Buying and Setting-Up the SDR:

1. The SDR that would be used for all the experiments under this repository is the ***RTL-SDR V4.***

2. The RTL-SDR range is one of the most popular ranges of Software-Defined Radios and come at an affordable price point as well.

3. An alternative to the V4 would be the older V3.

4. It is recommended to procure the V4 since it has many enhanced features such as HF up-conversion, Bias-T and the R828D chipset over the V3.

Where to buy?

Since there are many imitations of the SDR floating around, it becomes important to purchase it from a reputed seller.

It is recommended to either get it from Amazon or the official RTL-SDR Blog website.

In India, it can also be bought through Robu.in (which is what I did). The product I received is a genuine RTL-SDR V4.

Some easy ways to tell if your SDR is the real deal is to look at the orientation of the screws attached at either ends of the module. If they are diagonally placed, consider it genuine.

Also note the casing to be a black powder-coated metallic body.

Photograph of the received product:

Fig.1

Ports:

1. The port in the Fig.2(a) is the SMA (female) port. This is where the antenna input is to be given to the SDR through an SMA male connector.
2. The other port as shown in the Fig.2(b) is the regular USB-A type. It is to be plugged in to your system/workstation.

Fig. 2(a)

Fig.2(b)

Installing the SDR# Software:

1. Go to https://airspy.com/download/ and follow these steps (for Windows only).
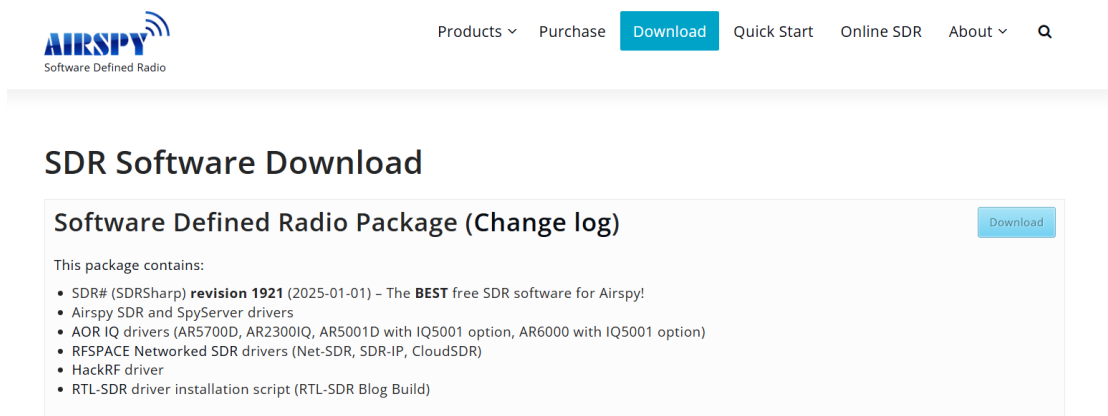

Fig. 3

2. Click the Download button of the above shown option.

3. Then, extract all the files to a location on your system.

4. After that, follow the instructions given by the YouTube video: https://www.youtube.com/watch?v=3PIi_BFulzA for easy installation.

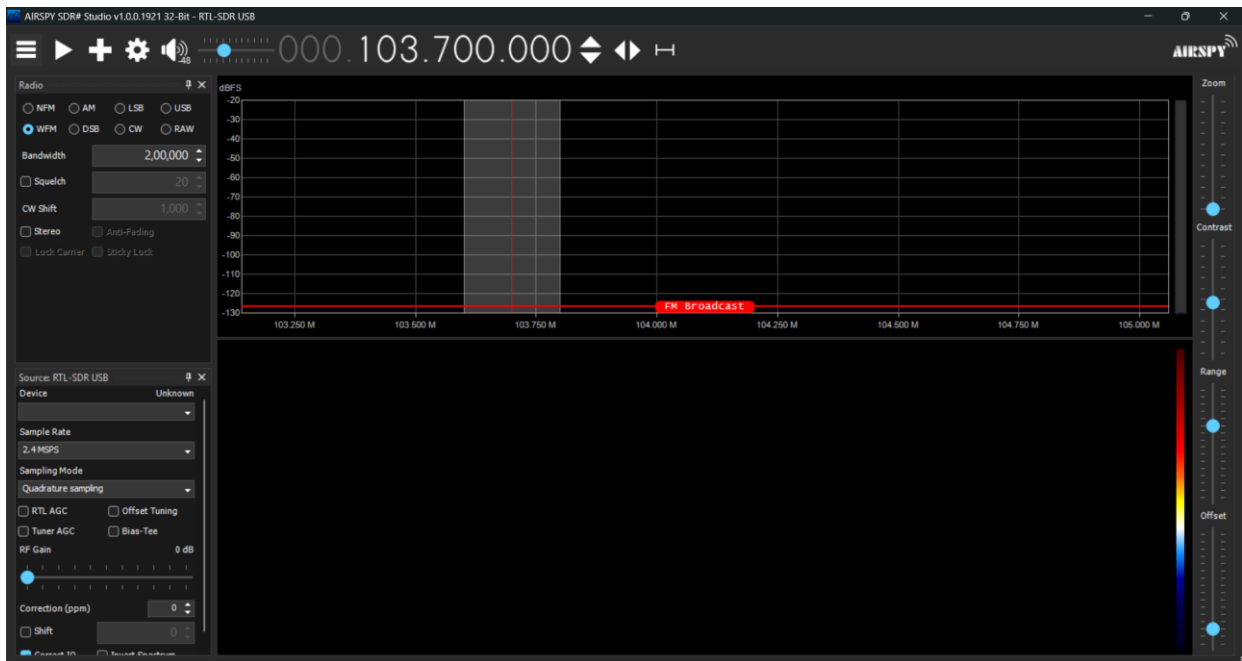5. Finally, your SDR# software should look something like this:

Fig. 4

Connection and Testing the SDR:

1. Connect the SDR to any USB-A port on your system (works well on a USB extender bus as well).

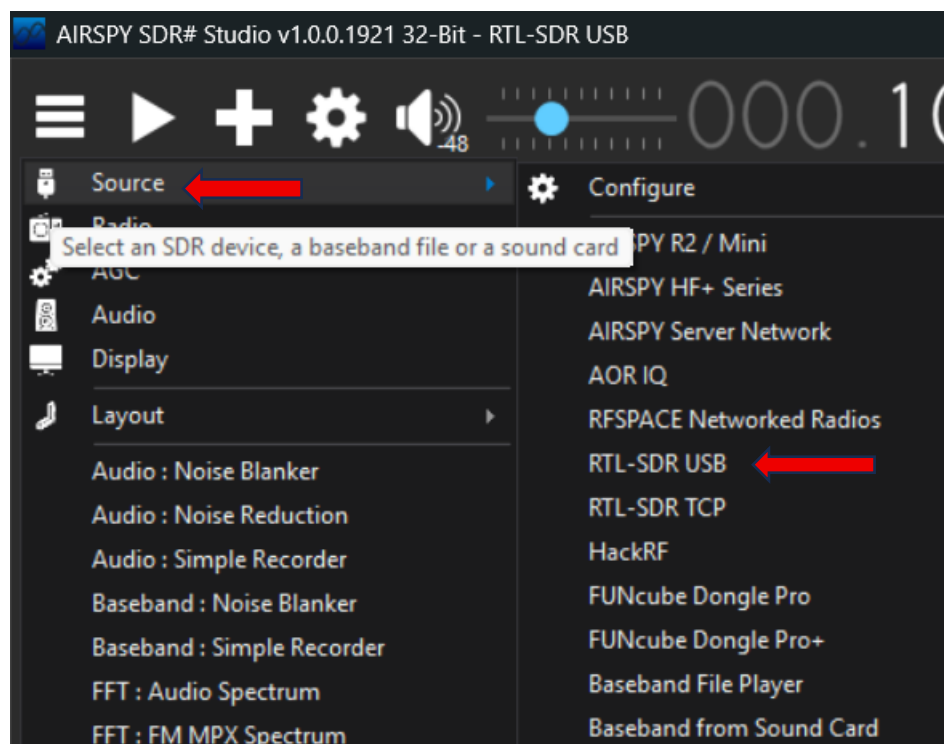2. Once connected, select the source as RTL-SDR USB, as shown in Fig. 5.

Fig.5

Testing:

1. Once connected, without an antenna, the SDR gives a static input, as shown in the waterfall diagram in Fig.6.
2. This means that the SDR is recognised, but is "blind" since there is no antenna input to the SMA connector, although, if near a radio station, it picks up very weak FM signals.
3. One method to see if the SDR is capable of receiving FM, is to cut a piece of 18 AWG Copper wire to a length of about 75 cm (explained in the FM-Antenna section of the repository) and carefully just touching one end of the copper wore to the central stalk of the SDR.
4. Orient the wire vertically and now, the SDR should be able to pick up intelligible FM broadcast.
5. All the above working principles are explained in the FM-Antenna section.
6. Fig. 7 shows the weak reception of 92.7 FM station, using the wire as an antenna.
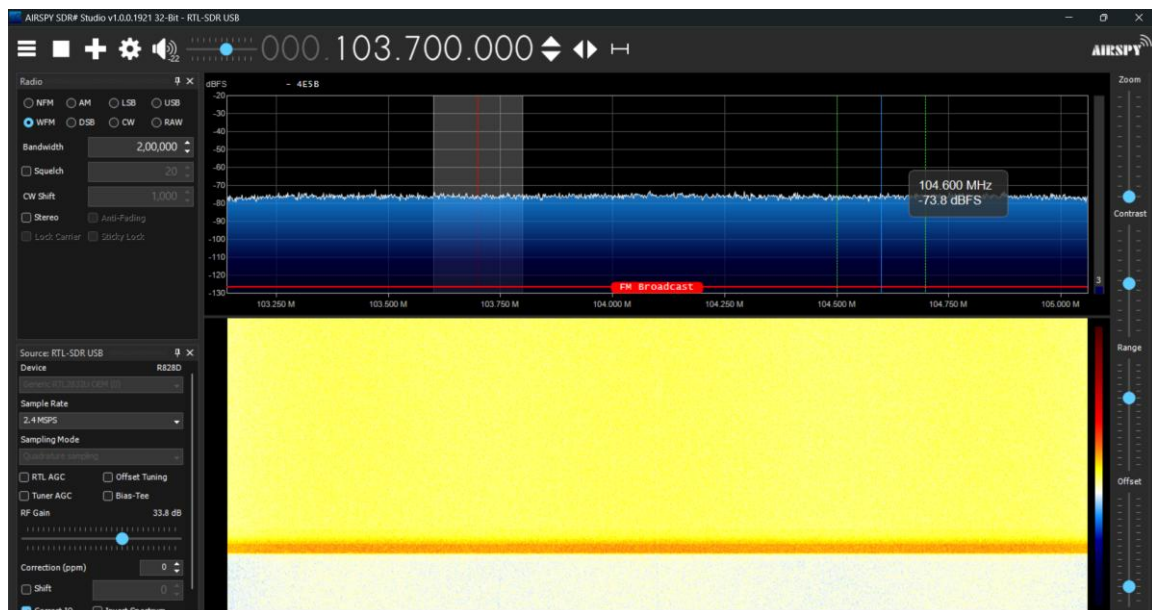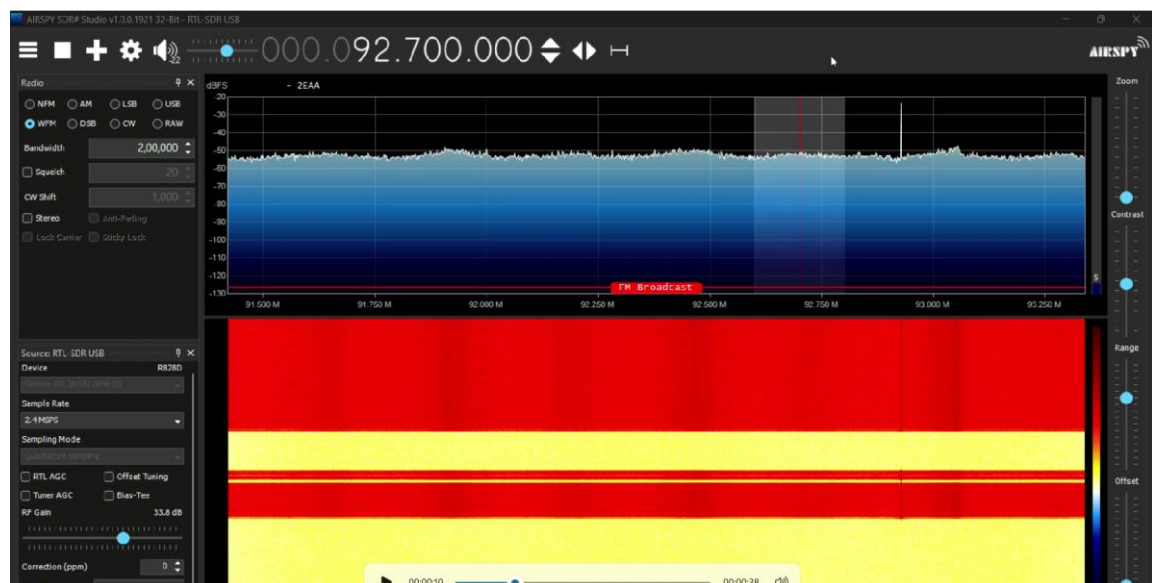

Fig. 6

Fig.7

A spike around 92.7 MHz can be observed and weak FM broadcast radio can be heard.
Fig.8 Shows how to test the SDR using the Cu wire, care must be taken such that the copper wire does not snap off inside the SMA connector
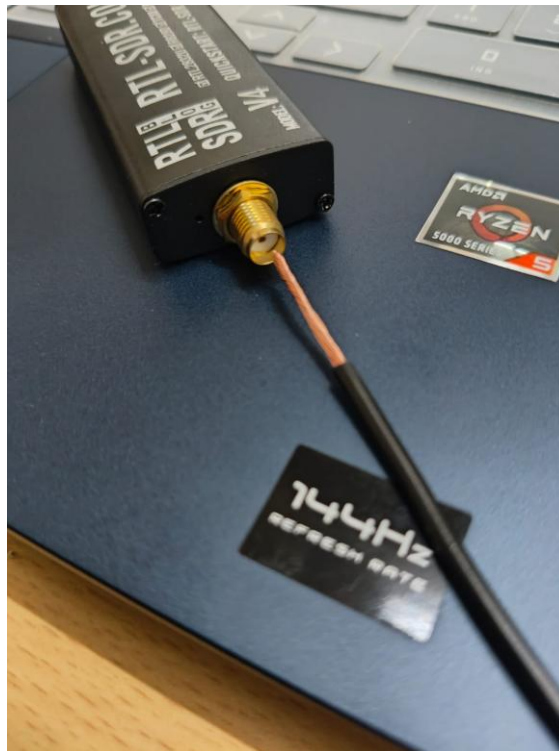
Fig.8

For testing,

- The gain should be set around 35 dB.
- WFM (wideband FM) should be selected.
- Correct IQ option must be selected.
- Bandwidth should be set around 200 kHz.
- Quadrature sampling must be enabled.

For full-scale design and build of an antenna to receive FM signals intelligibly, refer to the FM-Antenna section under the main repository.