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, TI’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.
Arduino Controllers & Ham Radio

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 programming 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.
Arduino Controllers & Ham Radio

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!!
Arduino Controllers & Ham Radio

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**

**Lightning Detection**
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
- Ardino - $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.

- More Arduino Projects for Ham Radio - $34.95
- Arduino Sketches (Wiley) $35.00
- Arduino Projects for Amateur Radio (McGraw Hill) - $30.00
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
Arduino Controllers & Ham Radio

Some projects found on the WEB

$40 Antenna Analyzer with Arduino and AD9850


ON7EQ ARDUINO
Intelligent antenna matrix switch

http://www.qsl.net/on7eq/projects/arduino_ant_matrix.htm
Arduino Controllers & Ham Radio

WB8NBS
Memory Keyer 2016

https://wb8nbs.wordpress.com/2016/02/11/arduino-iamic-keyer-2016-part-1-hardware/

PA3HCM

AUTOMATIC ANTENNA TUNER USING ARDUINO

http://iz6ndw.blogspot.com/2012/01/pa3hcm-propose-automatic-antenna-tuner.html
Arduino Controllers & Ham Radio

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/
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WA5ZNU
Cascata - an Arduino Waterfall

http://hamradioprojects.com/authors/wa5znu/+cascata/

Arduino GPS GridSquare Decoder

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Q & A
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