

N7ETA 6/1/2018



There are many SBC (Single Board Computer), and micro controllers that can be used with the control and operation of amateur radio. A few of the more popular ones are Microchip PIC, Arduino boards, Teensy, Parallax, ARM cores, hundreds of 8051 clones, Cypress, Tl's MSP430, Raspberry Pi, Chip, HummingBoard-Gate, BeagleBone, Intel Galileo,

Most of these SBCs and Micro controllers are under \$100. Some as low as \$5 and lower.





What is an Arduino

Arduino is an open source computer hardware and software company, project, and user community that designs and manufactures single-board micro controllers and microcontroller kits for building digital devices and interactive objects that can sense and control objects in the physical and digital world. The project's products are distributed as open-source hardware and software, which are licensed under the GNU Lesser General Public License (LGPL) or the GNU General Public License (GPL),[1] permitting the manufacture of Arduino boards and software distribution by anyone. Arduino boards are available commercially in preassembled form, or as do-it-yourself (DIY) kits.

Arduino board where designed for use as a educational tool to provide hands on instruction into micro controllers, sensors and other control devices. The boards are equipped with sets of digital and analog input/output (I/O) pins that may be interfaced to various expansion boards or Breadboards (shields) and other circuits. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The microcontrollers are typically programmed using a dialect of features from the programming languages C and C++. In addition to using traditional compiler toolchains, the Arduino project provides an integrated development environment (IDE) based on the Processing language project.



During this presentation I will be concentration on Arduino boards with supporting sensors and breakout boards.

I first got interested in the Arduino family of products as I was researching for parts to build my own CNC, 3D printer. As with most projects I was looking as cost as well as performance. I first looked ad and ordered the Raspberry Pi, then found the stepper motor controllers (\$5 each with shipping!) but these were designed for the Arduino. Researching, I found that the Nano fit the bill also at \$5. The Arduino family fit the bill (pun intended!!). I went ahead and research connecting the nano to the Raspberry Pi to enhance my project.

Thus I ended up with a complete computed and CNC in one. Using the Raspberry Pi to design and the out put directly to the Arduino and controllers.

With so many variations of the Arduino boards you can build the smallest projects with many configurations!!





Now with all micro controllers, they have to be programmed to tell the micro controller what to do. Arduino has an IDE (Integrated Development Environment) that is simple to use.

The language is a modified C, C++ code. Built into the software is plenty of examples and tutorials for programing all of the Arduino boards.

This IDE is at https://www.arduino.cc/ and is free to download!!. You can also use the online version.





If you think learning C, C++ might be too difficult, then consider an Visual Programming Language like XOD, With XOD you can drag and drop modules and connect them. Then the program will verify and even show you the code as it would be in the Arduino IDE!!





There are many sensors and breakout boards that removes the issue of soldering the surface mount parts. This is great for bread boarding and also for assembling for a finished project.





I have found many uses for the controller and sensors. Some of them are:

Weather

- Temperature
- Humidity
- Wind Speed
- Wind Direction
- Rain Fall
- Lightning Detection

Home Security

- Alarms
- Gas Sensors
- Motion
- Video

Ham Radio

- SWR Meter
- GPS
- Beacon
- Digital Communication
- Antenna Rotor
- Auto Antenna Tuner
- Antenna Analyzer
- VFO
- Receivers
- Transmitters
- Satellite Tracking
- Solar Battery Charger
- CW Keyer
- Rig Control
- Automatic CQ caller
- Test Equipment

System Temp



Earlier I mentioned cost, and As an example;

The Arduino Uno is priced From:

- GearBest \$5.44
- Amazon \$16.99
- Ardino \$22.00

Arduino Nano From:

- GearBest \$3.20
- Amazon \$7.44 w/ cable
- Arduino \$22.00
- Ebay \$2.98

Experimenter Kits From:

- Amazon \$34.99
- Walmart \$32.48
- Maker Studio \$36.32









There are many books available for HAM projects that not only give you the code, but also the circuit diagrams to actually build the project.

Four of them from ARRL that have a wealth of information and many projects.



Arduino Projects for HAM Radio: A Radio Amateur's Guide to Open Source Electronics and Microcontroller Projects (McGraw Hill) – AMAZON - \$29.95

> More Arduino Projects for Ham Radio - \$34.95





Arduino Sketches (Wiley) \$35.00

> Arduino Projects for Amateur Radio (McGraw Hill) - \$30.00







Arduino Controllers & Ham Radio Other books for Arduino

Building Wireless Sensor Networks: with ZigBee, XBee, Arduino, and Processing AMAZON - \$25.96

iOS Sensor Apps with Arduino: Wiring the iPhone and iPad into the Internet of Things AMAZON - \$19.32

Make: Bluetooth: Bluetooth LE Projects with Arduino, Raspberry Pi, and Smartphones AMAZON - \$19.88









Arduino Workshop: A Hands-On Introduction with 65 Projects AMAZON - \$20.45



Some projects found on the WEB

\$40 Antenna Analyzer with Arduino and AD9850

https://hackaday.com/2015/08/06/4 0-antenna-analyzer-with-arduinoand-ad9850/





ON7EQ ARDUINO Intelligent antenna matrix switch

http://www.qsl.net/on7eq/projects/ardui no_ant_matrix.htm



WB8NBS Memory Keyer 2016

https://wb8nbs.wordpress.com/2016/0 2/11/arduino-iambic-keyer-2016-part-1-hardware/





PA3HCM

AUTOMATIC ANTENNA TUNER USING ARDUINO

http://iz6ndw.blogspot.com/20 12/01/pa3hcm-proposeautomatic-antenna-tuner.html



ON7EQ ARDUINO ATU for EFHW (end fed half wave) 20/40m antenna & Icom TRX

http://www.qsl.net/on7eq/projects/ arduino_atu.htm







SP3DYF Arduino Antenna Rotator – DIY

http://qrznow.com/arduino-antenna-rotator-diy/



WA5ZNU Cascata - an Arduino Waterfall

http://hamradioprojects.com/authors/wa5z nu/+cascata/





Arduino GPS GridSquare Decoder

http://typefaster.tumblr.com/post/3597621540 9/arduino-gps-gridsquare-decoder













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HF-VHF-UHF-SHF-Sat TS2000X, 706MKIIG, FT-857, HB, 6M, 2M, 70cm, 23cm G5RV, HyGain Thunderbird MFJ and LDG tunners Alliance & KenPro Rotors

Old Call - KC7NAX