

In the Eighties ELEKTOR published in its review a small twinkling Christmas tree, I took as a starting point this idea to carry out that which will follow...

This little Christmas tree is 9 cm high and requires no programming, the animation of LED uses a single IC, the module for the melody need an old musical Christmas card.

**all schemes and doc are in a ZIP file at the end of this instructable**

I do not know English very well if you find mistakes in this instructable please leave me a message with the correction

Dans les années 80 ELEKTOR a publié dans sa revue un petit sapin de Noël clignotant ,je me suis inspiré de cette idée pour réaliser celui qui va suivre cet instructable est en Anglais mais dans le ZIP qui contient les schémas et les docs est il y a l' Anglais et le Français...

Ce petit sapin de Noël mesure 9 cm de haut, et ne demande pas de programmation, l'animation des led utilise un seul CI, pour la mélodie on utilise le module d'une ancienne carte de Noël musicale.

**USED EQUIPMENT:** (found in your country' stores electronic components )

epoxy presensitized 150x100mm (PCB)

iron solder and soldering 1mm diameter

0.8 mm drill and forest

cutter (to clean the burrs between tracks)

wirecutters

acetone (cleaning the PCBafter engraving)

Saw-metal compounds and small fine file (flat or triangular)

UV platesetter (to insolated the presensitized PCB )

developer (for exposed PCB)

ferric chloride (for the final burning of thePCB)

recipents plastic gloves and goggles

**COMPONENTS:**

8 x 3mm LED (different colors as you lake)

1 x IC CD4060 (CMOS 14 Stage Ripple-Carry Binary Counter/Divider and Oscillator)

1 x 14-pin IC holder double type lyre (for easy folding pin)

**resistors (all of 1/4 or 1/2 Watt)**

6 x 560 Ohms ( to 560 up to 1000 Ohms it depends on the brightness and battery life you want )

1 x 1 Kohm

1 x 10 Ohms

1 x 33 Ohms

1 x 100 Ohms

**capacitors:**

1 x 10 uF 16 or 25 Volts (to 10uF up to 33uf)

1 x 100nF (to 100nF up to 220nF it depends on the blink rate you want )

diodes:

1 x 1N4148 (or 1N914)

1 x Zener 3,3Volts

**various:**

some Christmas picture

Christmas picture (I have attached a print-ready)

1 x 9 volt battery or a small 9 volt block (filtered and regulated)

like this:





The formula of computation of the oscillator is the following one :  $F_{osc} = 1 / (2,3 \times R_9 \times C_1)$   
 $R_9 = 33000 \text{ Ohms}(33K)$   $C_1 = 0,0000001 \text{ Farad}(100nF) \Rightarrow F_{osc} = 1 / (33000 \times 0,0000001) = 303$   
 Hertz

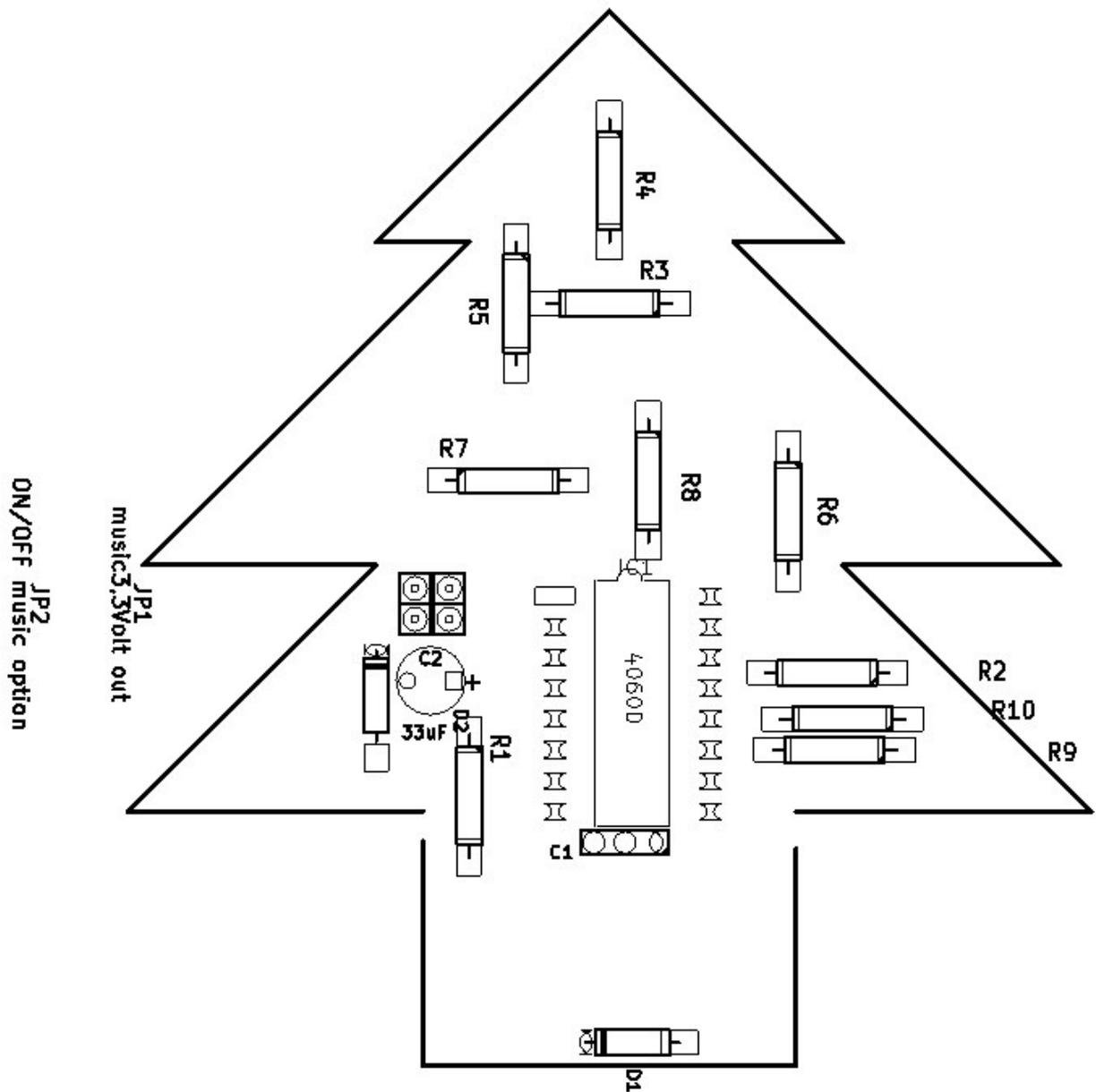
the output Q4 was  $303/4 = 75.7 \text{ Hz}$  Q5 was  $303/5 = 60.6 \text{ Hz}$  ect ....

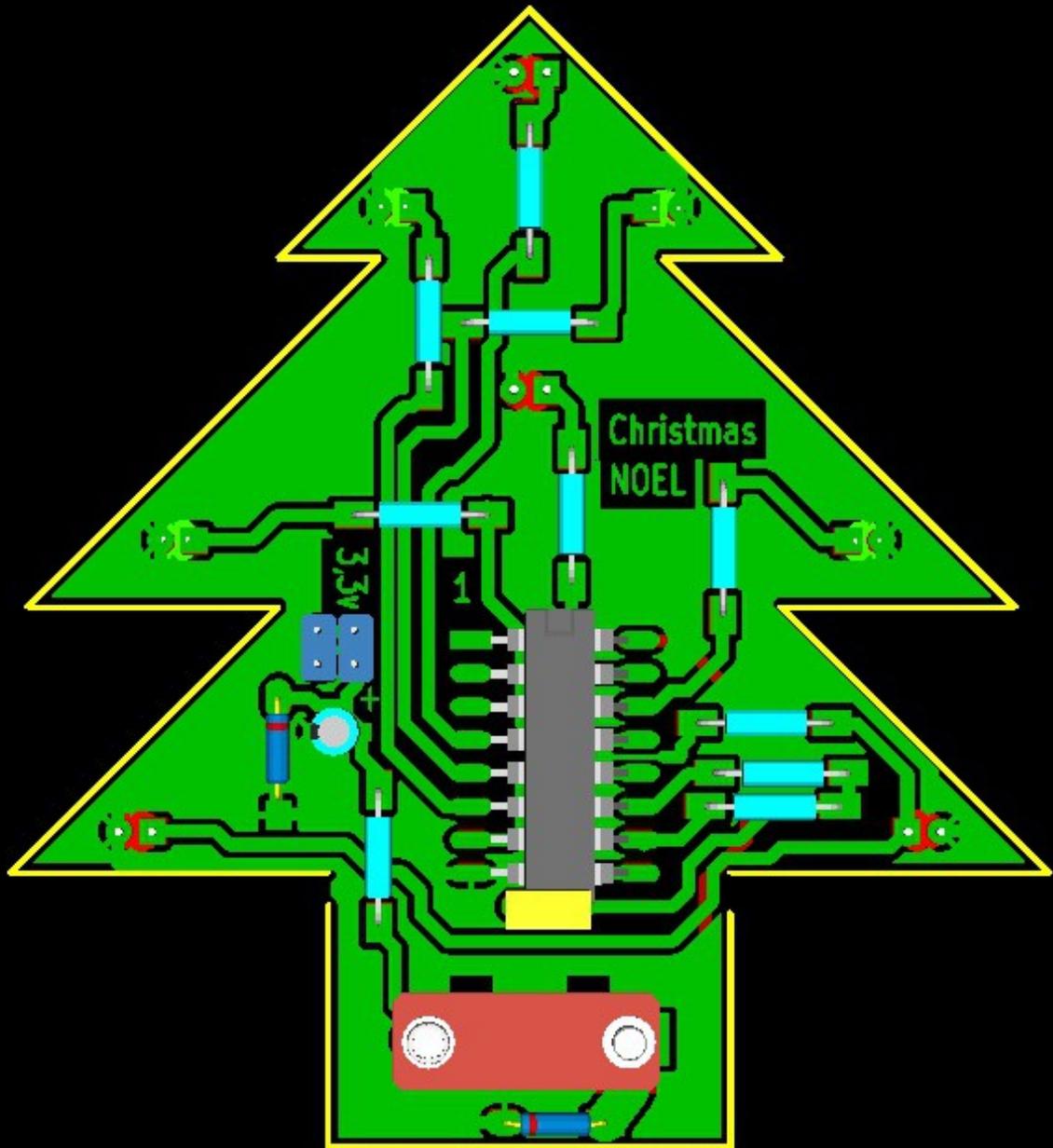
the resistor R10 should be between 2 and 10 times R9

There is also possible to connect a music module ( recovered from a Christmas card ) these modules work with two 1.5 volt button battery connected in series or battery 3V type CR2016 or CR2032 for these models a 3.3 volt zener diode and a resistance of 56 ohms or 5.1 volts and a resistance of 39 Ohms used to adjust the voltage of the 9V battery musical module .

Some works with a 1.5 volt battery and a small tip , it is possible with the same 9 volt battery for it I combined three 1N4148 diodes in series with a resistor 10KOhms the voltage drop of a diode is approximately 0.6 Volts , the addition of 10 microfarad capacitor acts as a reservoir.

In this instructable , I described the model using a musical module 3.3 Volts . , The fourth diode 1N4148 is a power actuator .

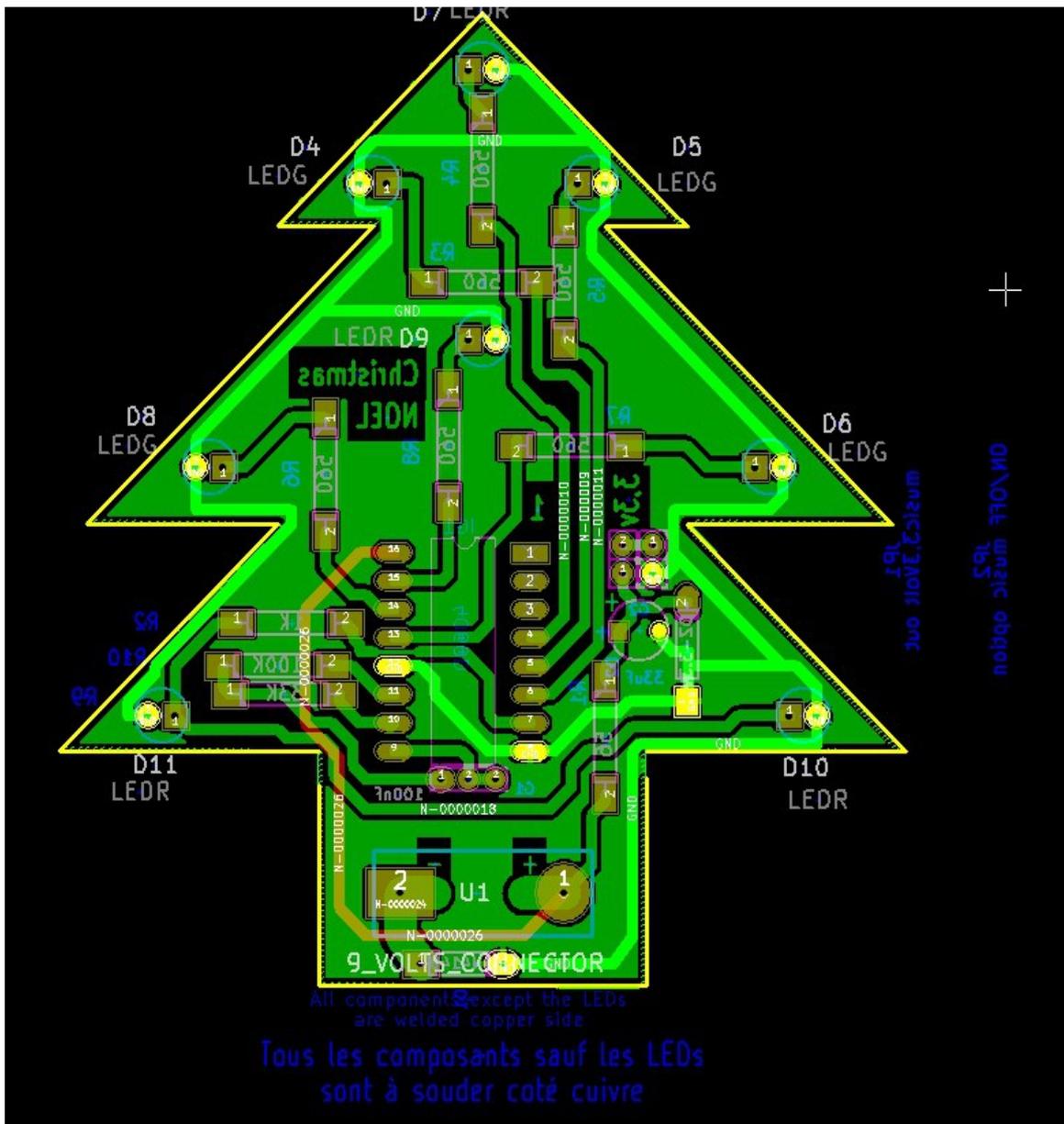




Tous les composants sauf les LEDs  
sont à souder côté cuivre

All components except the LEDs  
are welded copper side

do not forget the link between pin 16 and the + supply  
ne pas oublier le shunt entre la broche 16 et le + pat



All components except the LEDs are soldered copper side the procedure is as follows: CI to support the resistance of the pin musical module , capacitor , diodes and bend the legs to the horizontal , cut to length and weld like CMS , weld pressure 9V (without the sheath ) and the shunt supply 4060, solder the capacitor 10 mF ( upside down) on the + and - terminals of the power of music module. Glue the decorative side component ( I have attached a model) and the varnish , then drill and solder the LEDs.

CAUTION: Do not forget the shunts (red wire on the screenshot) that connects the battery to the + CI 4060

for those who do not want to use Kicad, here is the PCB (mirrored)

Just print it on transparent ink jet or laser.

attention should be writing upside down on the transparent

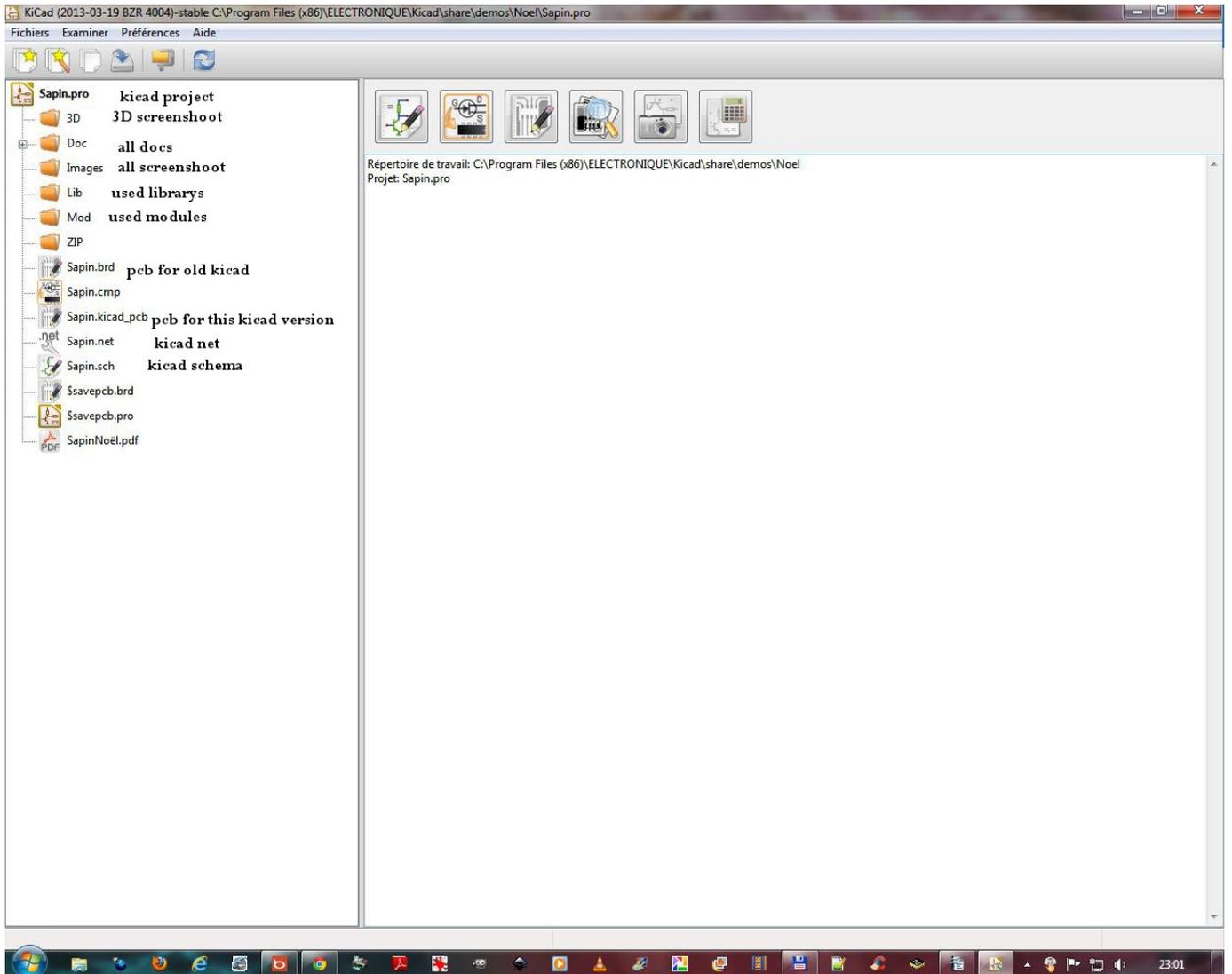
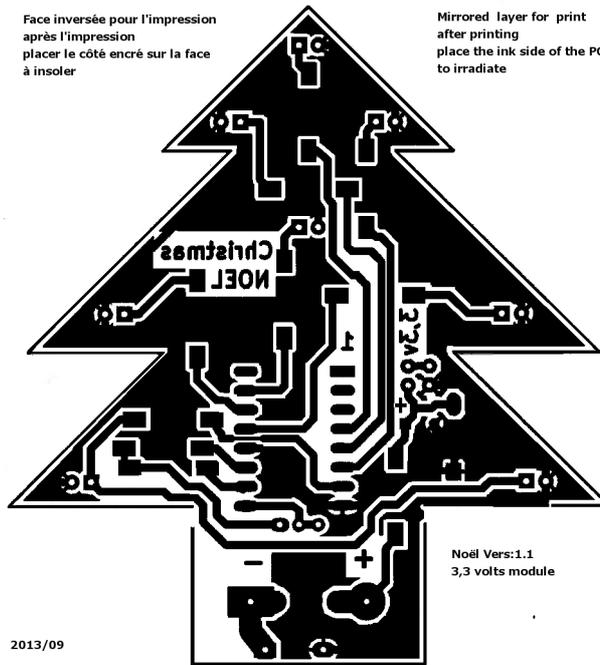
Then you tape it on the PCB side inked on copper sensitized and exposing with UV platesetter

Tip: If you use an inkjet, it is best to make two transparent

and tape them together, overlapping carefully, it gives better results in the burning of PCB.

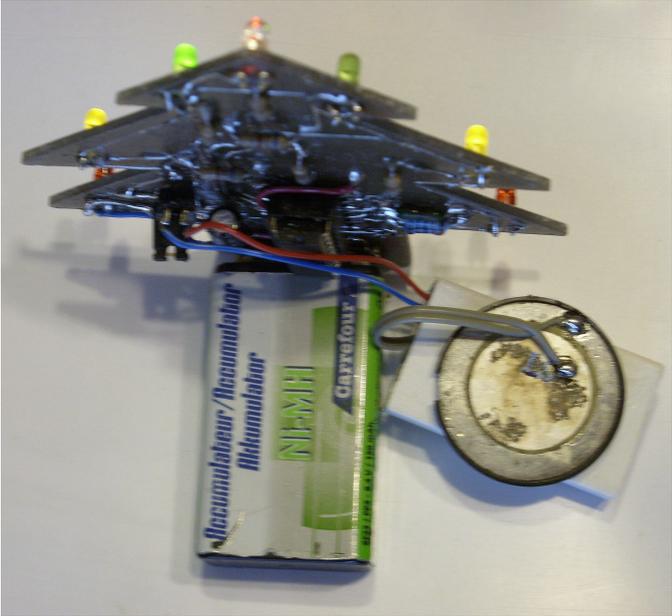
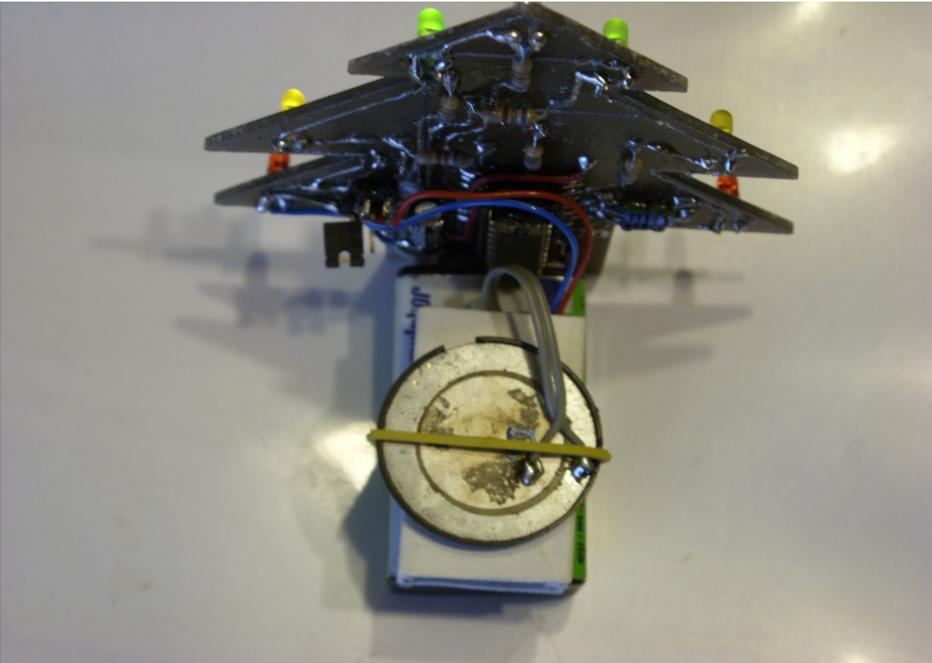
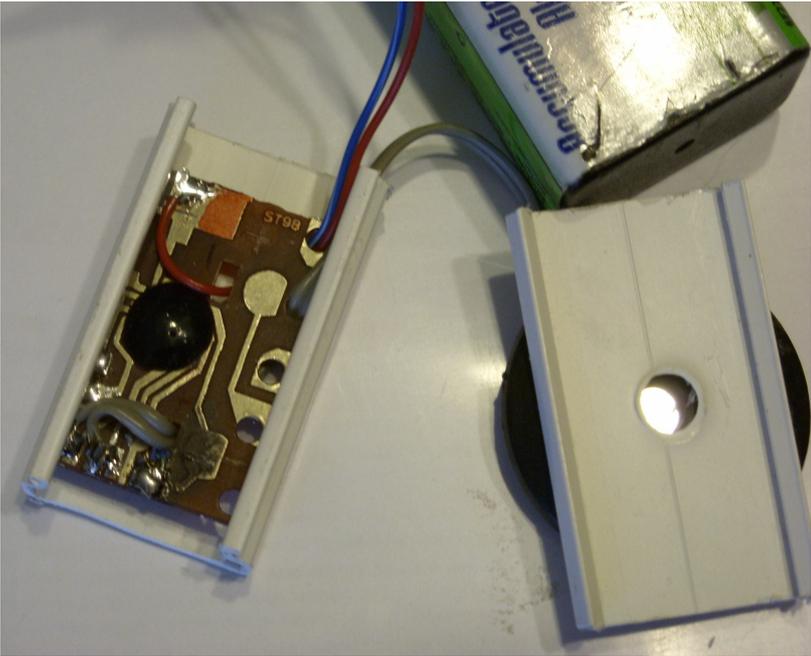
Face inversée pour l'impression  
après l'impression  
placer le côté encré sur la face  
à insoler

Mirrored layer for print  
after printing  
place the ink side of the PCB  
to irradiate



Here is a screen capture with a description Kicad files

some images and screenshots :





THE LINKS :

*some PDF Guides :*

***Understanding and Interpreting Standard-Logic Data Sheets :***

<http://www.ti.com/lit/an/szza036b/szza036b.pdf>

***Logic Guide :***

<http://www.ti.com/lit/sg/sdyu001z/sdyu001z.pdf>

***CD4060 Datasheet :***

<http://www.alldatasheet.com/datasheet-pdf/pdf/26880/TI/CD4060.html>

Kicad and some library and video at these links ::

<http://www.kicad-pcb.org/display/KICAD/KiCad+EDA+Software+Suite>

<http://iut-tice.ujf-grenoble.fr/kicad/>

<http://www.kicadlib.org/>

<http://www.youtube.com/watch?v=rkQ0nVX1q1k>

here is the video link of the Christmas tree :

<http://youtu.be/ktTYQQfbQ-k>

**BONNES FÊTES DE FIN D'ANNEE  
HAPPY END YEAR**