Digital Modes for the portable µBitX radio
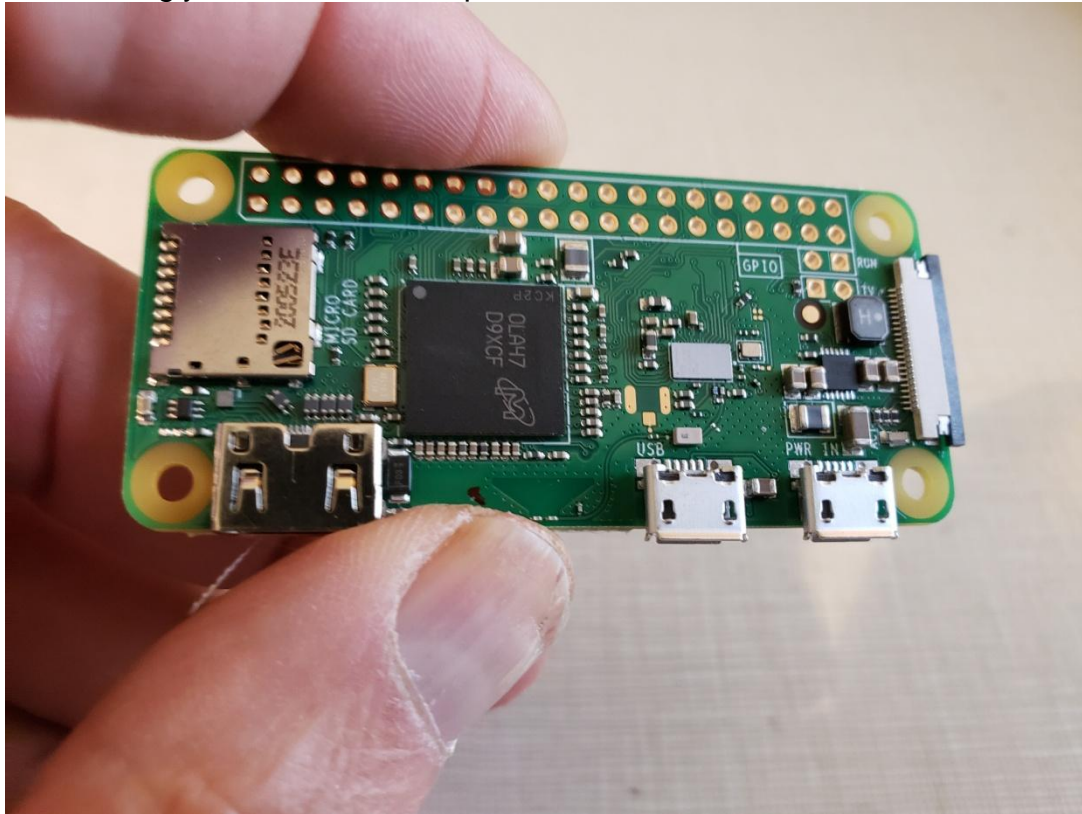
I have been fortunate to have a "project" each of the last several years that I can address, usually during February, when aside from plowing snow my other time demands on the farm are minimal. For the previous 3 years I have been enjoying playing with the BitX QRP radios from https://www.hfsignals.com/ and their current version is far more advanced than the box of circuit boards they supplied a few years ago. Last summer one of my sons gave me a Raspberry Pi Zero W basic kit (https://vilros.com/collections/raspberry-pi-kits) which included the amazingly small Pi Zero computer:

This package also included needed adaptors for the miniature USB port and the HDMI video port, a wall-wart power supply, an adaptable case, and several minor other items. My son threw in a needed SD card, as well. Interesting, but I knew nothing about these devices other than having read that other hams use them in their stations. It was so small that I thought it might be used as a digital mode interface to add to my portable QRP setup that already included the rig, a collapsible Loop antenna, and a small Li-Ion battery pack.

The first thing I found I needed was some sort of operating system and a way to get it on the Pi. The easiest way was to go to the Raspberry Pi website: https://www.raspberrypi.org/software/ and the latest version, "Buster", was there for installing directly on to the SD card if plugged in to your computer. I put the programmed SD card into the Pi and when I plugged in an old HDMI monitor to the Pi and a keyboard and mouse into an attached USB hub, I was amazed that it started up in Linux with a screen that looked a lot like Windows with icons, drop down menus and links to the internet and so forth. Yes, links to the internet, the little Pi has built-in WiFi and Bluetooth! That meant I could quickly dispense with all the attachments and operate the Pi in "headless" mode by linking to it with a program called VNC Connect. The hosting software was part of the "Buster" package and you only need to install a free viewer from the web, available for many different platforms including Windows, Apple, and Android.
https://www.realvnc.com/en/connect/download/viewer/

Now my computer mouse, monitor, and keyboard directly acted with the Pi, and I found I could load a viewer onto my Kindle Fire tablet and even my phone and access the Pi, with the touchscreens acting to access the mouse or keyboard functions. This was coming together pretty well!

Next was to get some Ham software on the Pi. You can download individual programs from within the Pi (Add or delete software is built in with links to lots of programs), but the first and easiest thing to do is get a good foundation. Jason, KM4ACK, has done all the hard work and has created a script called "Build-a-Pi" (BAP) to allow you to add just what software you want and set all the parameters so it works together. See: https://github.com/km4ack/pi-build where he even has a video describing how to do it. This allowed me to also get a program called Conky that uses a GPS dongle to get accurate time and grid square information, which would be very helpful if operating "off the grid" somewhere. It also sets the Pi up to be its own hotspot if there is no WiFi to connect to, so the tablet or phone still connects wirelessly to the Pi. I did find that my standard digi-mode program, Fldigi, just seemed to be too much for this

very basic computer. It runs well in the Pi big brothers like the Pi-4, but they have a lot more processing power than the little Pi-zero. So I skipped that and found a program called LinPSK which works well for the PSK modes and RTTY. The author, DL1KSV, was very helpful fixing some minor issues and has since upgraded his program to version 3.7 to reflect the changes made from our conversations. I also found I needed to close some background programs when running FT8 as the time to decode signals was taking too long, so after starting and setting the system clock and looking to see the correct grid square, I just shut the Conky program down.

The result is a nice compact setup that still fits in the bag with the antenna, tripod, battery and rig. Here it is running FT8. The Pi is the small black case on the lower left, with a power cord and a connection going to the USB hub with the lighted buttons. The Hub has a converted mic cord with some internal components to connect the mic and speaker functions on the rig to a USB sound card, a USB cable to allow CAT control of the rig, and a GPS dongle. The Li-Ion battery on top of the radio has both 12v and 5v USB outlets, so it is powering everything. The screen is just my inexpensive Kindle tablet connected by WiFi to the Pi.

As a result, the entire digital mode package can fit in an old VHS case (shown beside the battery):

This has been an fun project and I've enjoyed a number of FT-8 and JT-65 QSOs and some pleasant conversations on PSK-31. Now I am ready to head out to the woods or the beach with this package!

73, =Vic=
WA4THR
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