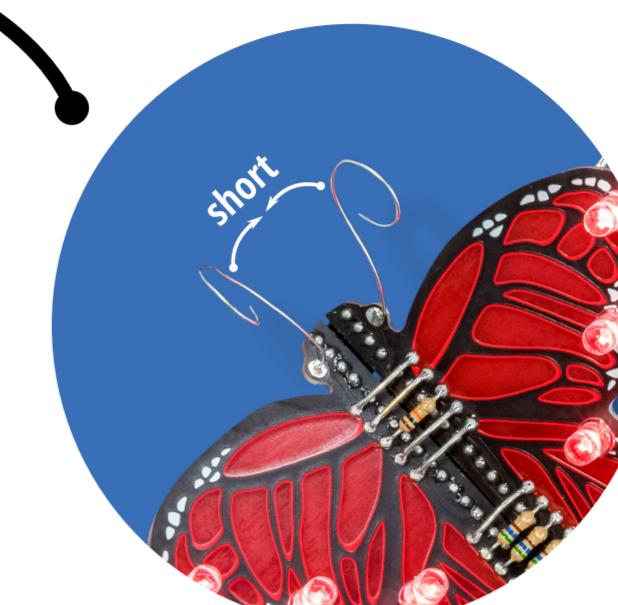
Hint: the wire that came with the project
might be a bit short, use resistor leg clippings
for some of the jumpers instead to leave
plenty for the antennae

Gently bend the boards
to a desired angle



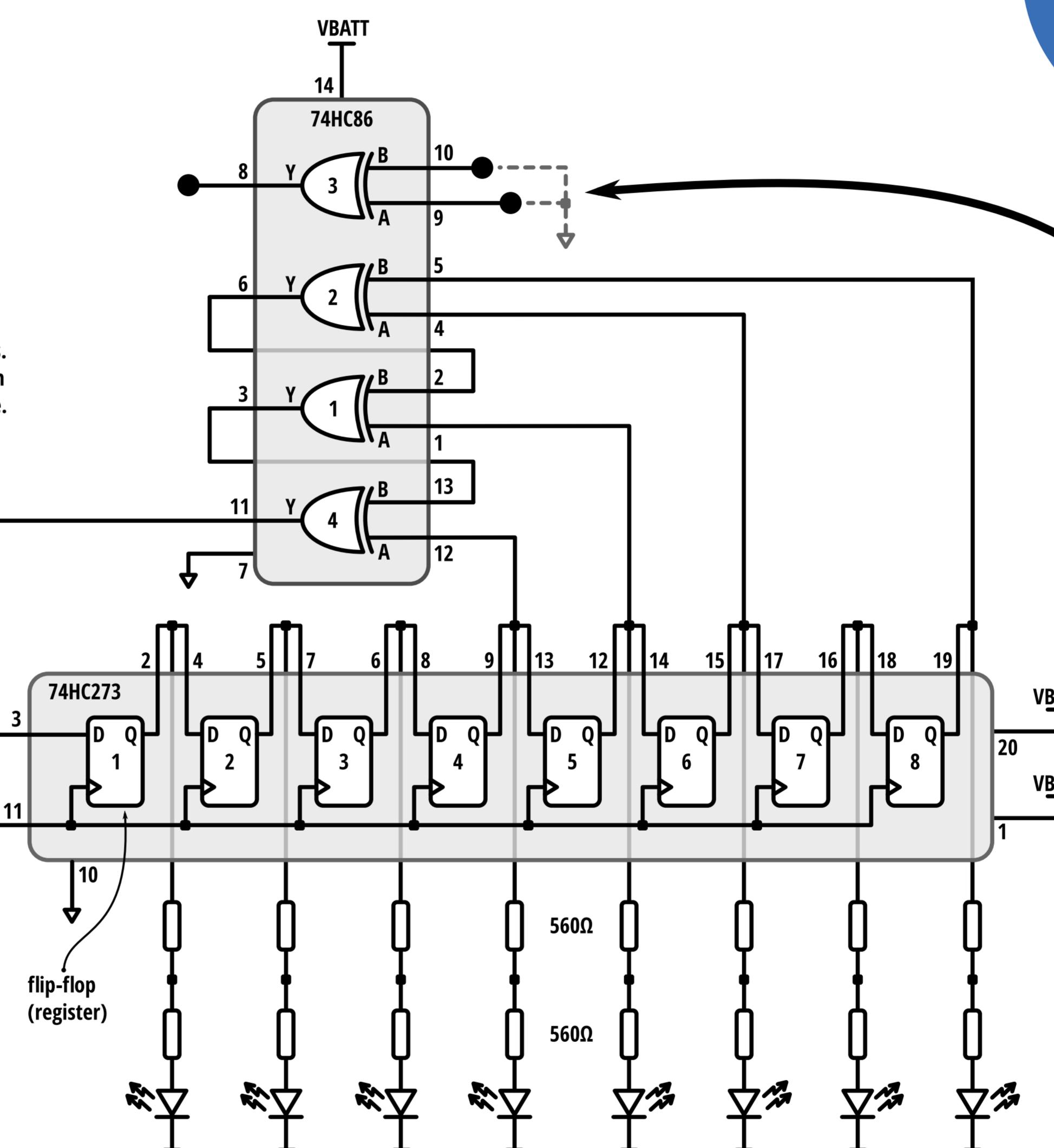
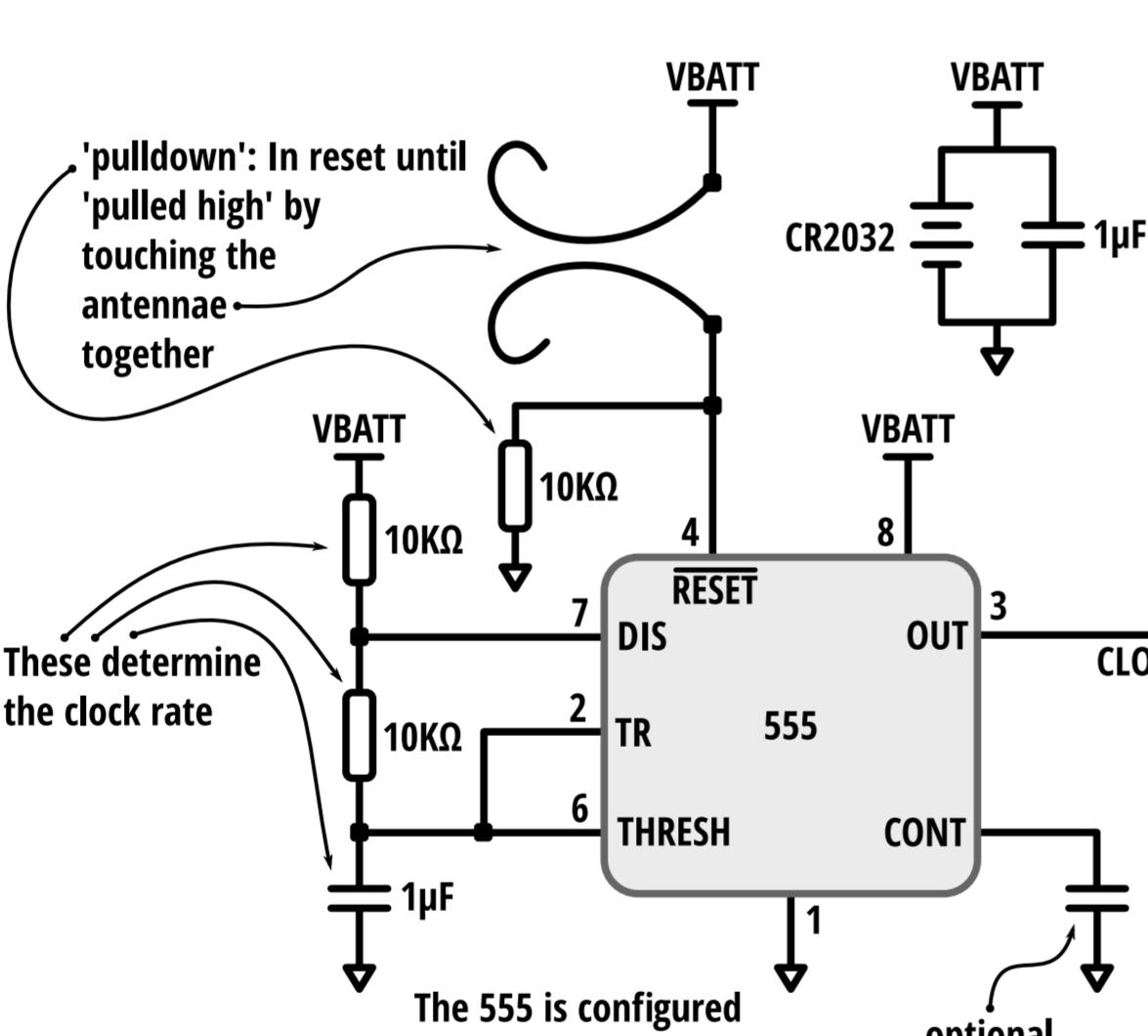
While keeping the angle,
solder the resistors and
wire jumpers.

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



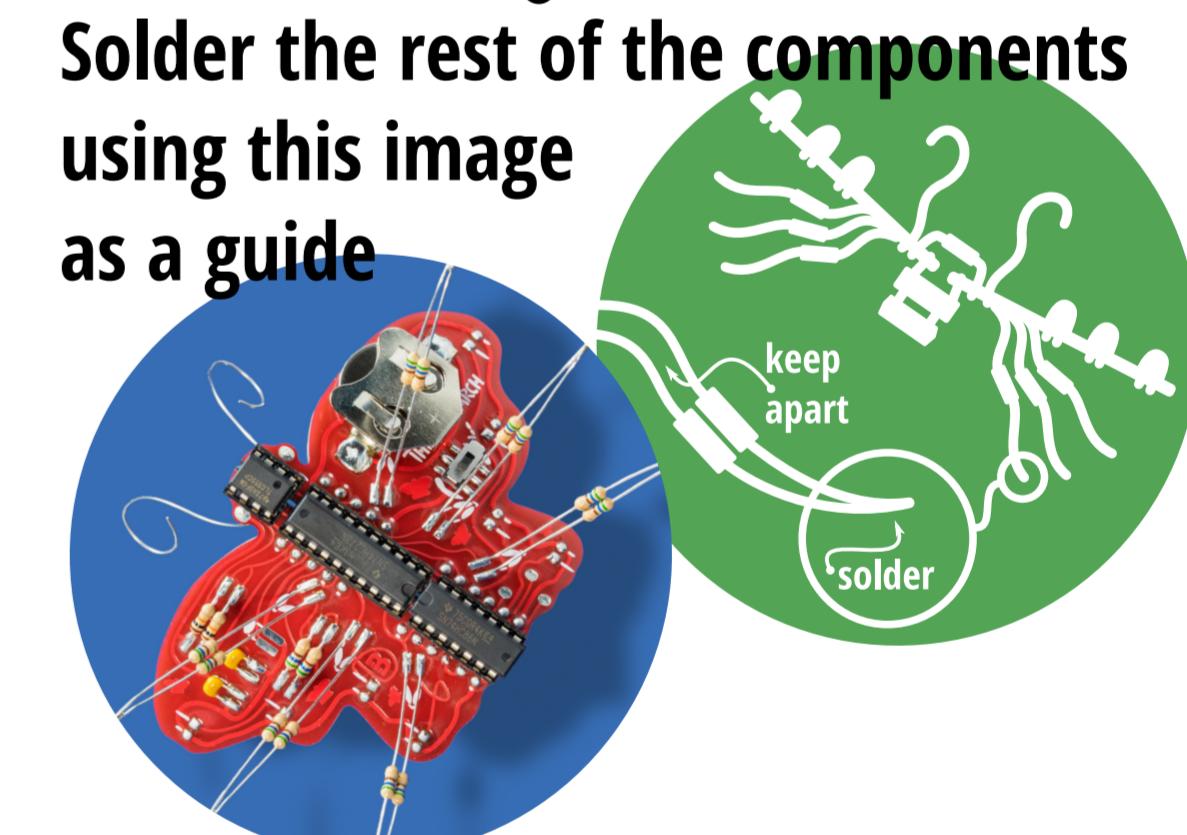
This circuit uses an LFSR or 'linear feedback shift register'. With the right feedback through XOR gates we can get all possible states of the amount of resistors, minus one. So here, $2^8 - 1$, or 255. A 'formula' that exhibits this behaviour is called a 'maximal length polynomial'.

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.



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 bad practice since it could lead to higher power consumption -- in the order of millamps in this case -- under some conditions. So even if the circuit will work without a fix, we strongly recommend using a short wire to connect the XOR's inputs to ground as shown.

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



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.