Revision 1, 2020-12-27 by FRC

This is a short DIY guide I made for fixing Beelink's U57 annoying fan-noise issue.

The background story…

The U57 is a pretty nice (and cheap) mini-PC equipped with an Intel Core-i5 5257U, 8GB RAM and 256GB-SSD for about 230€ (as of November 2020).
The machine is pretty OK for the price, BUT the fan sounds like a ***hairdryer*** and it's spinning up/down every few seconds even then the CPU is cool around 30°C.
I did not find that so cool… as you may guess.

Of course, I've tried to contact Beelink support a couple of times and they were actually coming back – but despite sending me a "new" BIOS and EC firmware they never really fixed the problem.
As I am an electronics & firmware engineer I decided to take a look and found that the issue lies in the firmware of the ENE KB930 embedded controller which controls the fan.
I've offered my help in fixing that problem, because I am pretty familiar with 8051 microcontrollers, but Beelink was never reacting.

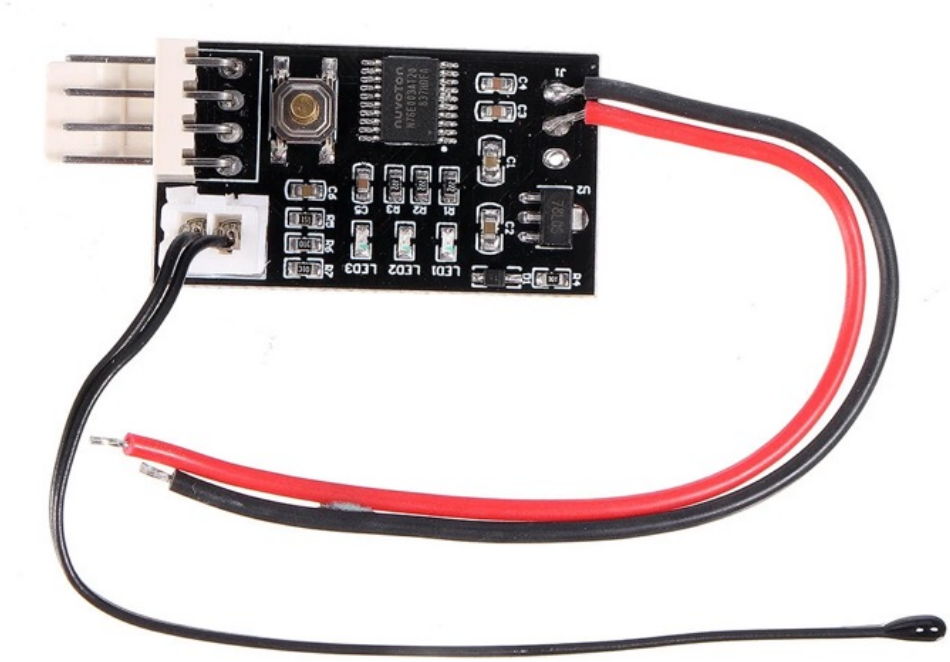
So, I decided to fix the problem by another way – by simply adding a temperature controlled and programmable PWM fan controller.
Note however that this will void your "warranty" – but with Chinese products you usually have no *real* warranty anyway…

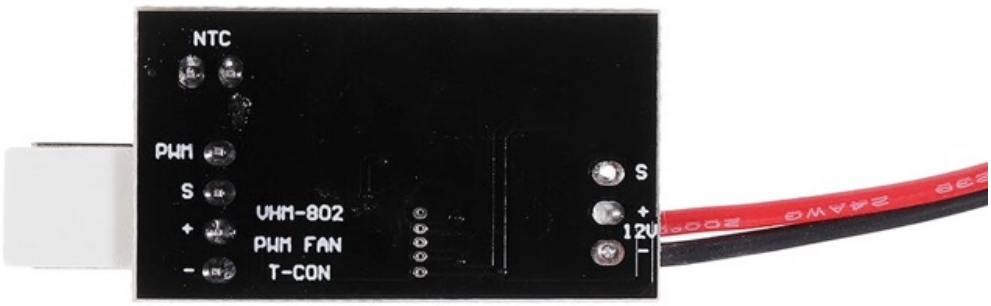
DISCLAIMER:

Use this DIY guide purely "at your own risk". It will void your warranty.
I am not responsible for any injury or damage due to the misuse or misunderstanding.
As with any DIY project, unfamiliarity with the tools and process can be dangerous.
If you are at all uncomfortable or inexperienced working with electronics, please keep your hand off. It is very possible on any DIY project to damage your property, void your property insurance, create a hazardous condition, or harm or even kill yourself or others.
And finally, always remember: safety comes first!

1.)Preparation – tools needed

- Philips screwdrivers (PH0, PH00)
- tweezers, a small side cutter
- soldering iron, flux + solder
- write stripper for tiny wires (or a cutter)
- double sided sticky tape (the foamy type about 1mm thick)
- shrinking tube with approx. 1-2 mm diameter
- hot-air gun or a lighter for shrinking the tube
- an ESD safe workplace
- thermal grease (any “thick one” will do): https://www.banggood.com/30g-Heatsink-Thermal-Grease-Compound-Paste-Syringe-Tube-p-959239.html
- fan controller board with PWM: https://www.banggood.com/VHM-802-1-Channel-12V-PWM-Four-wire-Fan-Temperature-Control-Governor-For-Chassis-Cabinet-Computer-with-Thermal-Probe-p-1662910.html



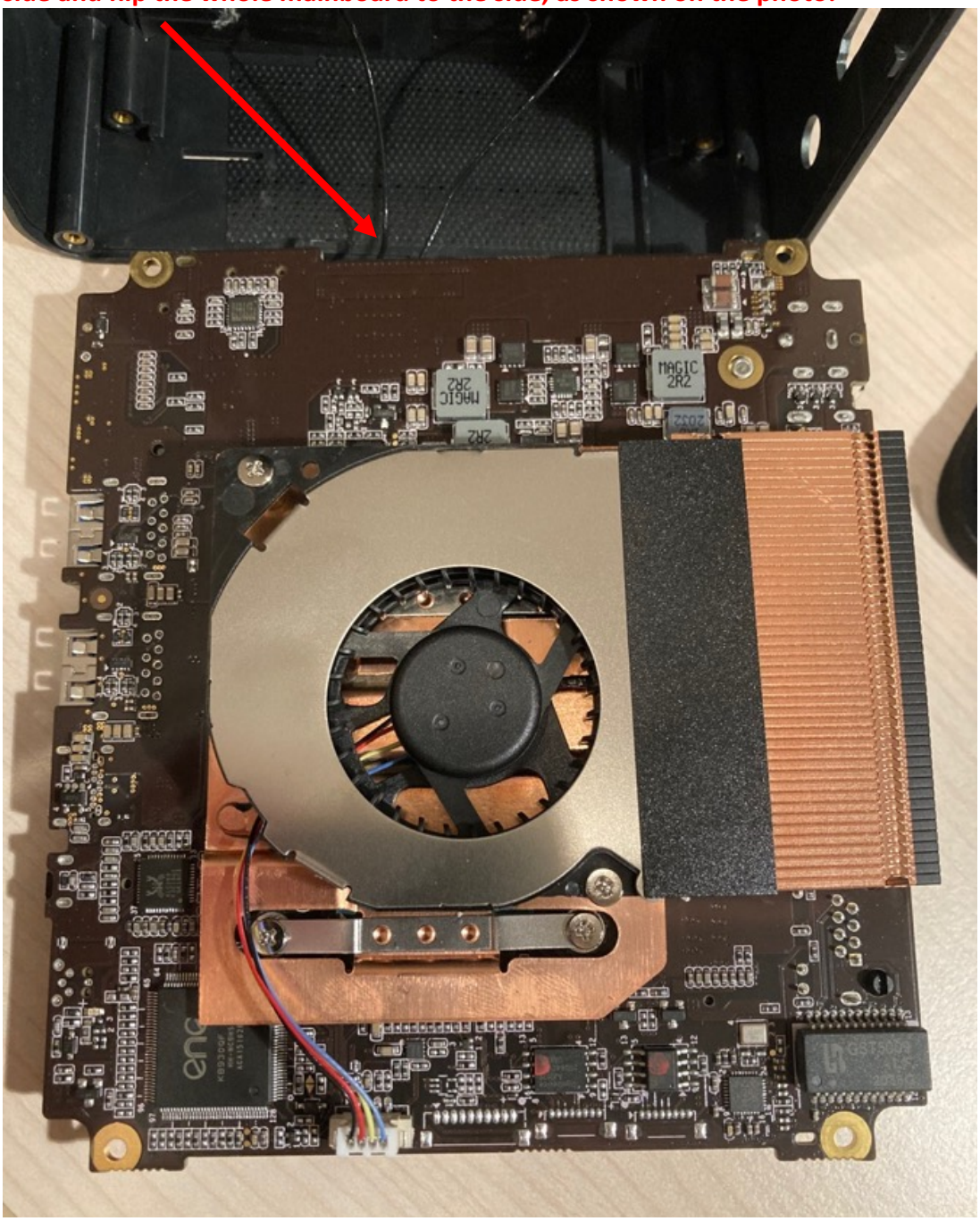


1.)How the final U57 should look like…

- After following this guide, you should have something similar to what you see here
- **NOTE: Please read the guide first and check for yourself if you are able to do all the things. Do not attempt to continue if you are not feeling comfortable.**
- The fan-controller board is stuck to the heat-sink using double-sided-tape
- The thermal sensor is placed in a groove below then fan with some thermal grease
- The sensor cable is secured by routing it through a mounting-hole of the fan
- The fourth wire on the fan connector (blue) was insulated using a shrinking tube

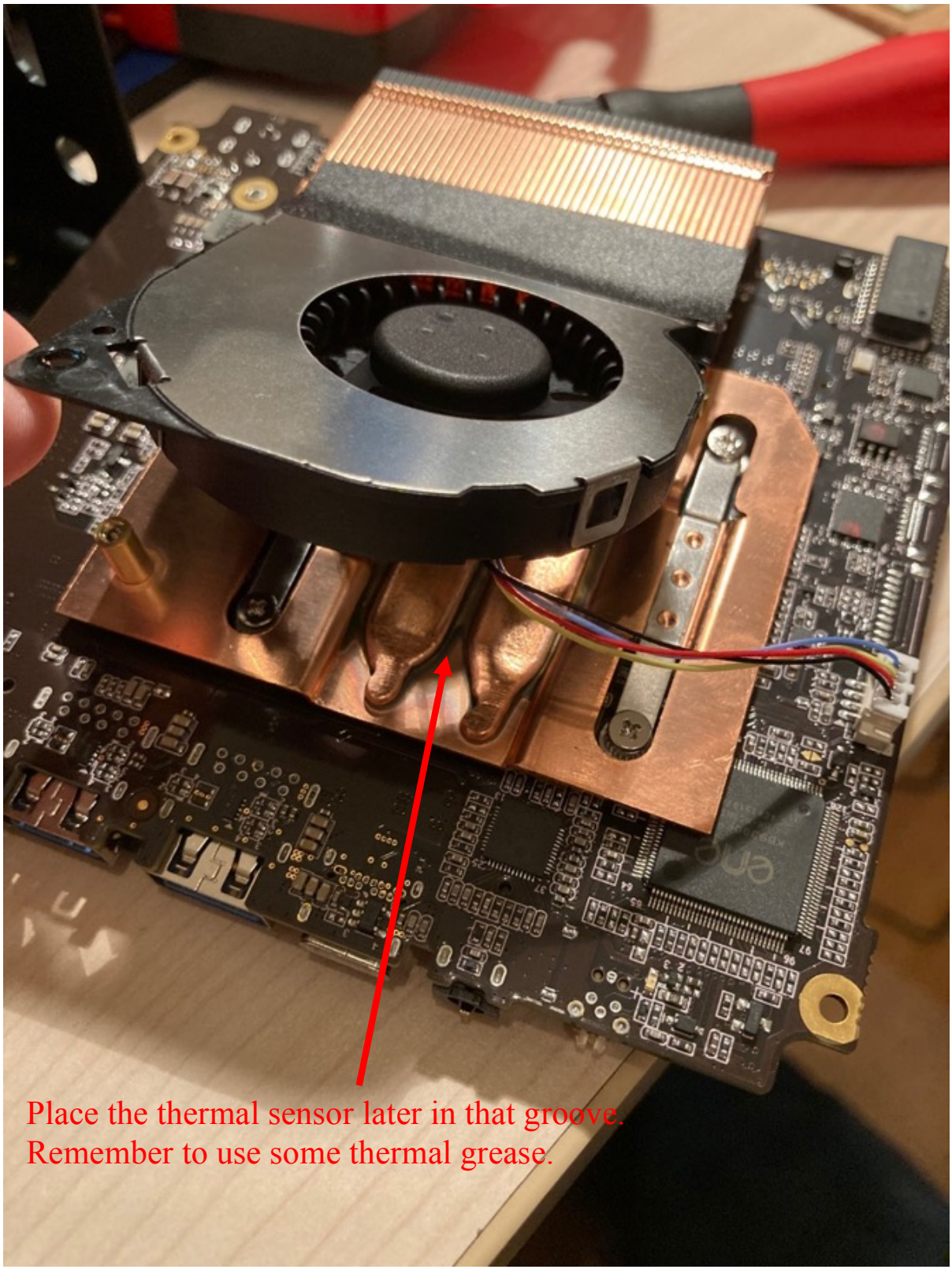
2.)Opening the U57

- Use the Philips screw driver PH0/PH00 to remove the bottom of the housing.
- Unscrew the 4 silver screws holding main board. Be careful not to damage any components.
- NOTE: intentionally I do not provide any more details on how to safely open the U57. You have to feel comfortable of doing this by yourself – else **DO NOT CONTINUE** for your own safety.
- Carefully lift the mainboard out.
  ATTENTION! The WIFI antennas are soldered to the WIFI boards and the cables are short!! Don't lift the side where the WIFI board is too much – instead, lift the other side and flip the whole mainboard to the side, as shown on the photo:



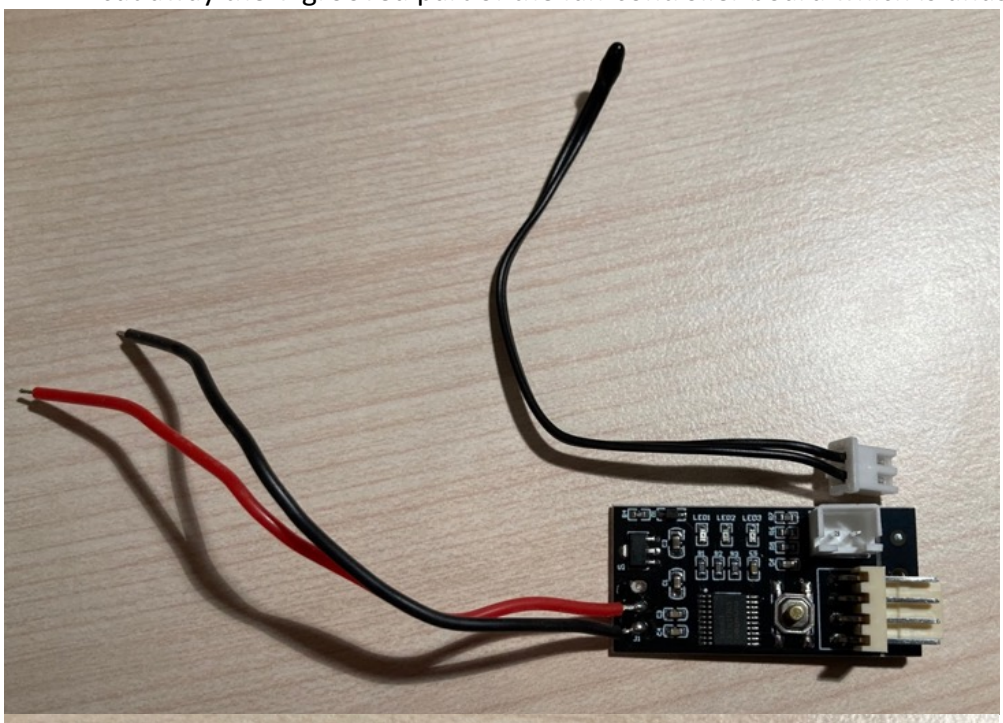
3.)Unscrew the fan

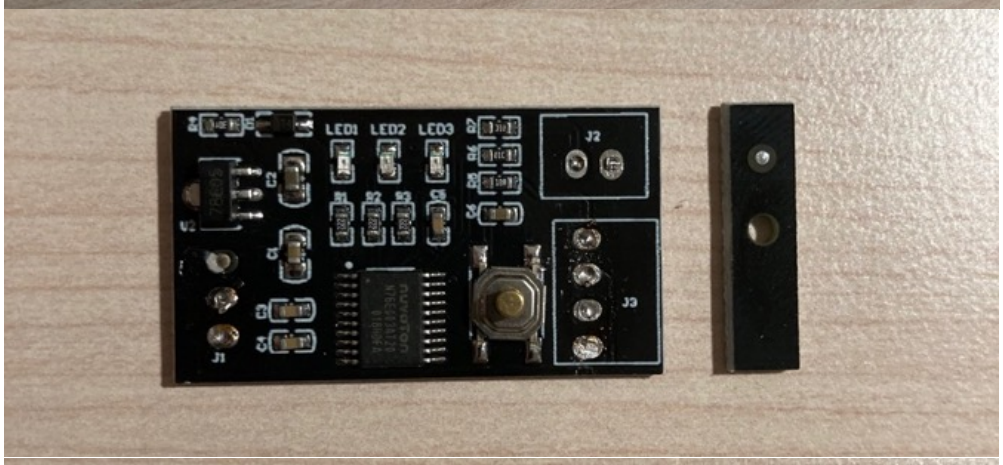
- Disconnect the fan cable
- Use the Philips screw driver PH0/PH00 to unscrew the fan.
- The thermal sensor will be placed at the marked spot using some thermal grease.
- Put the U57 aside for now.

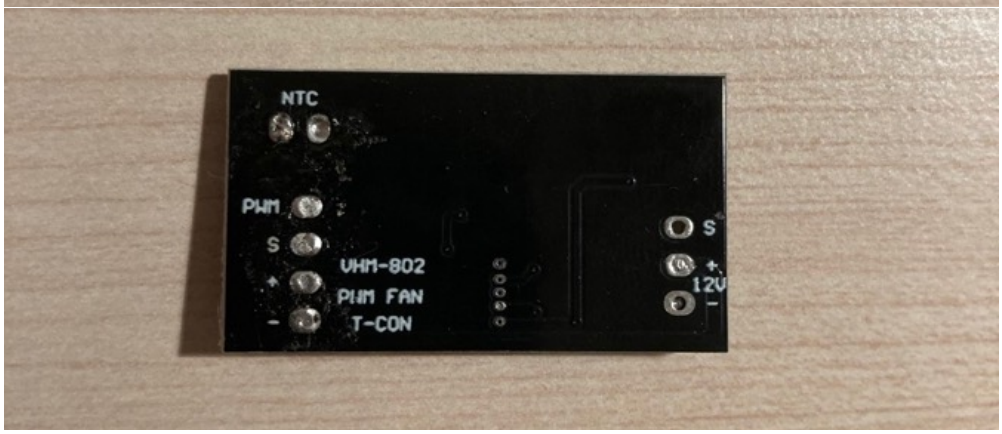


4.)Prepare the fan-controller board

- De-solder all connectors from the fan-controller board
- cut away the V-grooved part of the fan-controller board which is unused

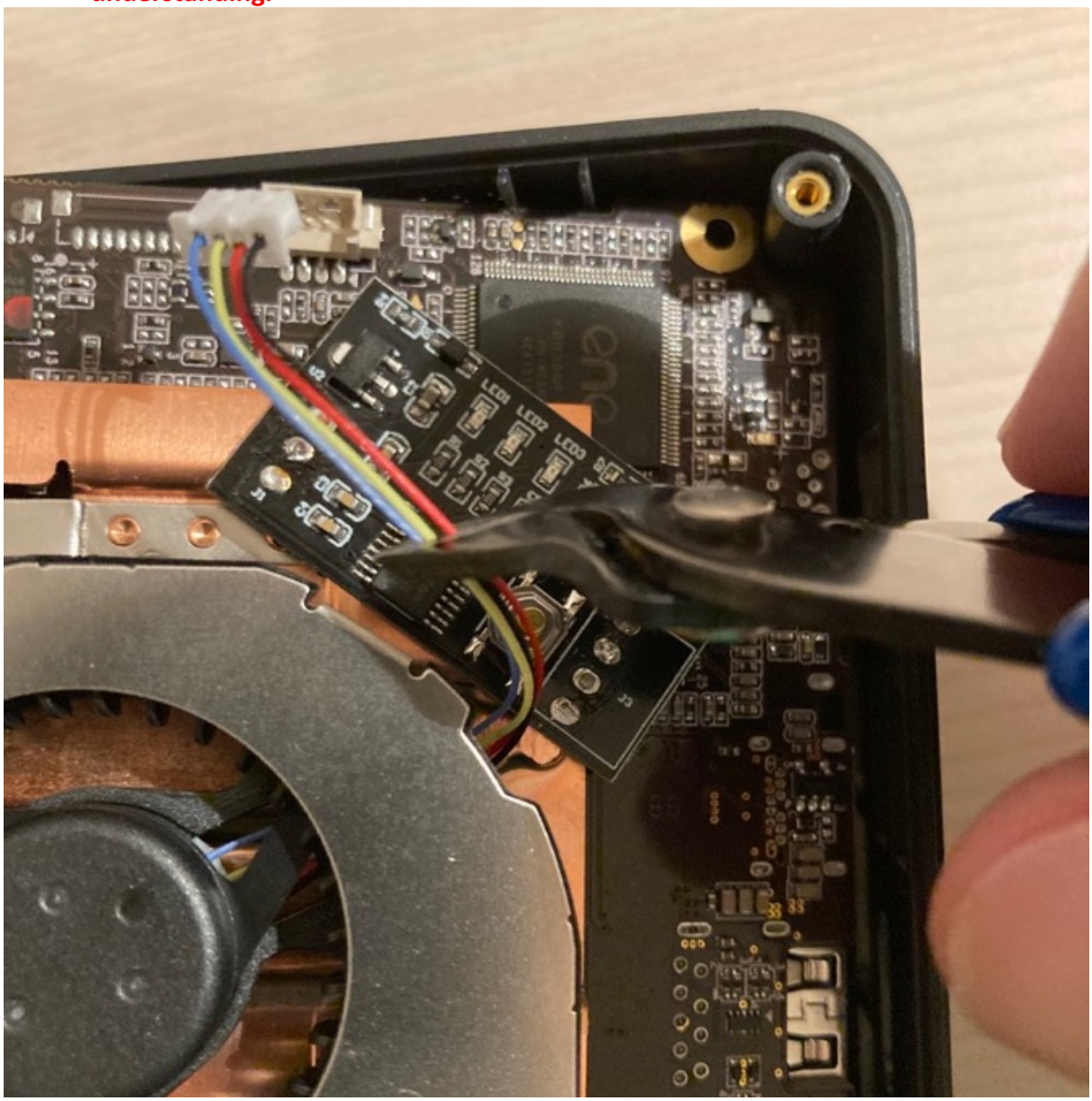






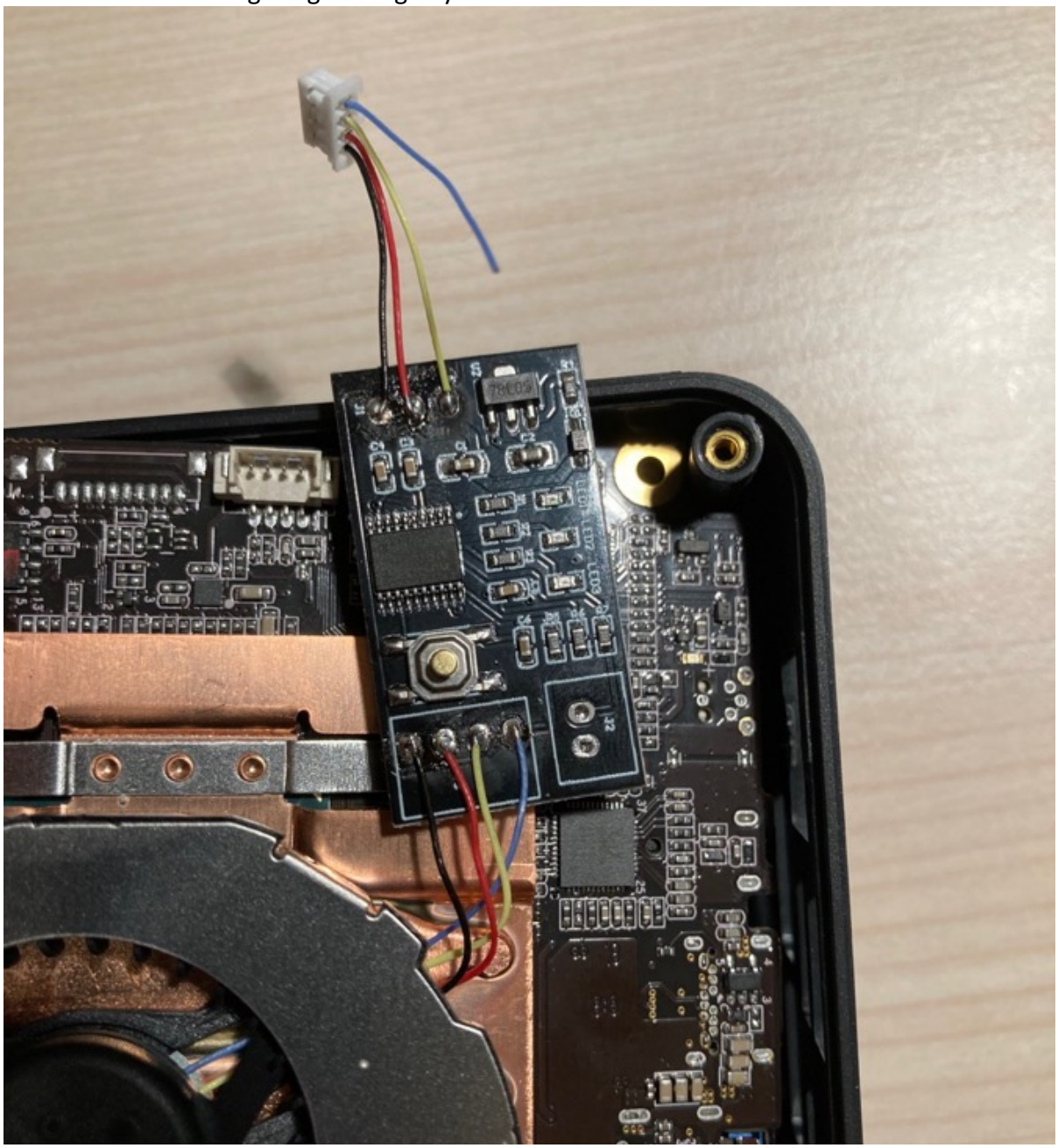
5.)Cut the fan wire at the right place

- Position the fan-controller board for best fit like on the photo
- Then cut the fan-cable at a position which gives you enough wire to solder the connector-part to the left side of the controller and the fan-cable to the right side. **Go back and take a look at the photo of the "final outcome" for better understanding.**



6.)Solder the wires

- **Take care not so drop any lead on the mainboard while soldering!**
  It may be a good idea to place some paper underneath the fan-controller prior to soldering.
- Now solder the fan-connector wires (black, red, yellow) to the top part as seen on the photo. Take care you solder the correct color at the correct position!
  NOTE: the blue wire of the fan-connector will NOT be soldered!
  A shrinking tube will be used later to insulate that wire.
- Solder the fan wires (black, red, yellow, blue) to the bottom part as on the photo.
- Make sure the cables are long enough so you can still later mount the controller-board with ought tightening any of the cables.



7.)Technical note about the wire colors and their function

- This device uses a standard 4-pin fan.
  The 4th pin is the “control” signal, a PWM signal which controls the fan speed.
- Standard 4-pin connections are as shown in the photo.
  This device uses the RIGHT table – blue is the PWM control signal.
- Because we don’t want the U57’s PWM signal, we are cutting the blue wire and put some shrinking tube over it. Don’t just cut the wire near the connector – you may want to “undo” this DIY hack again in the future and solder the connector + fan back together as they were. Just in case Beelink provides a working BIOS/EC firmware.
- On the fan side, you HAVE TO solder the blue wire to the controller-board because it’s generating that PWM signal depending on the measured temperature.