BeagleBone Black: $45 tiny Open Source Hardware Linux ARM Computer

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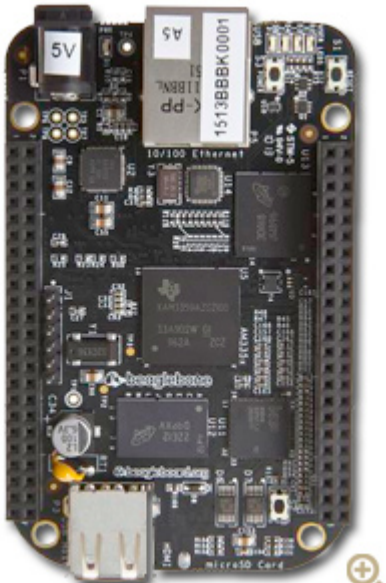
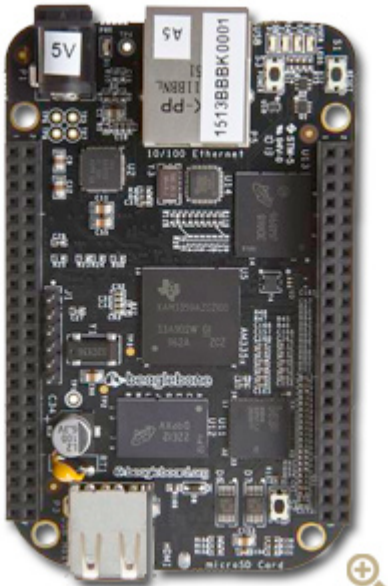
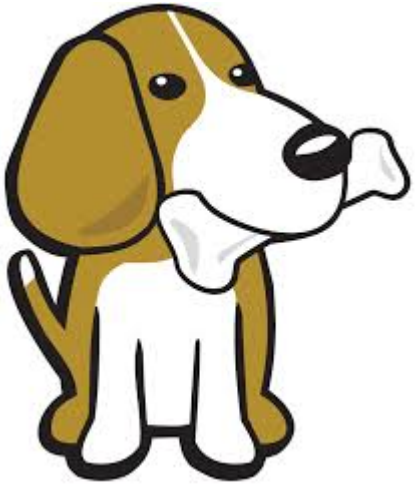




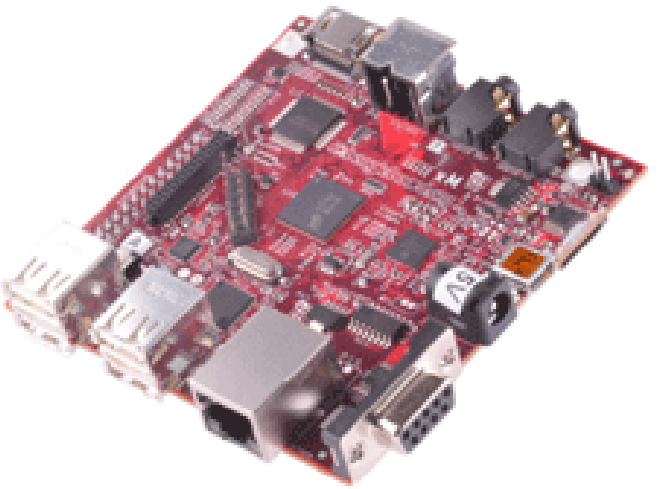
BeagleBoard.org Family

- Manufactured by CircutiCo in Texas
- Developed by BeagleBoard.org community
  - Federal non-profit org with board members:
    - Gerald Coley, TI, HW & owner of (real) Beagle
    - Jason Kridner, TI, SW & Community
    - Clint Cooley, CircuitCo, President
- Mascot is Boris the Beagle! :)



Previous Beagles

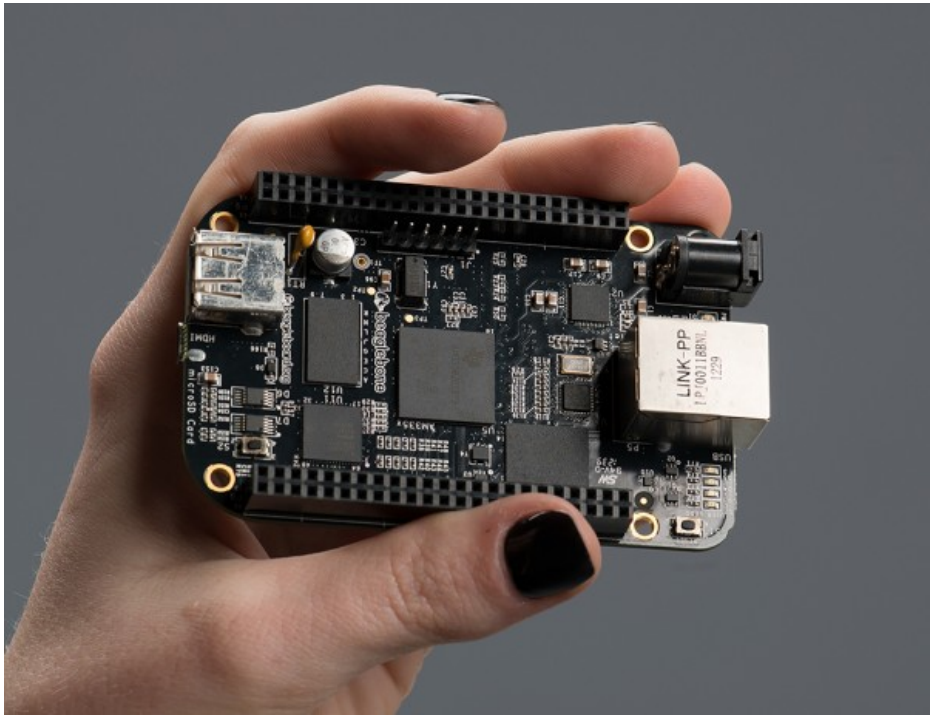
- BeagleBoard:
  - 2008
  - first affordable ($150) ARM single board computer (SBC)
  - Open Source Hardware!



- BeagleBone:
  - 2011
  - $89
  - 256MB RAM
  - 720MHz, ARM Cortex A8
  - ***fits in an Altoids-tin!***

BeagleBone Black: $45 ARM Computer

- 50% price of original BeagleBone (aka “White”)
- Faster 1GHz ARM Cortex A8
  - TI Sitara AM335x
- 512MB RAM
  - *double the White*
- Adds built-in HDMI
  - microHDMI port
- Adds 2GB Flash built-in
  - No SD card needed to boot



100% Open Source Hardware

- Schematics: YES!
- Board Layout (PCB): YES!
- Bill of Materials (BOM): YES!
  - All components chosen are available in single quantity
- Design files!
  http://circuitco.com/support/index.php?title=BeagleBoneBlack#Hardware_Files
- Full system technical reference manual!
  http://elinux.org/Beagleboard:BeagleBoneBlack#Hardware_Files

Linux Distros

- Linux ships on-board 2GB flash (eMMC)
  - Angstrom distribution w/ 3.8 Kernel & Device Tree
  - Transition to Debian in progress :)
    - beta image now available!
- ARMv7 instruction set:
  - This is the current standard for Linux on ARM
  - Run Android, Ubuntu, Debian, Fedora, and more without repackaging *(e.g. Raspbian)*
- Install distro of your choice on eMMC or just run off microSD card *(like the Pi does)*

Extensive I/O capabilities

- Standard computer peripherals: USB 2.0 host & device, micro HDMI, microSD, serial
- Lots of GPIO pins (General Purpose Input/Oupt)! 2 x 48 pin headers provide:
  - 65 digital I/O
  - 8 PWM / 4 timers / 7 analog inputs
  - 4 UART / 2 i2c / 2 SPI
- Daughterboards called Capes (like Arduino Shields) provide lots of options:
  - touchscreen LCD, sensors, motor control, 3D printing & CNC (LinuxCNC), wireless comm

Physical Computing = Awesome!

- You can interface LEDs, buttons & sensors using any programming language
  - all the pins can be controlled via /sys
  - if your fav language runs on ARM Linux and has file I/O library you are in luck!
- Recommended ways to start:
  - JavaScript library called Bonescript
    - http://beagleboard.org/support/bonescript
  - Python library called PyBBIO
    - http://learn.adafruit.com/category/beaglebone

Tidbit: 5 years old last July!

Let's get I N T E R A C T I V E!

- LOTS OF COOL STUFF HAPPENS... hopefully
- http://beagleboard.org/Support/BoneScript/demo_b
- http://beagleboard.org/Support/BoneScript/demo_b
- http://learn.adafruit.com/blinking-an-led-with-beagle
- http://learn.adafruit.com/connecting-a-push-button-

Resources

- BeagleBone Black - GPIO Programming on ARM Embedded Linux (video): http://derekmolloy.ie/beaglebone/beaglebone-gpio-programming-on-arm-embedded-linux/
- BeagleBoard.org Blog (weekly project spotlight): http://beagleboard.org/blog
- Adafruit Learning System: http://learn.adafruit.com/category/beaglebone
- BoneScript workshop: http://beagleboard.org/makerfairedetroit2013
- Beagle Community Mailing List: http://beagleboard.org/Community/Forums
- Robert C Nelson (Community member), maintains kernels & root filesystems for Debian and Ubuntu on BeagleBone and BeagleBone Black http://eewiki.net/display/linuxonarm/BeagleBone+Black
- Wiki: http://elinux.org/Beagleboard:BeagleBoneBlack