Spying On My Neighbours Weatherstations

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1 Motivation

After watching a video from Andreas Spiess on YouTube (link at the end of the document) I decided to build my own antenna and use my SDR receiver I bought a while back to receive data from nearby weather stations.

2 Building The Antenna

I had to build an antenna for 433MHz since the cheap SDR receiver I got did not come with one included.

For the design I choose a simple dipole antenna since it was the first antenna I build. The dipole is made of two wires, both at the same length. The total length is one half wavelength so each wire is a quarter wavelength. I cut both cables too long, since shortening is easier than adding more wire later on.

To solder the wires to the SMA connector I clamped it in the vice and fixed the wires with some tape. Once the solder joints were completed I added some hot glue as additional support. The hot glue should not influence the performance of the antenna very much.

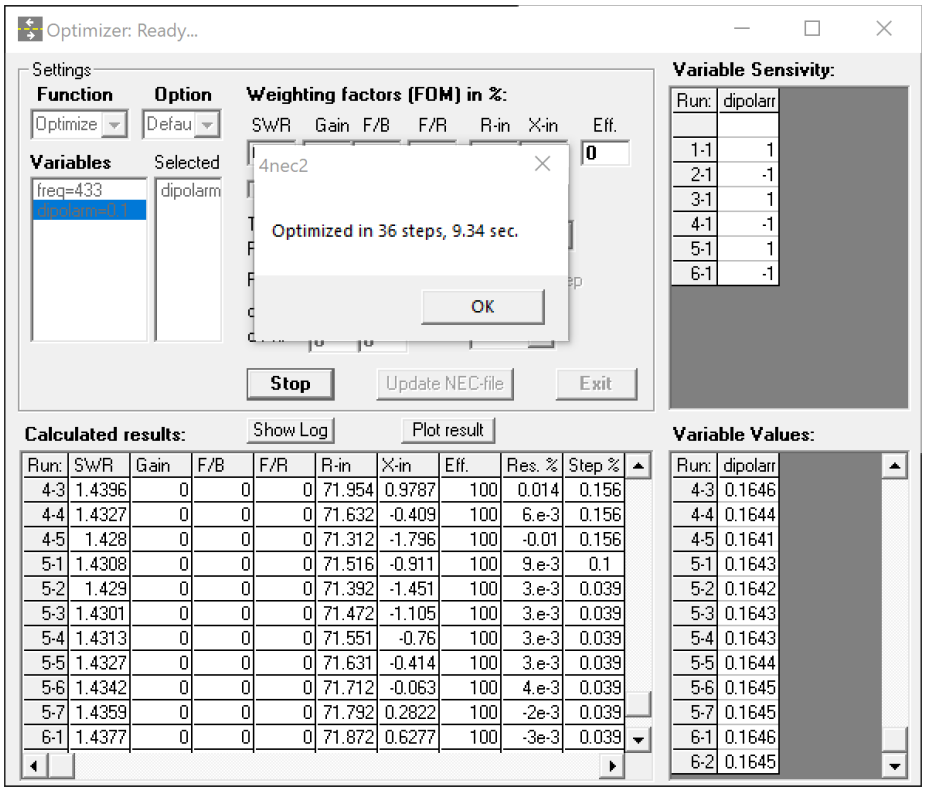

Figure 1: The antenna optimizer working

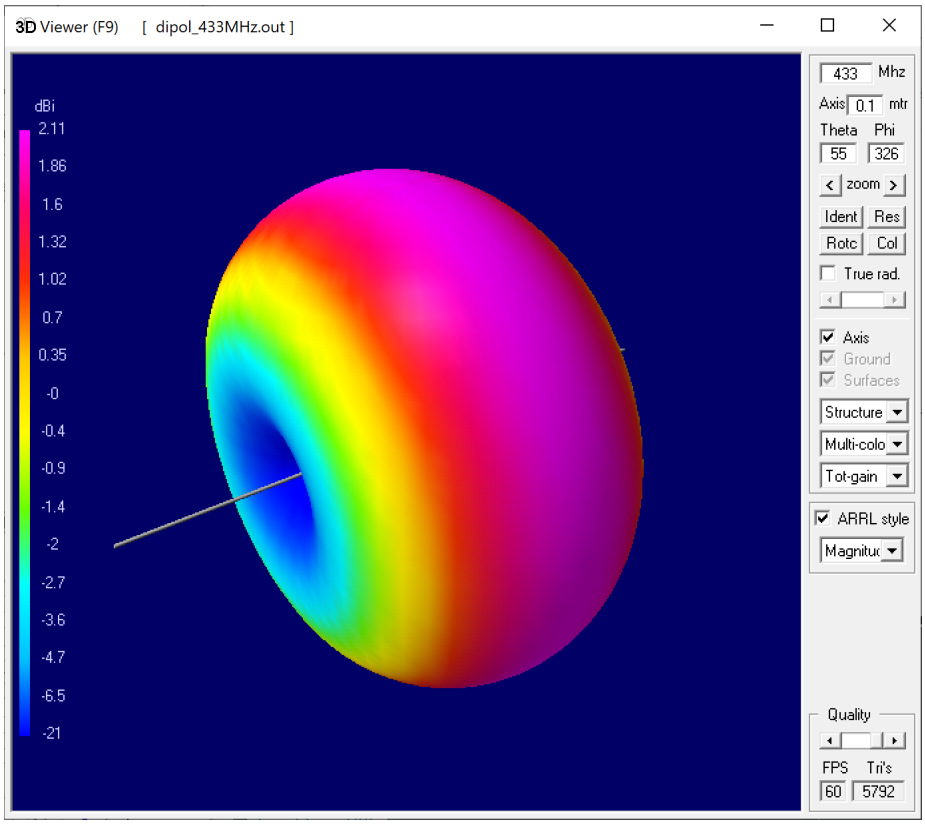

Figure 2: Radiation pattern as simulated

As an additional step to calculating the length of the dipole, I also used the optimizer built into 4nec2. Also with this simulation tool I was able to estimate the ratiation pattern and the impedance. From the simulation I ran in 4nec2 I expected the antenna impedance to be worse, but somehow the completed build performs quite well. There was no need for impedance matching.

3 Test Setup

For the test setup I build a “RF Box”. It is basically a Raspberry Pi in a nice enclosure. I fixed the antenna to the wood of our balcony and started recording. By adding the “level” command to the program it will output the received signal strength indicator (RSSI) along the weather information.

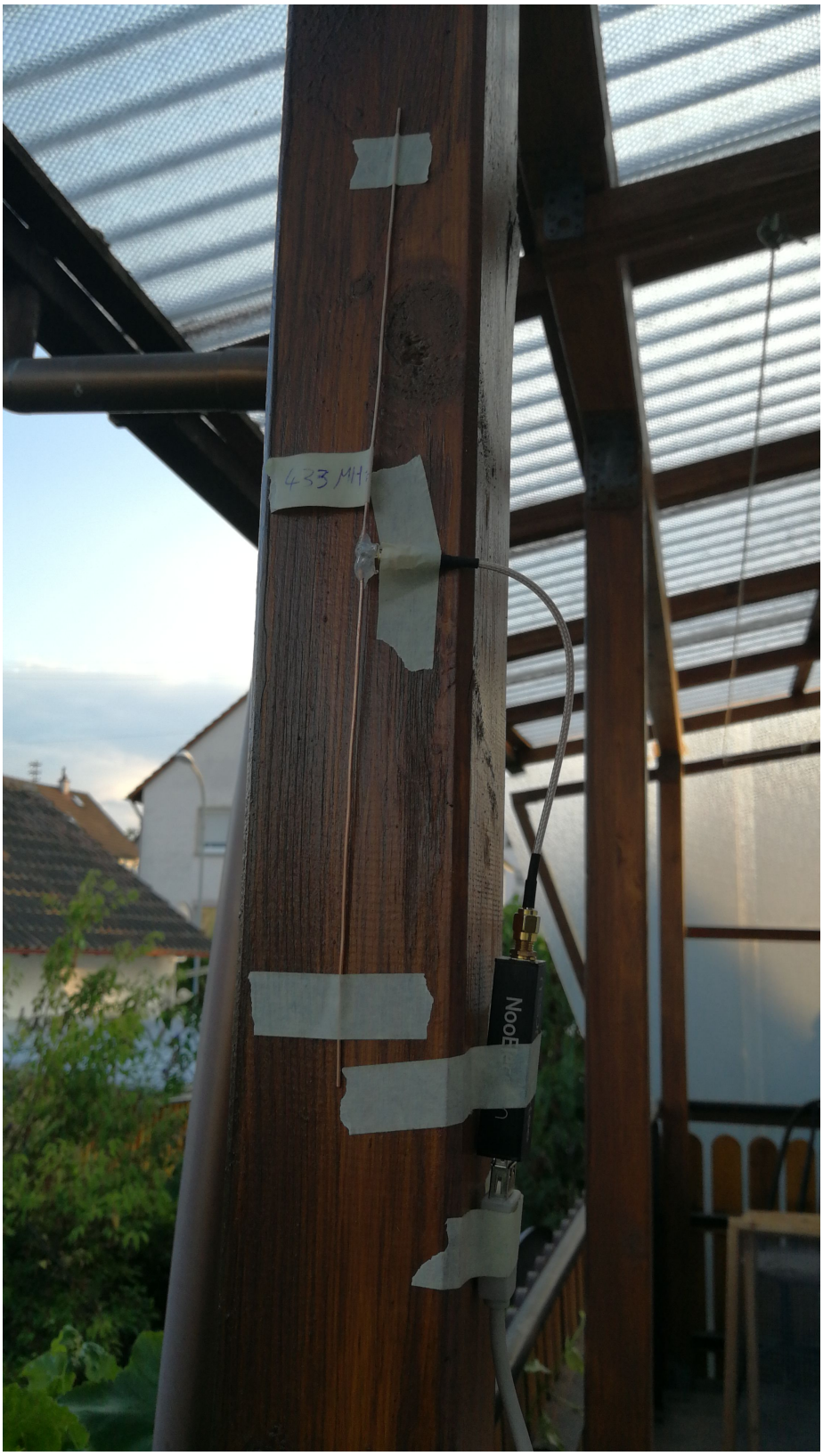

Figure 3: The antenna mounted on the balcony

I counted the number of stations I could receive and their signal strength. I was able to capture data from eight different weather stations. I plan on comparing the result with captures I get with other antennas I might build.

Figure 4: Screenshot of the output

4 Links

YouTube Video from Andreas Spiess
GitHub of the Rtl 433 Project