

Arduino for Hams

PAARA 2014-03-06

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Remember the 1980's?



Not *those* 1980's

- That's Lynard Skynard!

I mean the Apple][

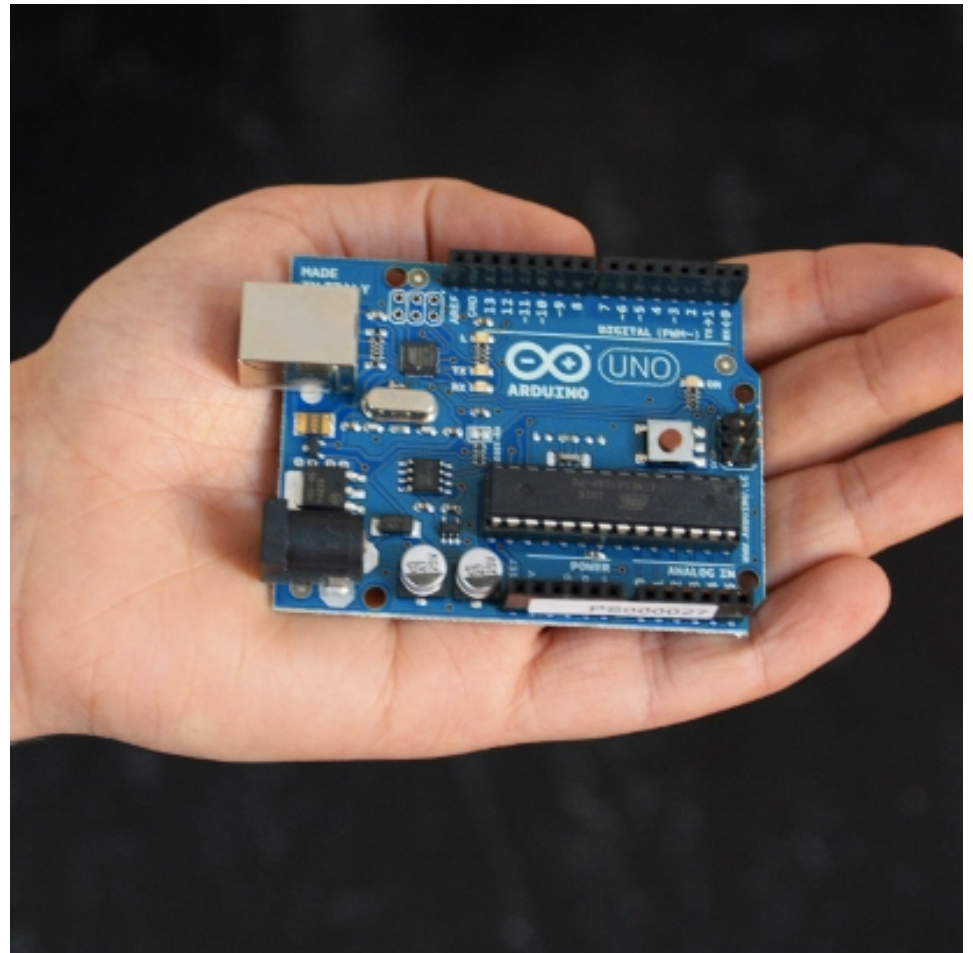


It had

- ✓ 8-bit CPU
- ✓ 32K Memory
- ✓ Expansion Cards
- ✓ Lots of Software
- ✓ Low Cost
- ✓ Extreme Popularity

So Does the Arduino

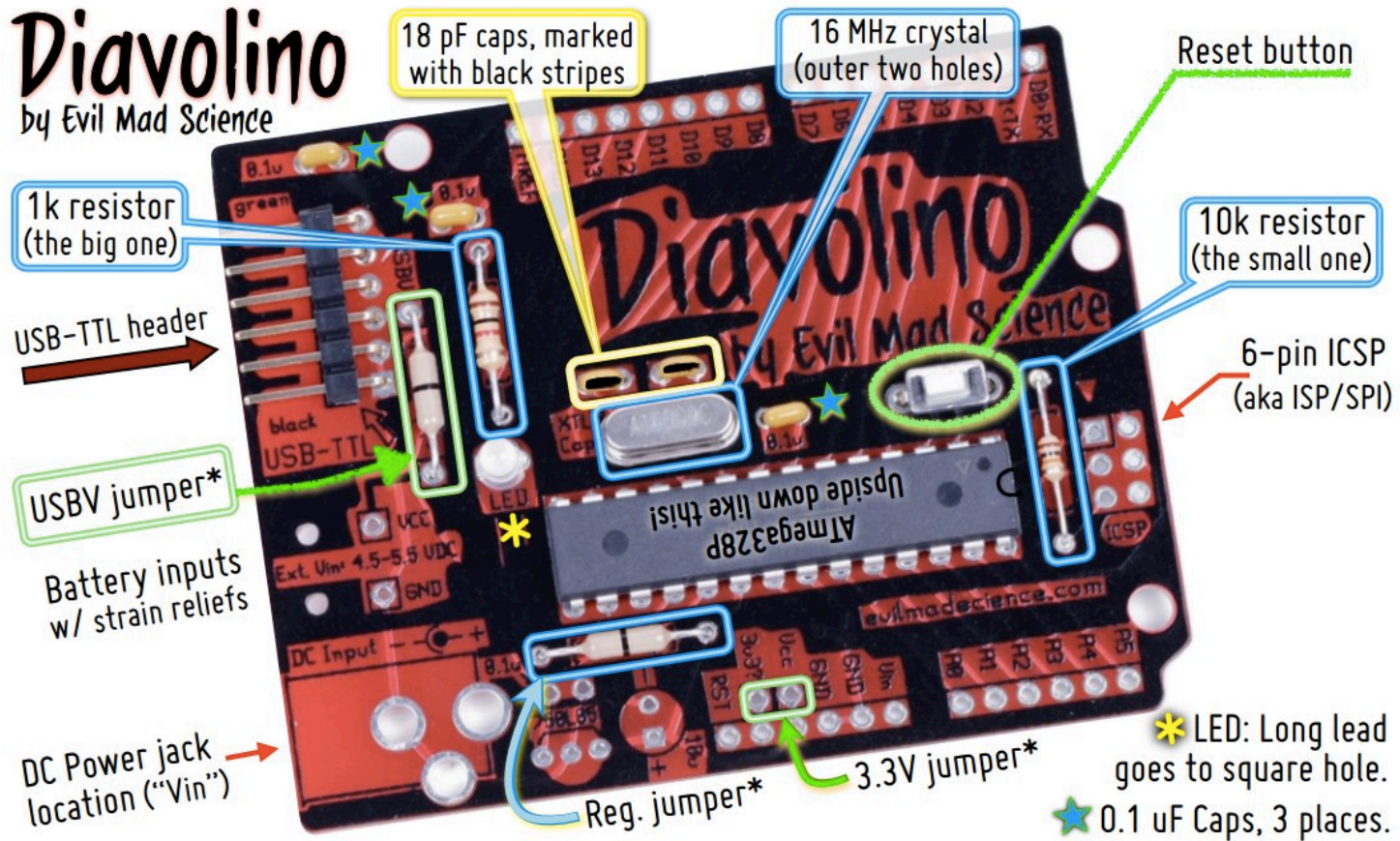
- About as powerful as an Apple II



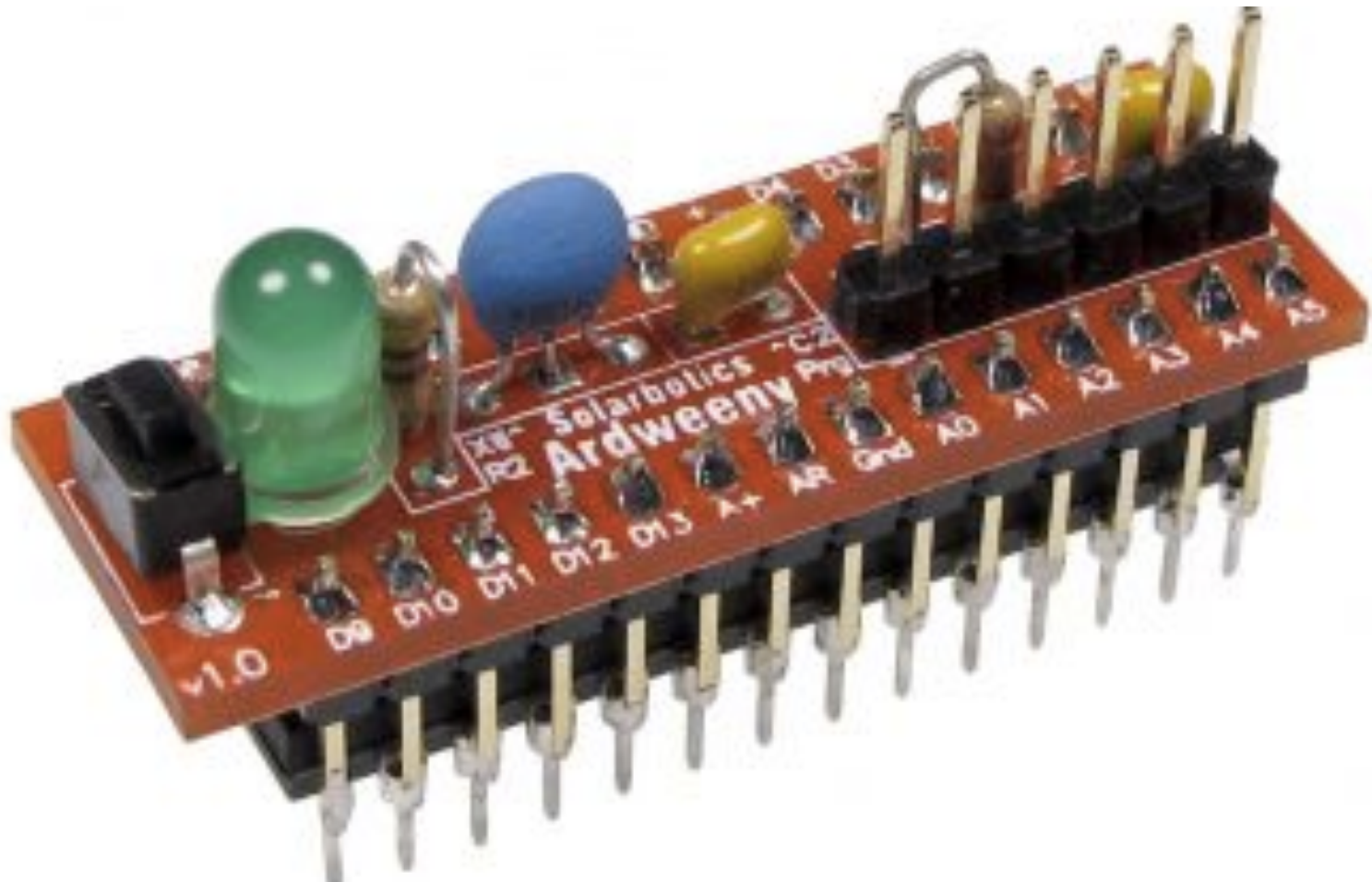
But for \$29!



Or for \$12...



Or even \$9.95...



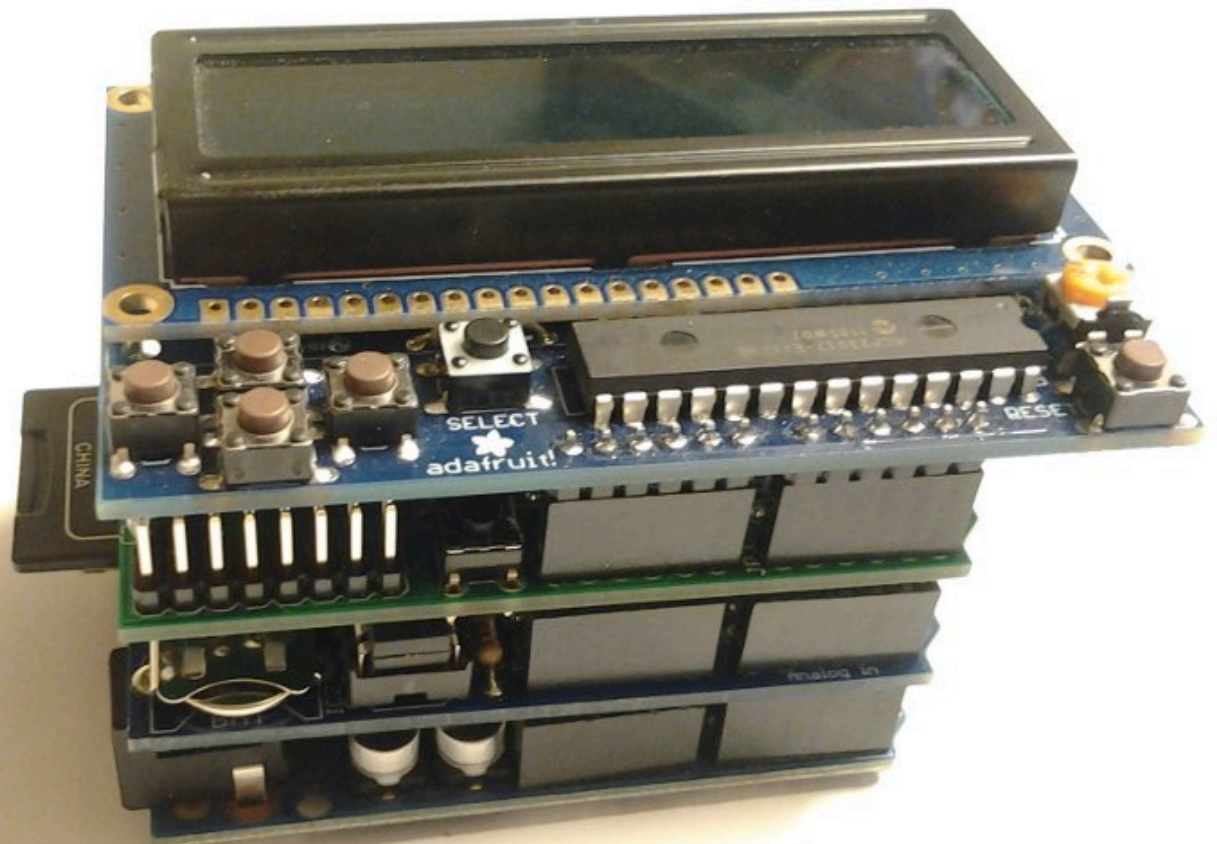
Would you believe \$3.65?



<http://www.aliexpress.com/>

Arduino Peripherals

- Instead of *expansion cards* the Arduino has *shields*



Lots of Shields



Lots of Shields



SI4735 AM & FM Receiver Shield

● DEV-10342
\$34.95



SparkFun Inventor's Kit for Arduino

● KIT-11227
\$94.95



SparkFun Inventor's Kit for Arduino with Retail Case

● RTL-11022
\$99.95



Spectrum Shield

▲ DEV-10306
\$24.95



Starter Kit for Arduino - Flex

● DEV-11226
\$59.95



TellyMate

▲ DEV-09313
\$27.95



Touch Shield

● DEV-10508
\$14.95



TransmogriShield

● DEV-11469
\$14.95



USB Host Shield

● DEV-09947
\$24.95



Video Game Shield

● KIT-10226
\$22.95



LOTS of Shields!



NFC Shield

\$29.50

Add: Max: 18

ADD TO CART



Orbshield v1.0 kit

\$24.95

... more info

ADD TO CART



Protoshield Kit for Arduino

\$9.90

Add: Max: 13

ADD TO CART



Relay shield

\$20.00

Add: Max: 34

ADD TO CART



Renbotics ServoShield Rev 1.1

\$15.00

... more info

ADD TO CART

And Software Libraries to use them:

Displays and LEDs:

- [GFX](#) - base class with standard graphics routines (by [Adafruit Industries](#))
- [GLCD](#) - graphics routines for LCD based on the KS0108 or equivalent chipset.
- [Improved LCD library](#) fixes LCD initialization bugs in official Arduino LCD library
- [LedControl](#) - for controlling LED matrices or seven-segment displays with a MAX7221 or MAX7219.
- [LedControl](#) - an alternative to the Matrix library for driving multiple LEDs with Maxim chips.
- [LedDisplay](#) - control of a [HCMS-29xx](#) scrolling LED display.
- [Matrix](#) - Basic LED Matrix display manipulation library
- [PCD8544](#) - for the LCD controller on Nokia 55100-like displays (by [Adafruit Industries](#))
- [Sprite](#) - Basic image sprite manipulation library for use in animations with an LED matrix
- [ST7735](#) - for the LCD controller on a 1.8", 128x160 TFT screen (by [Adafruit Industries](#))

Audio and Waveforms:

- [FFT](#) - frequency analysis of audio or other analog signals
- [Tone](#) - generate audio frequency square waves in the background on any microcontroller pin

Motors and PWM:

- [TLC5940](#) - 16 channel 12 bit PWM controller.

Even Radio Shack Sells Them

Shield Collections ▸ Shields ▸ Make MakerShield Prototyping Kit

Make MakerShield Prototyping Kit

Model: MakerShield Kit | Catalog #: 276-138

\$16.99

 Like  5  +1 0

★★★★★ (No reviews) Be the first to Write a Review

Free Ground Shipping on orders over \$50. (DETAILS)

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And Jameco



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Getting Started with Arduino Kit v2.0

Jameco Part no. 2121121

Manufacturer	JAMECO KITPRO
Manufacturer no.	KIT-GSA



RoHS compliant *R*



Catalog 141 , page 159

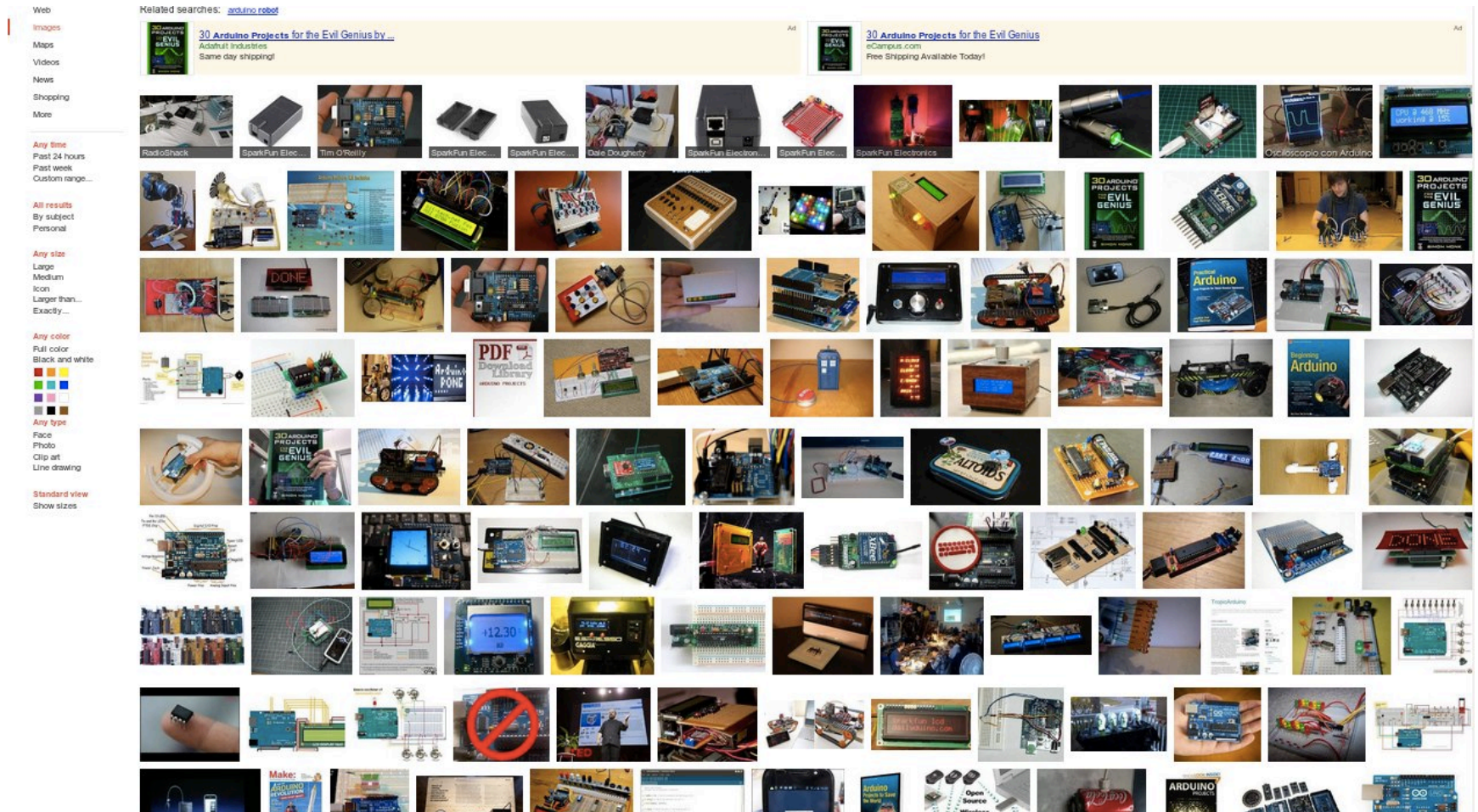


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The Arduino Advantage: Community

- The Arduino has a community of diverse disciplines and interests
 - *Art, Music, Robotics, Sensors, and now Amateur Radio*
- All using the same tools and software
 - *Sharing software libraries, hardware designs, techniques, and know-how*

Plenty of Projects to Choose From



Google image search for "Arduino Project"

Build your own projects

- Fit your needs, not someone else's
- Software, Modules, and Know-How is available
 - Start from scratch
 - Adopt someone else's project and adapt it to your needs

Using higher level programming than the micros that hams used in the past

```
void send_h() {  
    dit(); dit(); dit(); dit();  
    letter_space();  
}
```

```
void send_i() {  
    dit(); dit();  
    letter_space();  
}
```

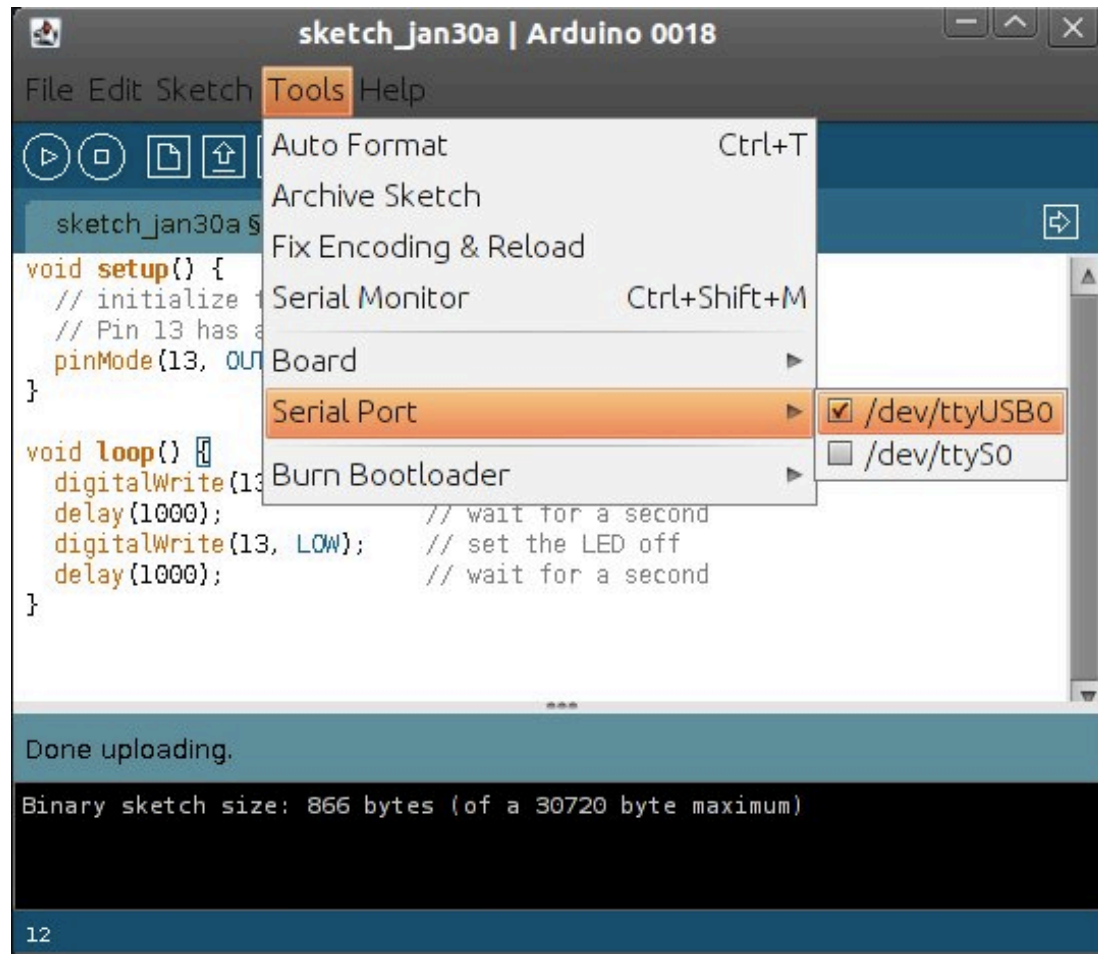
But gives the full power of C/C++ for experts

```
// Initialize sine_table
for (i = 0; i < 256; i++) {
    sine_table[i] = 127 * sin((2*M_PI*i)/256.0);
}

// The PWM frequency is 62.5KHz. The 3dB corner of the filter is
// about 16KHz. (R = 10K, C = .001uF) The default modulation
// frequency for the code signal is 600Hz (can be changed up or down
// with pushbuttons).

if (((PINB & _BV(PORTB0)) == 0) || ((PINB & _BV(PORTB1)) == 0)) {
    // change frequency
    if (PINB & _BV(PORTB0)) frequency -= 10; else frequency += 10;
    if (frequency <= 300) frequency = 300;
    if (frequency >= 1200) frequency = 1200;
    delta_phase = round((256.0*256.0*16.0*frequency)/1000000.0); // 1/16uS sample rate
    update_display();
    dot(0);
}
```

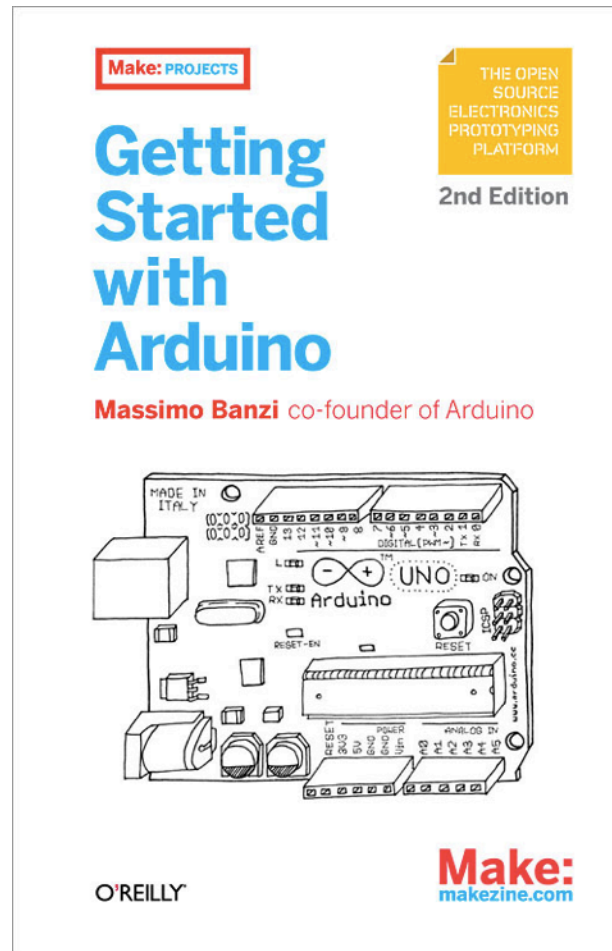
Develop with free tools on Linux, Mac, and Windows



III

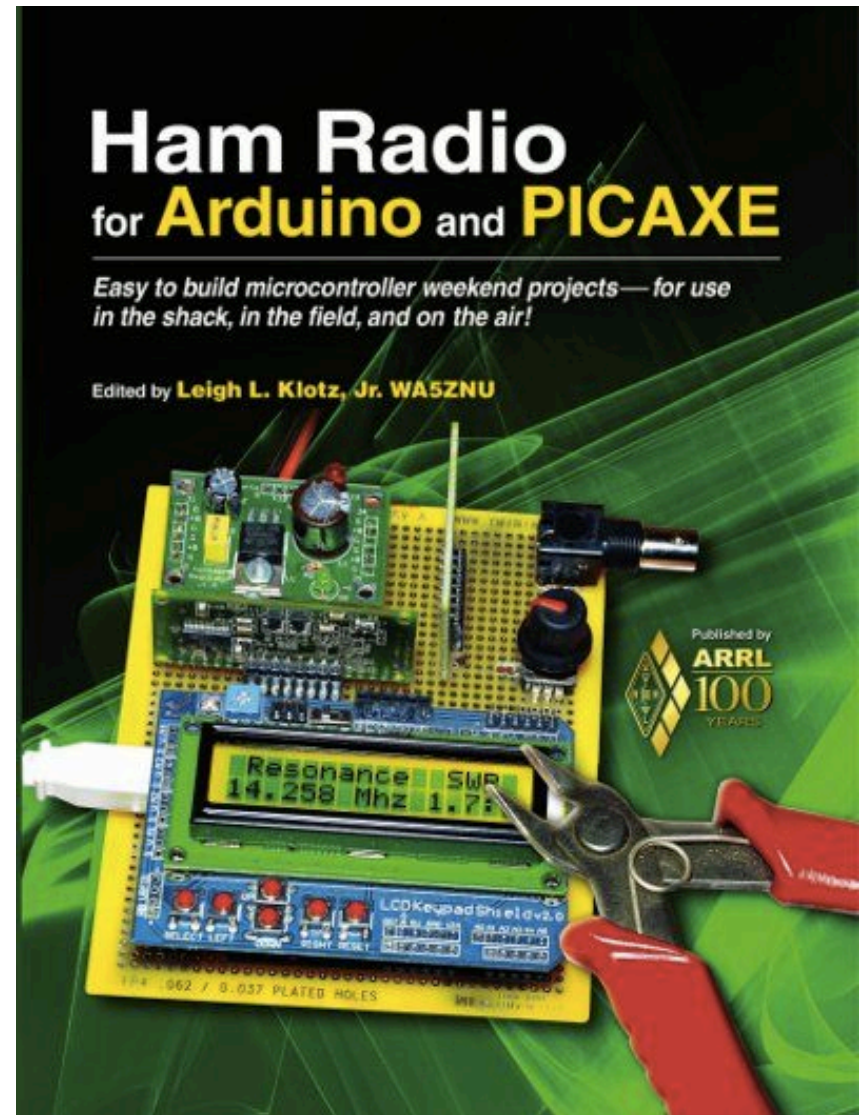


Start with this book...



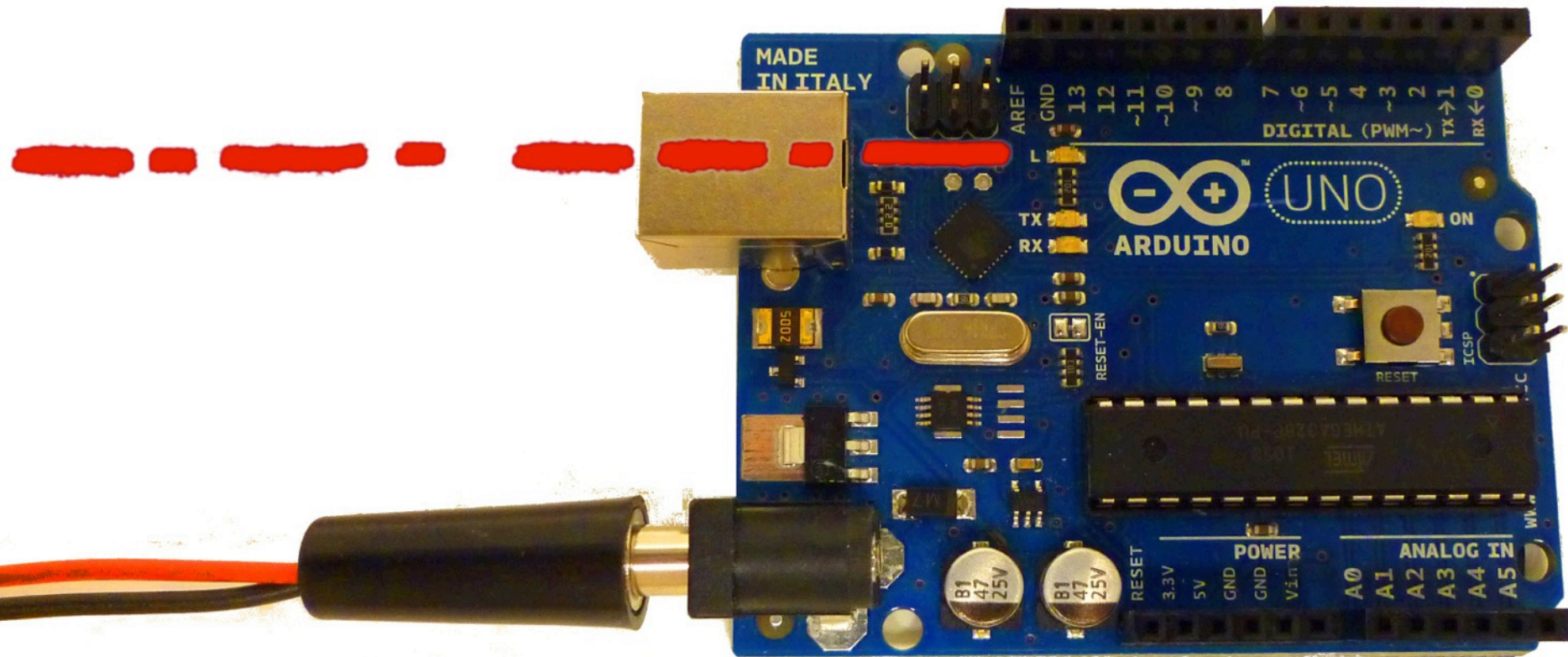
Or This One ;-)

The one and only
Arduino and PICAXE
Ham Radio Book!

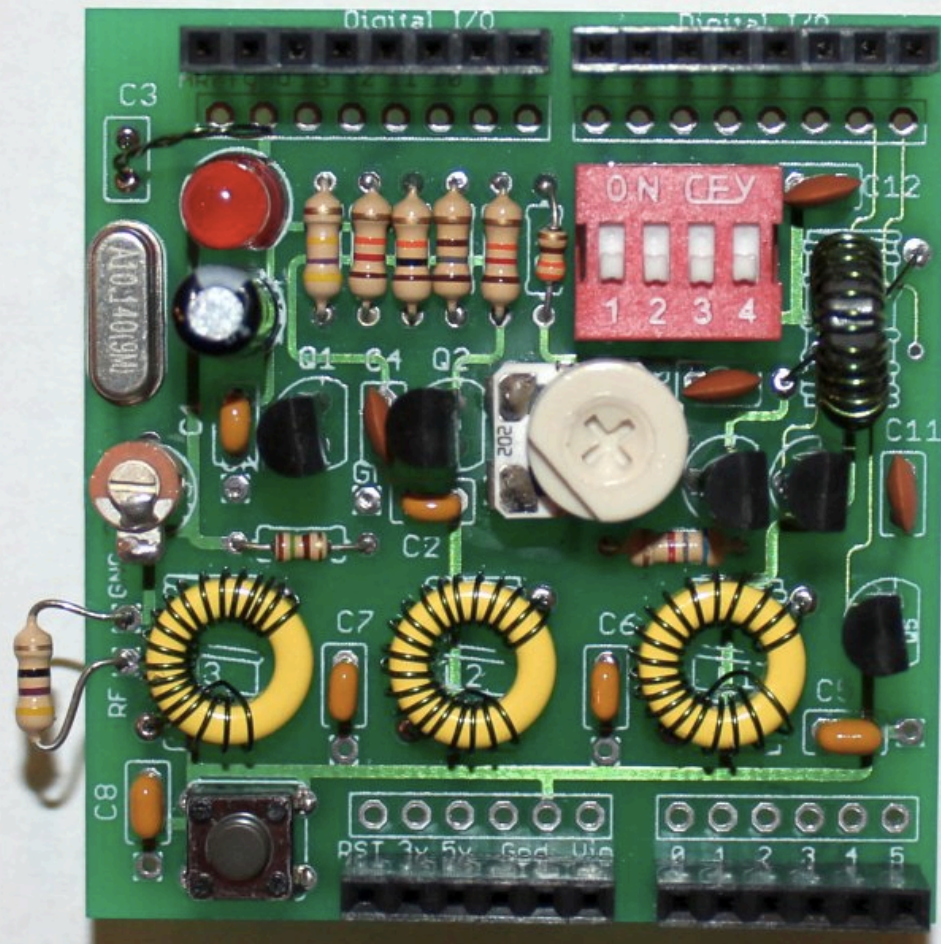


First Book Project: CQ DX

- A Ham's "Hello World:"
 - Blink CQ DX on an LED



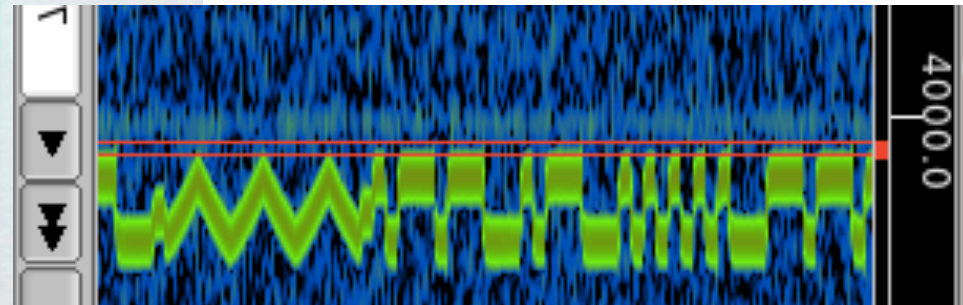
Book Project: QRSS Transmitter by Hans Summers G0UPL



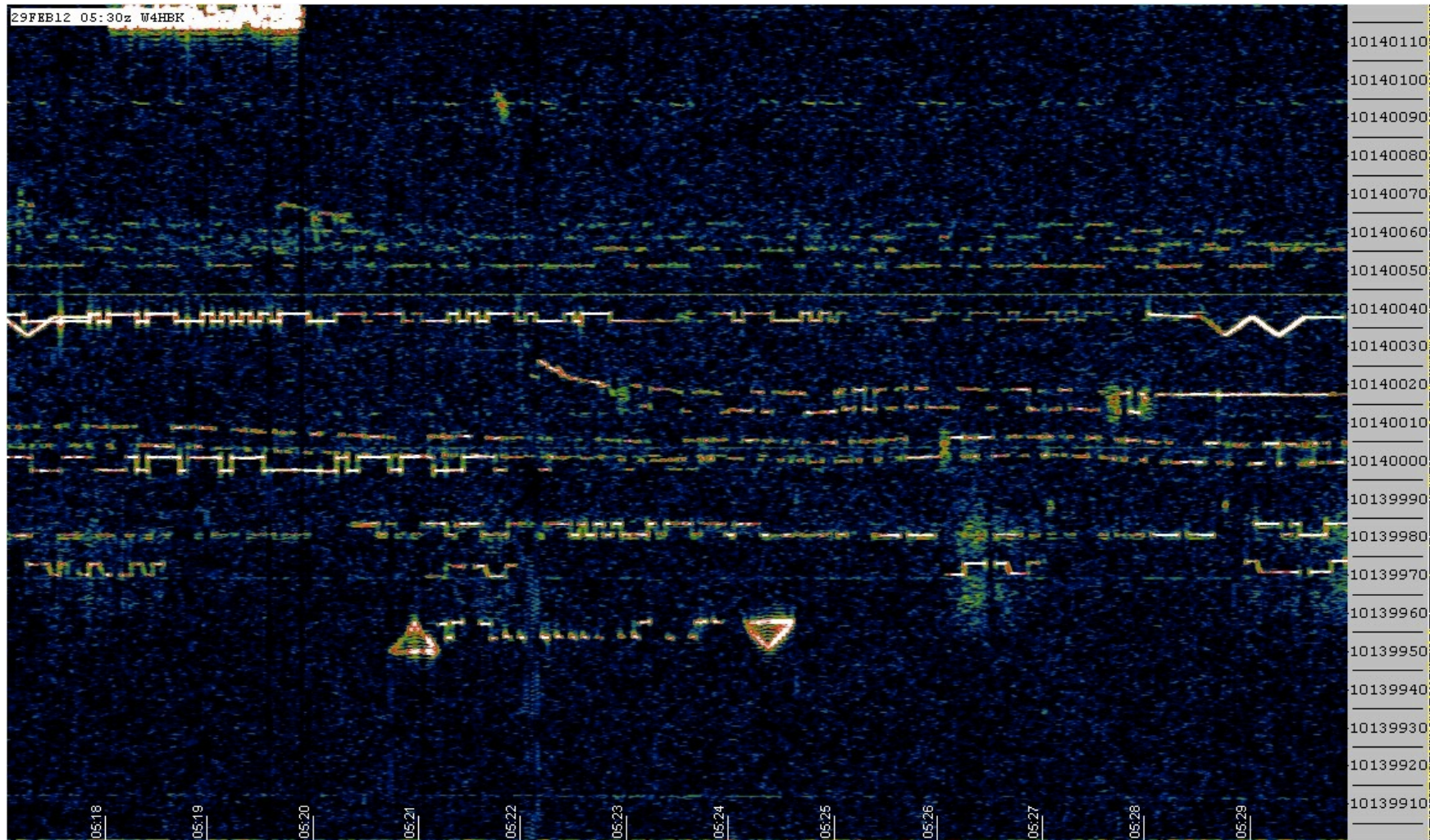
QRSS is an ultra-slow, ultra-low bandwidth,
ultra QRP mode...send your callsign in
10 minutes and see it on a waterfall
around the world on milliwatts.

A great weak-signal mode for propagation experiments, even Technician class.

10-50mW enough to cross continents.

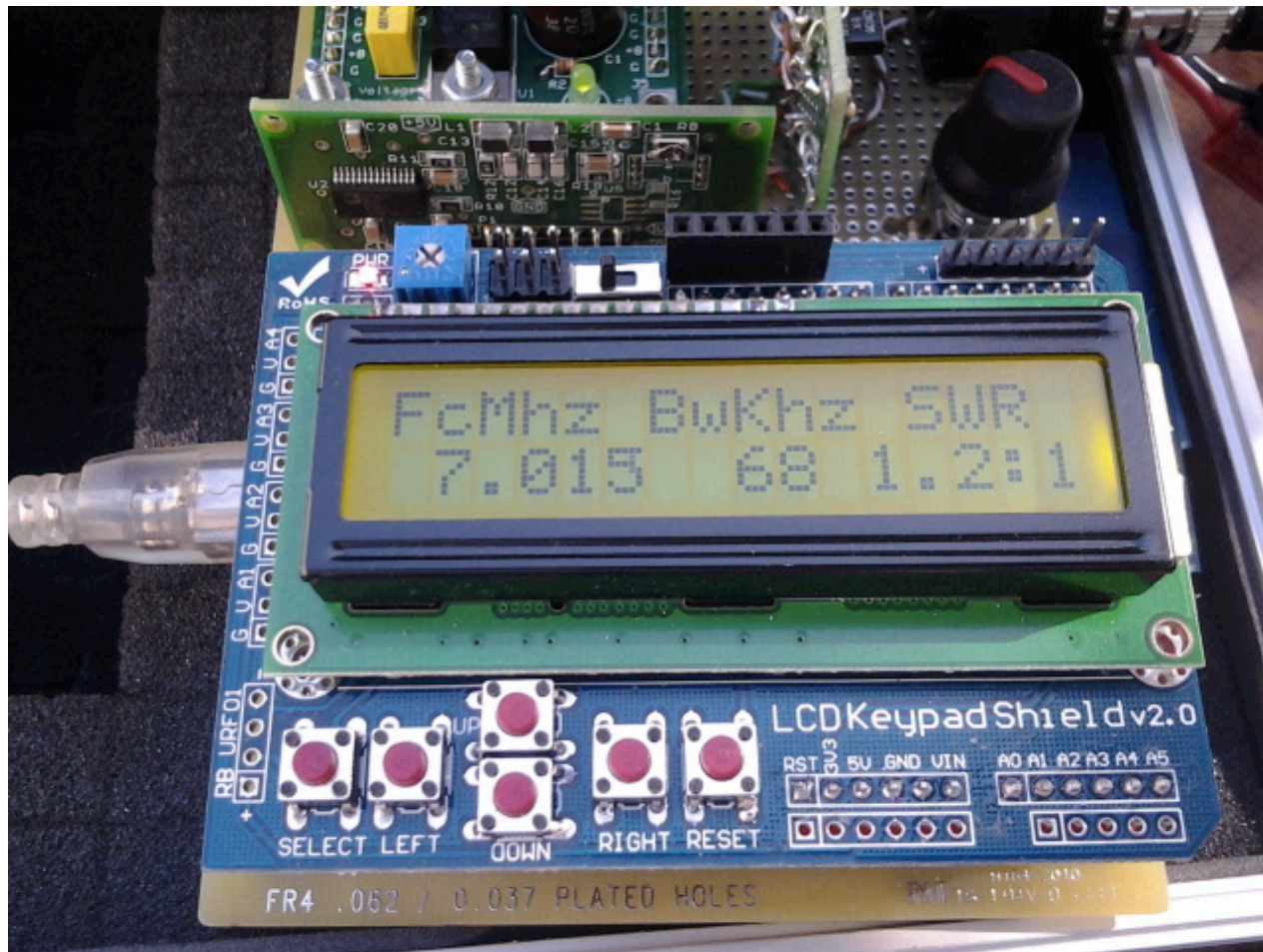


QRSS Grabbers on the web



W4HBK

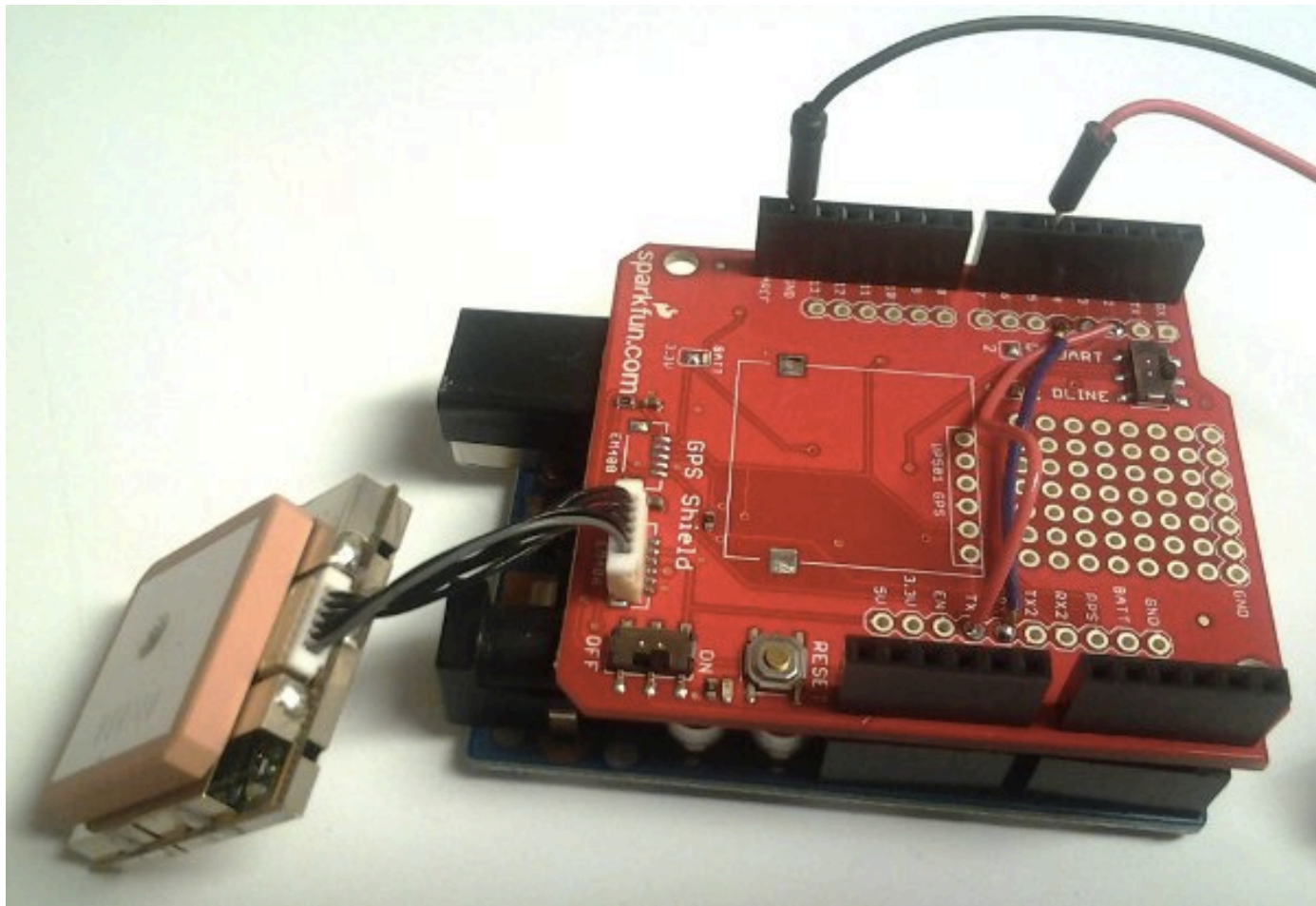
Book Project: Sweeper by Alan Biocca W6AKB



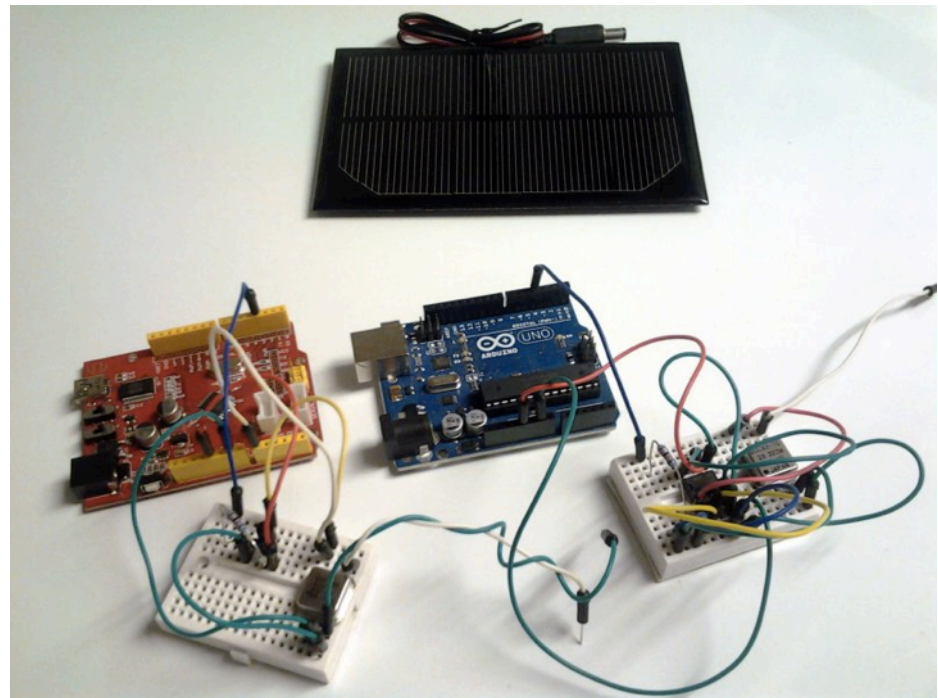
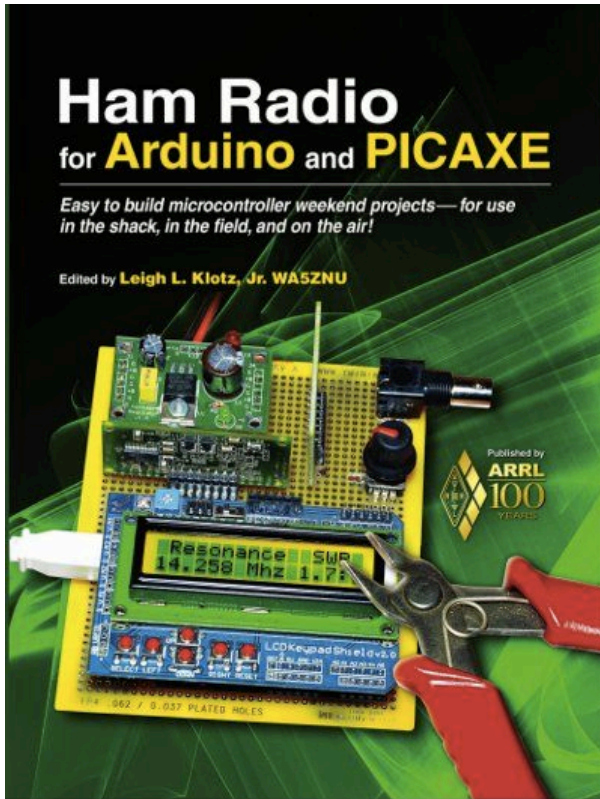
Book Project: Marinus Portable APRS Display



Book Project: Buddy Grid Square Annunciator



Buy the Book & Build your own!



Thank you!

Michael NE6RD
Hans G0UPL
Rich AC6MA
Bud N6SN
Peter KJ6PUN
Michael KF6WRW

Leigh WA5ZNU
Markus DL8RDS
Bill K6ACJ
Keith KJ6PUO
Alan W6ABK
Mark AF6IM

Slides and more at
<http://hamradioprojects.com>