Newcomers and Elmers Net: Small Computers for Radio Uses
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Radios and the computers to control them or interact with them are getting smaller and smaller. Between the software-defined radios and the advent of ever smaller computers, there is a wide range of computer/radio combinations which are not only extremely portable, but also quite inexpensive.

SDR Offerings

Software-defined radio has become a hot topic among folks who never thought they would ever get involved with them, myself included.
-- I had two main reservations before taking the plunge: cost and tradition.
-- Early SDR units were very pricey, as typical of new technology, and when something is pricey, it is hard to get in on the "bleeding edge" without getting more than a few scrapes and scabs.
-- Knowing the field of computers well enough, I knew software-defined radios would follow a similar development path.
-- Competing standards, experimental hardware, and rough-around-the-edges software would dominate the marketplace for some time.
-- In recent years costs have come down and hardware reliability is up, as well as mature software programs being developed around a common theme.
-- Proprietary software may be good for sales, but it is not usually good for users, at least not when technology is evolving so rapidly.
-- One of the big advantages today of getting into the SDR side of radio is that there are many programs which can be run on several platforms.
-- This allows the user to interchange software to take advantage of the best of what each program has to offer.
-- For example, there are numerous programs which allow the use of the SDR RTL dongle for tracking aircraft.
-- Some programs have simple database functions and logging capabilities, while others allow interfacing with online databases and plotting programs to see the aircraft in real time.
-- I have found some programs to be better than others at the initial logging, while other programs are better at the plotting side of things. No one program does all of this well.
-- By using some of the software capabilities of these multiple programs to monitor ports I can log with one program, look up plane data with another, and plot positions with a third. I do not have to rely on a one-size-fits-all solution.
-- As to the second reservation, tradition, this is a personal thing which affects some more than others.

-- I find myself quite modern when it comes to technology in many respects, but I am also nostalgic in other ways.

-- I like turning knobs, flipping switches, and rotating dials. I like the feel of real radios, and to at least some extent, I doubt radio replicas will ever replace the tactile sensation of real analog radios. But like many, I am learning to live in a hybrid world.

-- Having taken the SDR plunge several years ago, I will always have both types of radios in my shack, and will enjoy each for their particular strengths.

Size Does Matter in Many Ways!

I recently acquired an inexpensive SDR which incorporates both VHF/UHF like the RTL dongle, but also includes HF in the same package.

-- This has the advantage of not requiring a separate up-converter, as well as offering a second antenna connector which allows for two antennas to be attached simultaneously.

-- There is another advantage to this design which is that the radio comes in a metal box thereby shielding the components better than the plastic dongle designs.

-- While the chipsets are similar in principle, I noticed a big increase in the reception quality between the dongle and the SDR box just using the enclosed mag-mount antenna.

-- With the size being equivalent to a deck of cards, this is a very capable radio in a very portable package.

-- Coupled with one of the many new "mini" computers available it would be nothing to throw into an overnight bag or a suitcase when travelling.

-- Even better, the size is so small the weight would hardly be noticed on a hiking or camping trip, and with a roll-up J-pole and a spooled dipole, the possible reception opportunities are almost limitless.

-- A step up from this size/price radio for SDR is the newly released SDRplay RSP which is currently retailing for ~$150. With the price increase comes a significant performance boost in terms of filtering and the ability to record significant portions of the spectrum, one of the biggest benefits to SDR in my opinion.

-- This unit is also small enough to travel easily, and is also powered by a single USB port with which it shares data transfers. The frequency coverage is roughly 100 kHz through 2 GHz – pretty impressive!

-- Something I hope they add in the future is a second antenna port, one for VHF+ and another for HF. Right now there is only one antenna port, so there will be some switching needed depending on the frequencies in use.

-- What is perhaps most significant is that this unit does not rely on OEM software; rather it can run on any software platform that supports the EXTIO library.

-- This means the radio can run under Windows and Linux, and even run on a Raspberry Pi 2. The lack of specific OEM software could make troubleshooting a little more difficult, but the wide range of free software more than makes up for this limitation.
-- No worries about software becoming obsolete if the manufacturer should go under, or abandon development.
-- For the true experimenter the ability to run on something as small as the Raspberry Pi 2 is a great feature for both of these SDRs.

Miniaturization
I have had a fascination with computers for well over 30 years, and of course the changes in personal computers have been nothing short of phenomenal.
-- I cherish the days of DOS computers with the ability to really get down to the hardware level and tweak performance, where every fraction of a Megahertz made an impact.
-- And I will not even get into the fun I had with my TI-99 4A and cassette recorder (you long-timers know what I am talking about!).
-- Today the power and possibilities are almost endless. The aforementioned Raspberry Pi 2 computer is a perfect example of very great potential in a very small package.
-- The most recent release has significantly increased the effectiveness of the computer to run all kinds of radio-related software, as well as SDRs.
-- While size is certainly a bonus for those who want to travel with a good radio setup, the low price point also means one can have dedicated computers to run multiple applications without breaking the bank.
-- Indeed the biggest expense and/or limitation might just be how many antennas one can put up to service all of these devices.
-- I am a radio geek to be sure, but I can conservatively see having a dedicated APRS digipeter system, a dongle SDR system for ADS-B tracking, a "standard" amateur radio station, and a computer station for normal computer use.
-- That is four computers right there, and I could easily add several more to include utility monitoring, WSPR beaconing work, numbers station monitoring, and wide-swath frequency recording using an SDR capable of 2-6 MHz or more. But again, I am a radio geek!
-- The advantage of a system using a Raspberry Pi 2 system is that the computer itself only costs $50 or less, and there are built-in connectors for multiple USB ports, composite video or HDMI video.
-- The system can be purchased together with many useful add-ons while still running under $100.
-- The Pi 2 Model B design is based around a Broadcom BCM2836 SoC, which includes an Quad Core ARM7 900 MHz processor, VideoCore IV GPU,

and 1 Gigabyte of RAM. The revised Pi 2 Model B board relies on a microSD card for booting and long-term storage.

-- This board is intended to run Linux kernel based operating systems, and since it has an ARMv7 processor, it can run the full range of ARM GNU/Linux distributions.

-- Another interesting computer option are the dual OS boxes by a number of different manufacturers which use both Windows 8.1 and Android 4.4.

-- The boxes run anywhere from $85-$175 depending on features, and they offer substantial power and versatility.

-- Sometimes marketed as TV boxes, they do have the ability to run serious software, and should be able to handle most SDR and digital mode software applications.

-- One unit I saw even has a 7" screen built in, so it has the portable advantages of a tablet as well as the dual OS capability.

-- Even smaller are several "stick" computers using either Intel Atom or ARM processors, selling for $100 to $250 which are Bluetooth, HDMI, wireless networking and USB 2.0 capable.

-- These units tend to be a little light on storage space, but then again, they are not seeking to replace full-blown computers. These are niche products in my opinion, allowing us to have inexpensive computer power to offload work from our main computers.

-- As I mentioned above, there are a number of radio-related operations I would like to run concurrently without having to switch windows or bog down a processor. These options work quite well for this type of use.

-- With the advent of multi-core processors much of the workload can be spread out between the cores, requiring less speed to accomplish the same tasks. This works perfectly for smaller computer systems like these.

USB Devices
Along with the miniaturization of computers and radios in general, there has been something of a revolution in miniaturization of peripheral devices as well, with Ethernet cards, sound cards, Bluetooth keyboards and pointing devices, and a whole host of other useful things.

-- Gone are the days where PC expansion cards took up slots on motherboards.

-- While these options are still available, the port speeds for USB have gotten such that performance does not suffer noticeably for most of these add-ons.

-- Again we are not looking for hi-speed gaming computers here—we are typically using these type of combinations for specialized work, and often the computer is not operating faster than my poor ability to type!