Ham Radio for Arduino and PICAXE, edited by Leigh L. Klotz, Jr. WA5ZNU

Reviewed by Karl Berger, W4KRL for AMRAD

This timely new volume from the ARRL comes just when single board microcomputers are easily and cheaply available. They are tools looking for problems to solve and the full creativity and Do It Yourself spirit of ham radio provide a wealth of opportunities to explore. I had my own Arduino project underway before this book was published and having it on the desk may have saved many missteps. This book is for you if you are looking for inspiration, help in getting by some stumbling block, or just want to know what you can do with these amazing devices. With nineteen projects, ranging from a simple CW CQ caller to waterfall displays with fast Fourier transforms there is bound to be something of interest to any ham or electronic experimenter of any level.

You do not have to read the book from front to back but there is merit in starting with the lengthy "front matter." Here in five (5!) prefaces you will find ruminations on how the ham's home brew tradition is cross-pollinated by the Maker movement. The community of experimenters that is growing with single board microcomputers is a vital resource for help and an opportunity to bring ham radio Elmering to a new audience. The introduction to the first project,"CQ DX - A Ham's 'Hello World!'," says it best:

"...once a project gets underway, it will seem to move you along with it like a great mystery novel that will keep you turning pages late into the 80 meter DX hours. Then you may hit a seemingly insurmountable obstacle and know not how to proceed, until inspiration strikes - or, more likely you reach out to a community for help and find others who have been there before you and are ready to help get you back on track."

In all, there are nine different authors and the editor has done an admirable job in presenting each project in a consistent format without obscuring the authors' style and approach. Each project is well illustrated and supported with Internet links specific to the project or general to the hardware and software needed to make it work. The well-commented code for each project is online and saves you the trouble of retyping the program. You may find it odd, as I did, that circuit schematics are relatively rare. Instead, you see the Fritzing diagrams common to the Maker community. These are essentially interconnection diagrams; very useful for a beginner but somewhat limiting for experienced builders.

Sixteen articles use the Arduino or one of its variants. The other three projects use the PICAXE, a single chip controller that is easy to incorporate into projects at the board kevel. Likewise, the 8-pin DIP ATtiny45 will be a surprise to those familiar only with the Arduino and its stackable shields.

The CQ CW project is a good place to start for beginners as it explains each part of the hardware and software. The article walks you through several iterations that add well-explained software and hardware features. This is a great teaching approach for newcomers who might otherwise be intimidated by a fully developed project and it exposes them to the design process. This "build something then improve upon it" approach is a natural consequence of the interplay between hardware and software development that is well exemplified by all the projects in this book. Indeed, nearly every project ends with three or four suggested enhancements left to the builder for development.

Other projects explore the amazing capabilities of these small computers "for use in the shack, in the field, and on the air" as proclaimed on the front cover. My attention was immediately taken by "Sweeper: An Arduino SWR Scanner" by Alan Biocca W6AKB. Alan dispels the mysteries surrounding the use of the Direct Digital Synthesis (DDS) chips found on eBay for less than $10. Just 20 straightforward lines of code give you a stable signal generator that will sweep any ham band from 100kHz to 60MHz! The possibilities of using DDS in a benchtop signal generator, in a direct conversion receiver, or QRP rig are endless. Alan uses it to drive a very simple resistive bridge with the Arduino doing the heavy lifting of converting the forward and backward voltages to an SWR reading and then goes a step further to give it the ability to automatically find the minimum SWR frequency.

One of the most elaborate software projects is the "Cascata: An Arduino Waterfall Display" by the editor, Leigh Klotz. Leigh converted a 16-bit FFT routine to 8-bits for faster execution on the Arduino and, in the process, made some corrections to the original routine. The result is a 4kHz-wide audio spectrum analyzer with all components available at Radio Shack. The waterfall display is familiar to any ham who has worked one of the digital modes like PSK31. Leigh's project does not decode a PSK31 signal but that is the obvious next enhancement.

The appendices are a resource that you should not overlook. They present guidance on controller hardware choices, designing and building cases for your projects, and comparison of LCD displays available for microcontrollers.

You can build any one of these projects in a weekend. Many will become useful items in your shack and all will inspire you to learn more about microcontrollers. My recommendation: Buy the book and get started!

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