How to make a Cable Serial - USB

To assemble the sensor proposed by the SEAGLASS methodology, we will need a cable not easy to find in the market unless it is requested by order, customized with some international suppliers. Therefore, we decided to build our own serial-USB cables, by combining some elements of easier access, and thus be able to connect the smartphone with the featured phone. This will be achieved by having a Micro USB connector for the smartphone on one end of the cable and a 2.5-mm three-pole audio connector on the other end working as a serial cable.

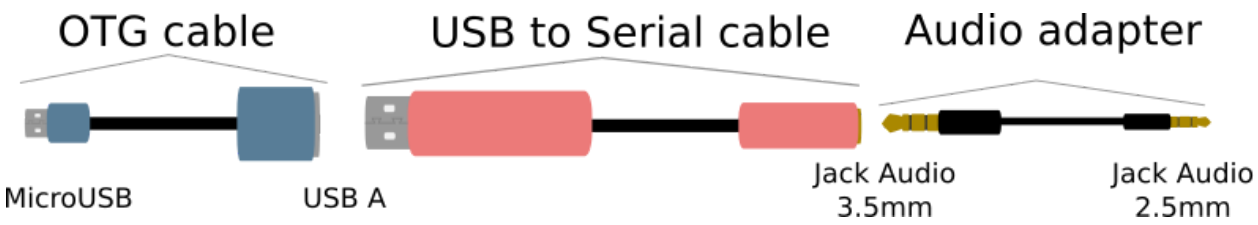


Figure 1. Component of a cable Serial USB

1. Cable OTG

Any OTG cable used generally to connect USB devices to phones in good condition should work without any problems. Also, in most regions it can be found at affordable prices.

Figure 2. Cable OTG

2. Serial - USB adapter

This is probably the most complicated part of the making since you need to have at each end, connectors that are extremely unusual to see together, so we will need some basic skills in electronics (especially welding and joining wires) to assemble this adapter. It should have one USB A connector on one end and a 3.5mm audio jack on the other end, in our case. It may be preferable to assemble directly to a 2.5mm audio connector. (in our case for convenience and characteristics of the parts found we preferred to use the 3.5mm connector as an intermediate step). The parts needed are:

- **USB adapter for serial signals**

In this case adapters of type CP2102 were tested, which are also recommended by the Osmocom project, this piece can generally be obtained in electronic component stores, and websites such as "mercadolibre or eBay". It is important to check that the output voltage of the serial signal is 3V maximum, since it might damage the featured telephone if it receives a voltage of 5V, (standard of the USB ports) In our case, all the adapters that we obtained also complied with this feature, yet it is important to check.

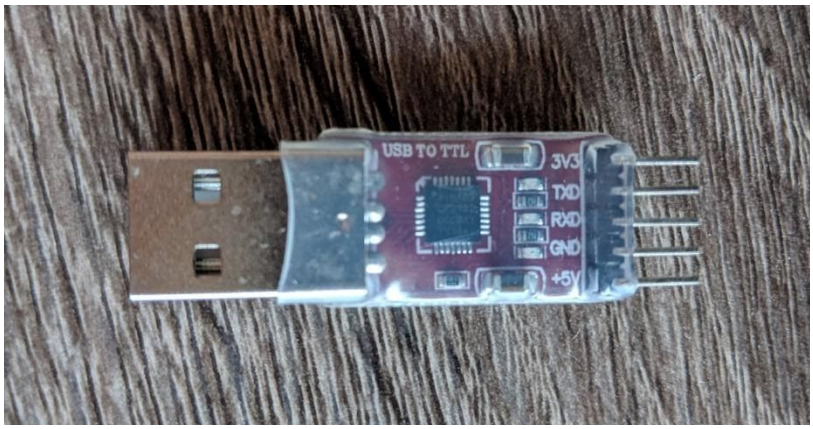


Figure 3. USB adapter for serial signals

- **3.5mm audio cable**

In our case, we used auxiliary audio cables with both their own two ends with 3.5mm connectors, divided into two equal parts. It is very important to check that they are 3-poled, that is, that they have 3 metallic contacts in their connector (often sold as "stereo" cables), since in any other case the cable will not be useful.

Figure 4. 3.5mm audio cable

When cutting the cable it is very important to identify which of its internal cables corresponds to each contact of the connector, given that soon after we will need to weld each of these cables in the correct place of the USB to serial adapter, this can be done with the help of a multimeter in its function of continuity test or with a tester. The color reference in our case was the following:

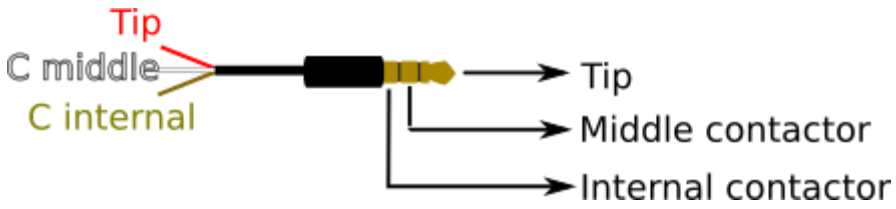
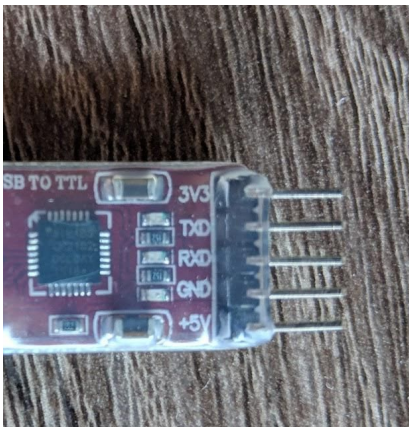
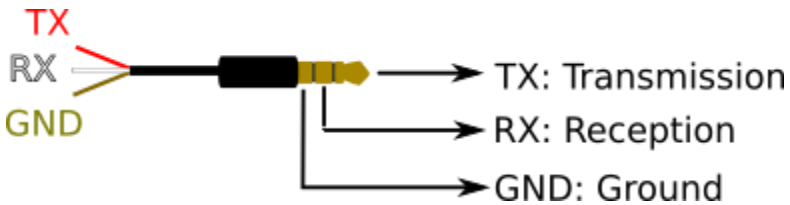


Figure 5. Color reference for 3.5mm cable

3. Assembly

At this point, it is necessary to weld the 3.5mm audio cable with the terminals of the USB to Serial adapter in such a way that the contact terminals are in the proper order, in our case the color reference, and associated terminals are shown below. Depending on the manufacturer of the cable these may be different, however the order of the contacts of the connector and its association with the terminals of the USB to serial adapter must be exactly the same as those described.





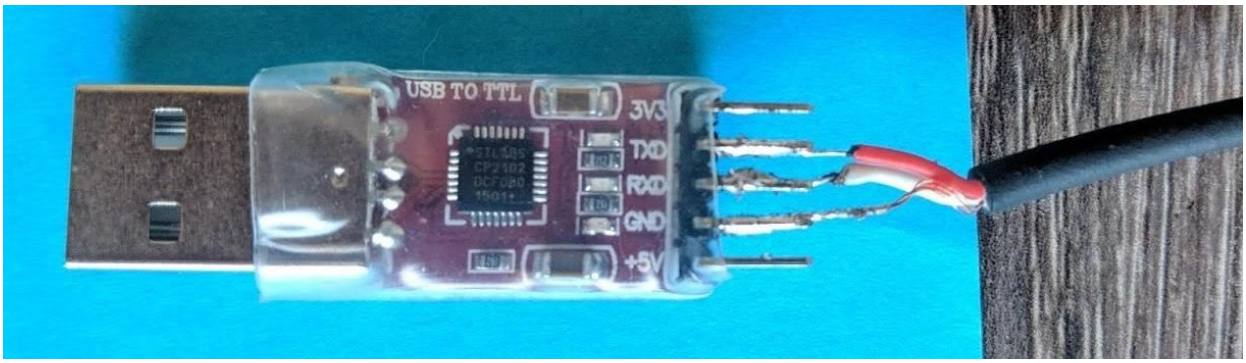


Figure 6. assembly

- Useful reference for welding here: https://www.youtube.com/watch?v=IkjMK26ROcM

4. **Packaging**

With the joined parts we can use electrical tape or any other element to cover and protect the joints of the welded components. If you have doubts about the effectiveness of the welding this step can be left for later.

Figure 7. Packaging

- **Pole audio adapter, 3.5mm to 2.5mm**

This connector is easy to get on the market as a hands-free cell phone adapter from older models, it is important that just like the 3.5mm audio cables we used earlier, these adapters are also 3-pole so that it works as a serial cable for the feature telephones sensor that we will use.

Figure 8. Adaptador de audio de 3 polos de 3.5mm a 2.5mm

5. Joining and tests

At the moment, we have each of the parts of our cable serial-USB ready. Now, we must proceed to join them, and start using it. In order to test the functionality, we will need the feature telephone for the corresponding sensor, and a computer with a software that allows USB connections to serial port.

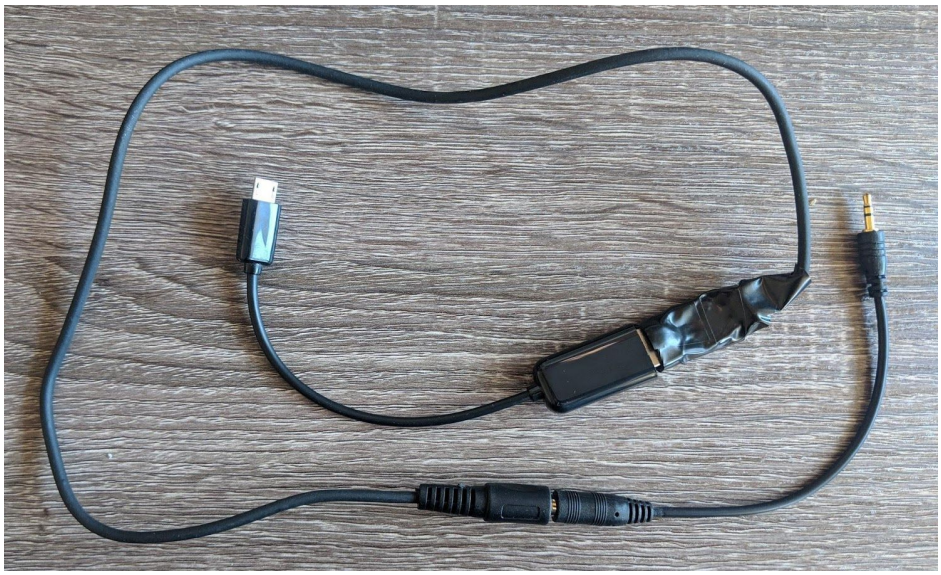


Figure 9. Cable assembly.

6. Terminal software with serial interface

- **Windows**

Download Putty https://www.putty.org/

After connecting the USB to serial adapter, go to the Control Panel -> System -> Device Manager (in the left bar) and search in "Ports (COM and LPT)" the USB adapter to know which COM port corresponds. In the example below, it corresponds to COM3.

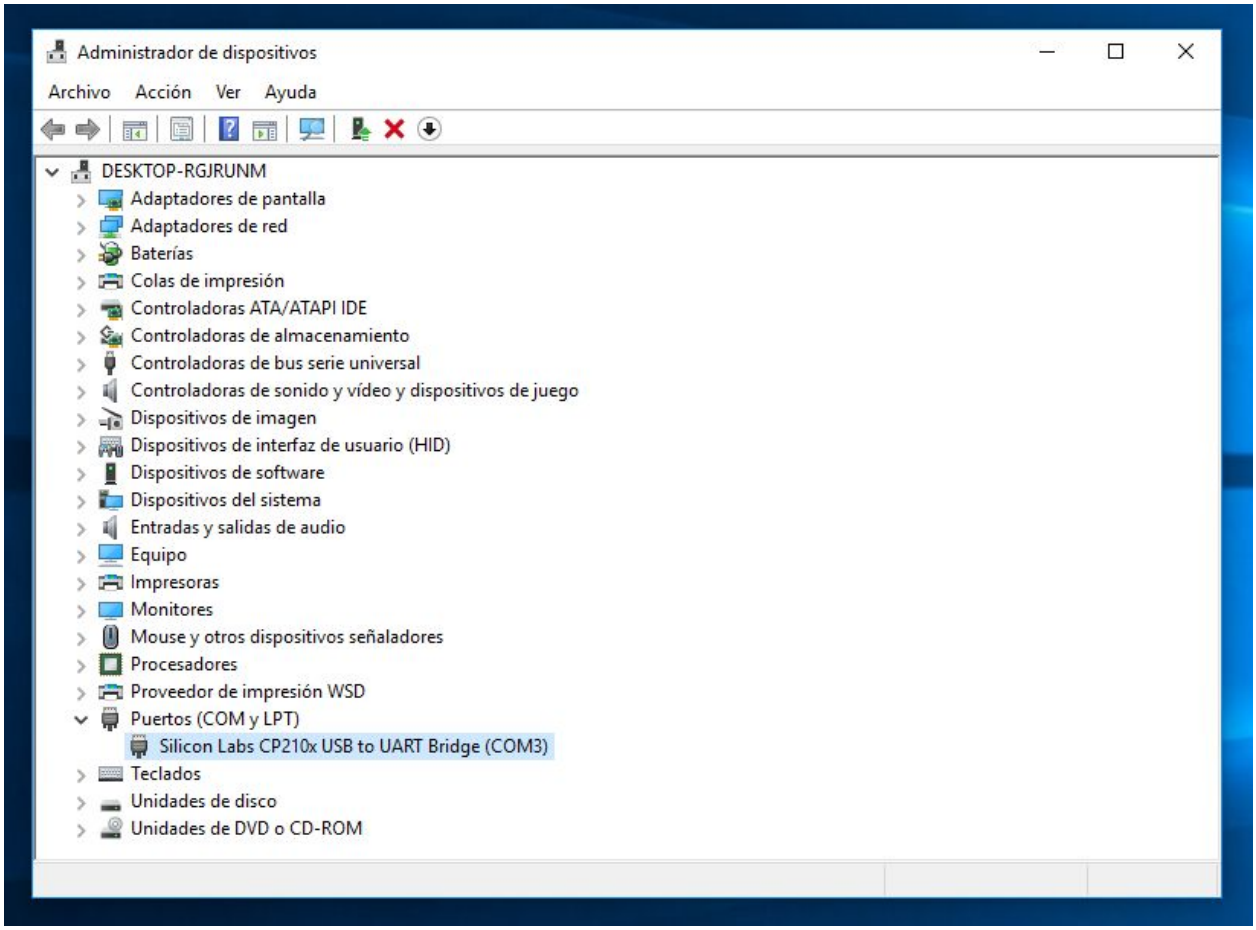


Figure 10. start Putty

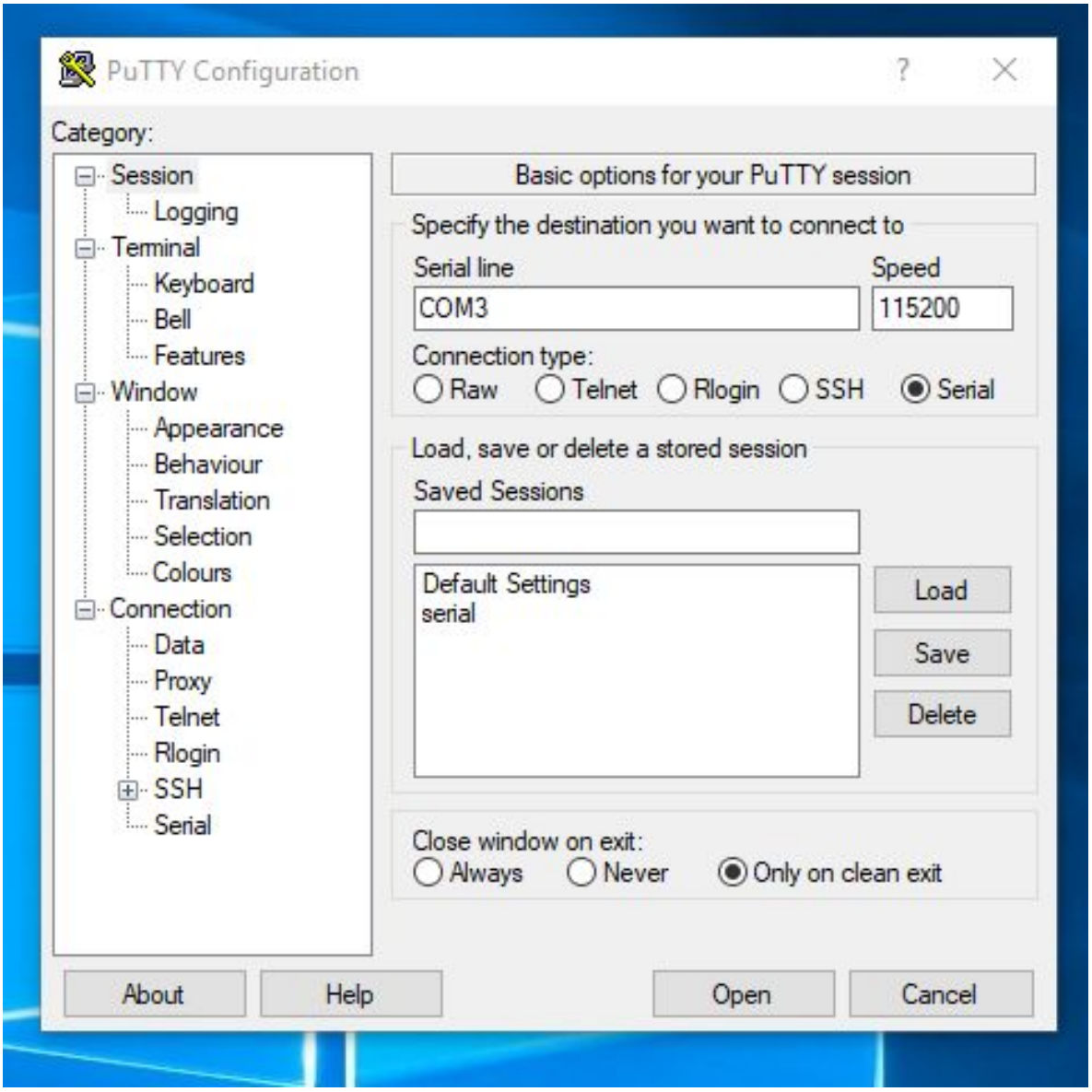


Figure 11. Setting Putty.

- **Serial Line:** In this case COM3
- **Speed:** 115200
- **Connection type:** Serial
- The other parameters will probably be fine by default, before any problems you might find, it is possible to check that they match to the image above.

Linux

For distributions based in Debian

```
sudo apt install gtkterm
```

Then, execute and set with the following parameters:

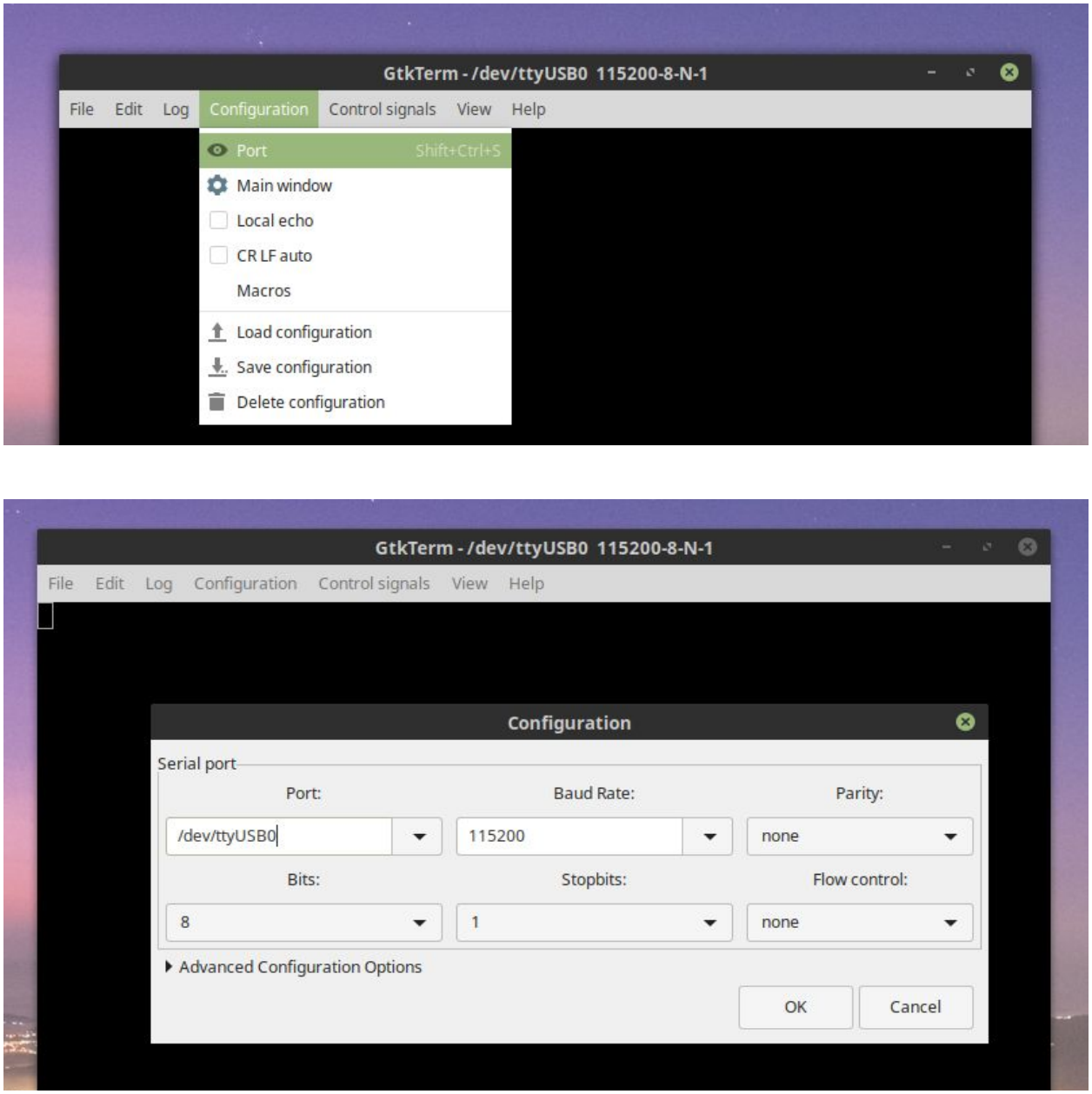


Figure 12. GtkTerm setting.

- **Port:** Usually, it will be / dev / ttyUSB0 however in some cases this might change.
- **Baud Rate:** 115200

- The other parameters will probably be fine by default, before any problems you might find, it is possible to check that they match to the image above.

Test 1: Reception

1. Connect the cable to the computer by the USB end, and the feature telephone (turned off) by the serial end.
2. Keep one terminal open, then press the power on button of the phone (it is not necessary to turn on, just by press it when the phone is off should do it).
3. If the serial cable is working properly, we should see in the terminal after pressing the button something like "��A@ ftmtoolerror", the start characters may vary since they are unintelligible in the character set used, but the "ftmtoolerror" should be seen without any problems.

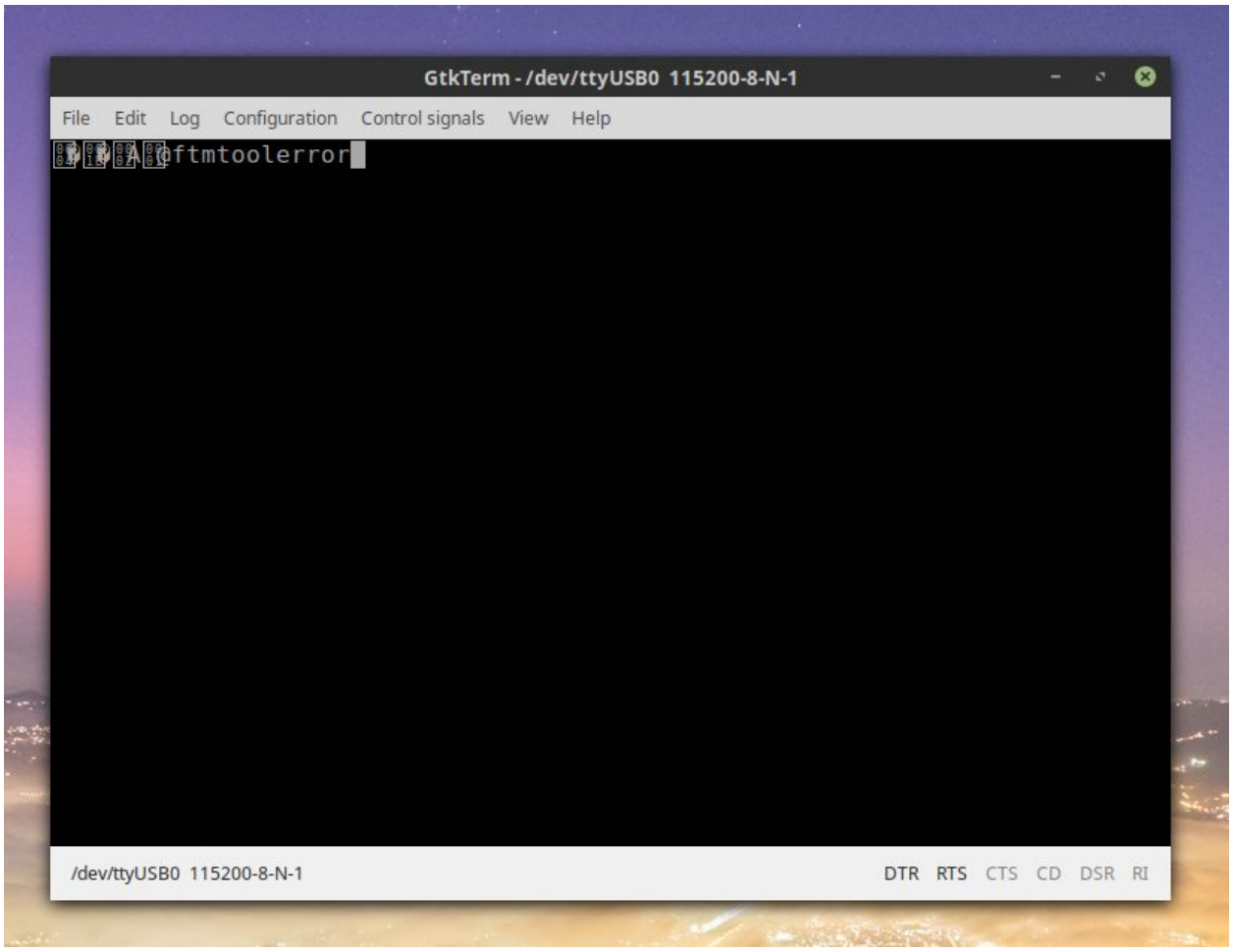


Figure 13. Test 1 reception

Test 2: Transmission

By disconnecting the cable from the feature telephone we will make a temporary "short circuit" between the transmit and receive terminals (the two most external contacts of the

audio connector), and being in the serial terminal on the computer we start typing on the keyboard, since the terminals transmission and reception are linked, everything that is transmitted must be received instantly, so we should see in the terminal the characters we are writing. If this is true, our cable receives and transmits information successfully and we can use it for our sensor.

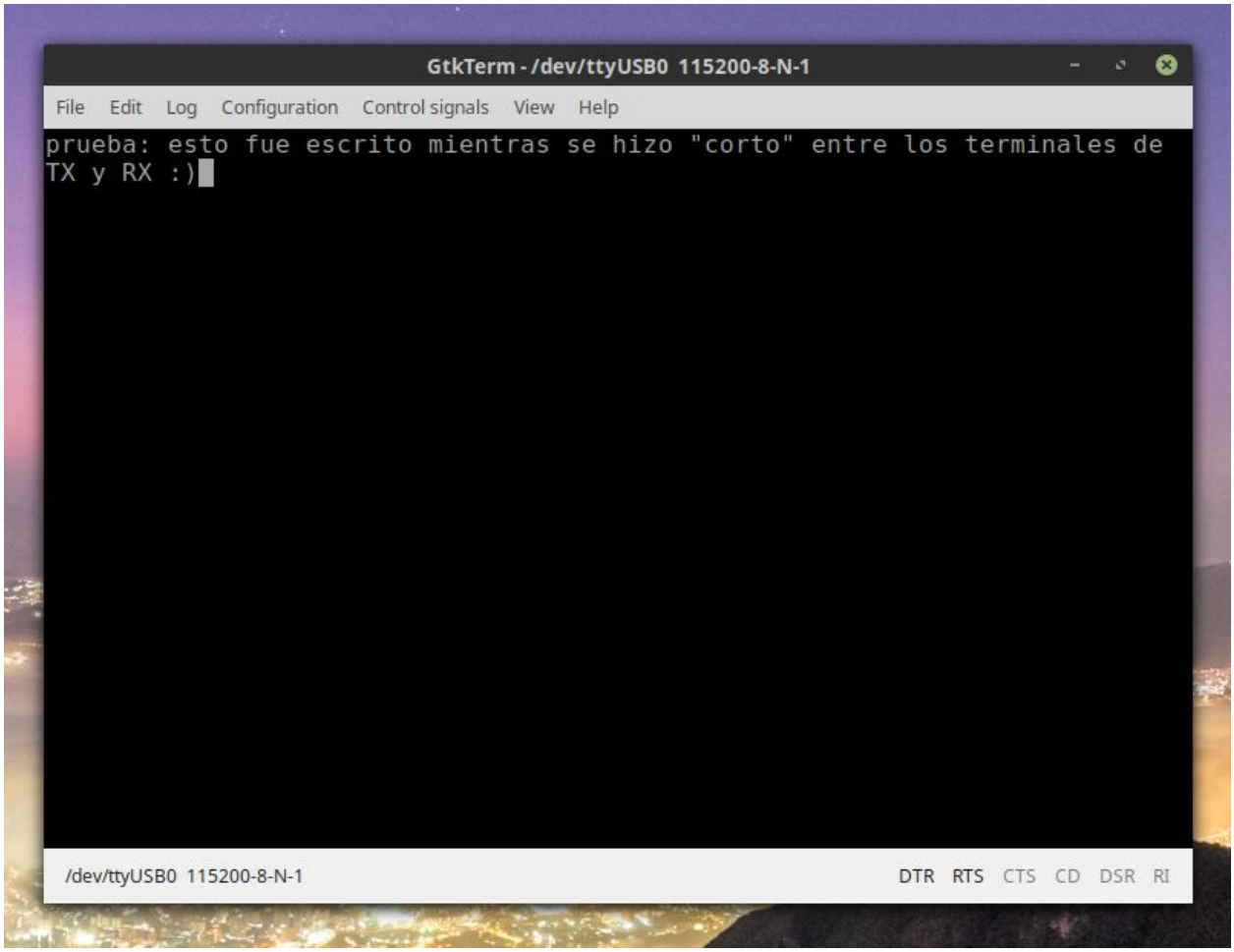


Figure 13.1 Test 2 Transmission

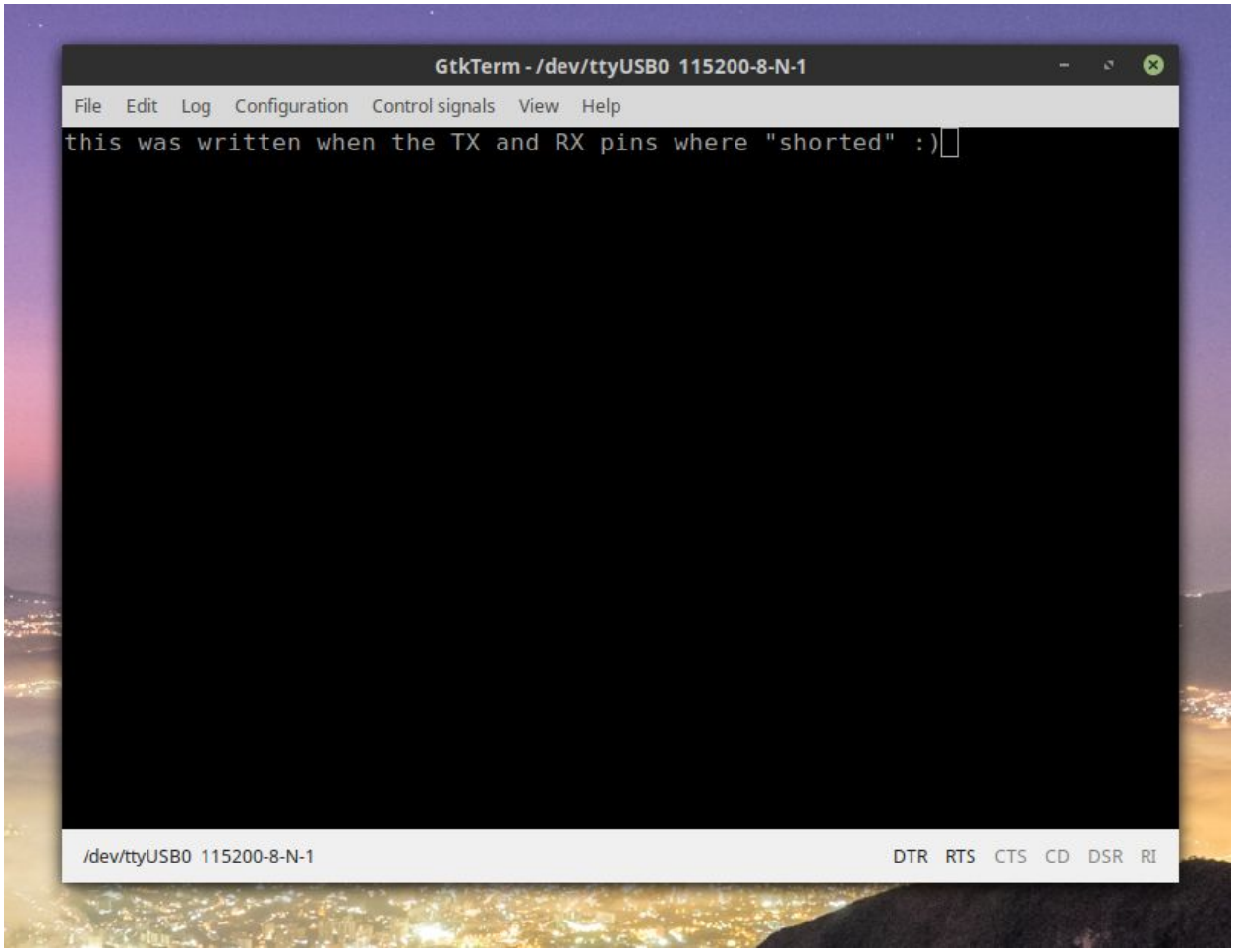


Figure 13.2 Test 2 Transmission

- **Use**

With all these elaborated steps we will have a fully functional cable for our IMSI-Catchers detection sensor.

Figure 14. IMSI-Catchers detection sensor.

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