PortableSDR

The PortableSDR is a self constrained software defined transceiver. With spectrum analysis, and vector network analysis functions. It’s designed to be ergonomic, and very intuitive to use.

I want the PortableSDR to be a great radio, particularly for portable use, a useful, versatile tool, and a potentially life saving device.

I designed it because this is was the radio I wanted to have. I love backpacking, in particular ultralight backpacking. I have two great radios that are made for portable use, the Yaesu FT-817 and the AT Sprint (version2). The 817 is very capable and fun to use, but large, fairly heavy, consumes a lot of electricity. The Sprint is much smaller and lighter, but is extremely limited in its capabilities. Neither take advantage of the amazing flexibility of SDR techniques.

Whenever I’ve seen ham radio operators operating out in the field, they often carry a radio like one of these, an external battery, an antenna tuner, a morse code key, etc. I don’t want that. I really want the only thing other than the radio, to be the antenna.

I also realized that so many RF instruments have many of the same building blocks in common, a transceiver has a lot in common with a spectrum analyzer which has a pretty good deal in common with a vector network analyzer. I want the PortableSDR to take full advantage of the components available.

There have been interesting developments in ultra low power communication. With DSP techniques, it is possible to send and receive extremely weak signals, far too weak to hear, if you don’t mind sending very slowly. This is a perfect fit for backpacking use, where you may want or need to get a message out, but don’t have a lot of power or a great antenna. In particular for emergencies, I think the PortableSDR could send out a call for help when there may be few other options for communication. For this reason (as well as obtaining precies time information) the PSDR will include GPS.

I’ve decided to take the plunge with open source here for the first time. I figured I’d go all in, so every aspect of the design is open, all component lists, schematic, pcb files, gerbers, software, etc. It’s all open.

I’ve made great progress on the design. It’s already highly functional, and I’m delighted that a few people have already built their own. Check it out!

* PortableSDR: The PortableSDR is a Portable Software Defined Tranciever, with Spectrum analyzer, Vector network analyzer and GPS. I am designing it to be ergonomic and easy to use. It has an innovative interface, and is completely open source.
* Background: I made the PortableSDR because I wanted the capability of SDR, but I needed something rugged, self constrained, and in a size and form that I could take backpacking. I wanted something very capable, but also light and easy to use. Most portable Amateur radios are either very limited in capability and usability, or are large and expensive. Often, they require accessories and upgrades to work well and very few run open source software.
* Only about 30Mhz? The PortableSDR covers the HF or shortwave bands. From the AM broadcast band up to about 30Mhz. At these frequencies, radio waves bounce off the earth’s atmosphere, meaning you can hear signals and people from all around the world, and you can talk back. This means the PortableSDR can communicate for huge distances, thousands of miles. Some of the most interesting signals in radio happen here.
* Flexibility: Transceivers, Spectrum analyzers, and Vector Network Analyzers share a lot of common components, so I am designing the PortableSDR to take advantage of this to make it very flexible. The circuit is laid out in blocks that make it easy to learn and modify. It’s not only a great little radio, a learning aid and a useful tool.
* Recent work on very low power digital transmission means that the PortableSDR will be able to send short digital messages thousands of miles from anywhere in the world without any infrastructure. This means it could be used as a lifesaving tool when there is no other way to get a message out. That’s why the GPS is included. There is already a large number of people that monitor these messages, I hope in the future this emergency reporting can be automated.
* This is my first time completely open sourcing my work. Every part of the design is freely available to inspect, learn from, and tinker with. I’m really excited to see what others can do with what I’ve started. A few people have already built up their own PortableSDRs.
* Currently I have the first board, the PSDR1, build and functioning. The interface works with a single knob. Push and turn to select a setting, turn without pushing to change it. The waterfall display makes it easy to see what is happening on nearby frequencies. A variable bandpass filter makes it possible to focus in on what you are trying to listen to. It can currently demodulate AM and Lower Sideband transmissions. There is a lot to do but a lot is working well already.
* The next step is to build the next revision of hardware, and to get it out into the community.