BeagleBoard.org Foundation is a non-profit

- US-based (Michigan) 501c3 tax-exempt non-profit
  - Will accept donations
- Educational mission - Kindergarten to Kickstarter
  - Design and use of open source hardware and software
  - Foster collaboration within our community

What is PocketBeagle and how is it special?

$25 1GHz tiny Linux computer
USB powered with host/client and on headers
Lots of expansion
Same processor as BeagleBone Black including PRUs

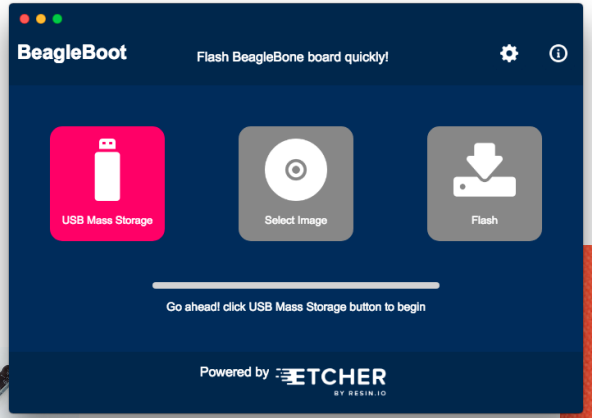
OSHW
US0083

Why use PocketBeagle in STEM education?

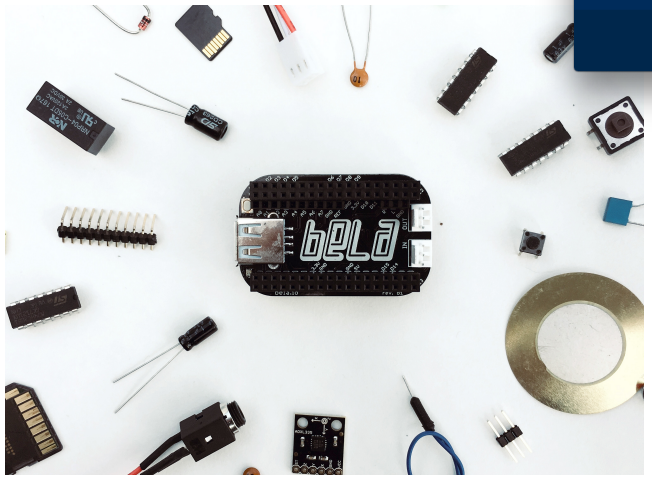
beagleboard.org®

git

Programming is a human endeavor where we learn from history

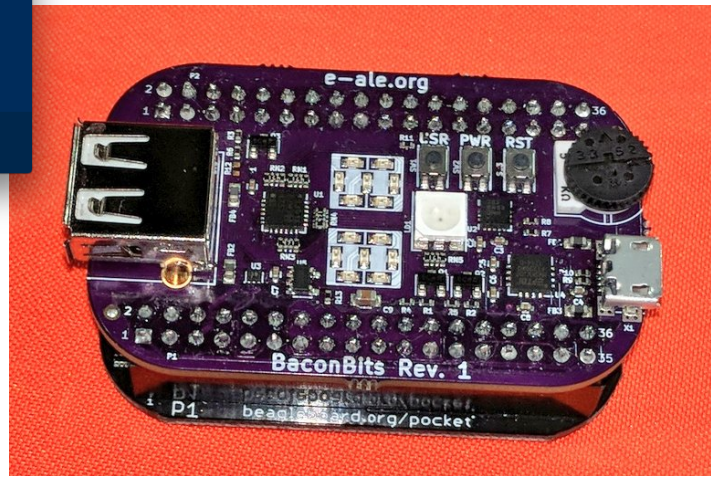


Predictable and low-cost



Unique real-time capabilities

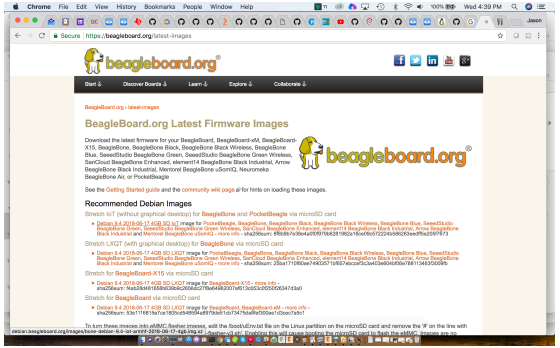
Collaboration, not cut-and-paste



Same tools as the pros

How to start teaching with PocketBeagle

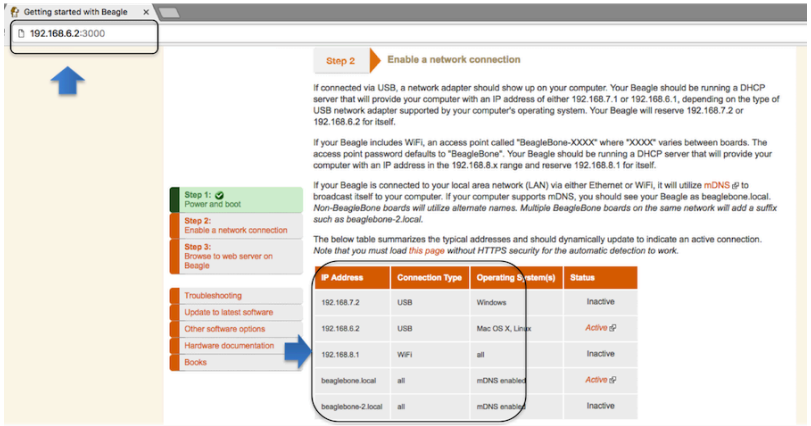
1) Boot the board

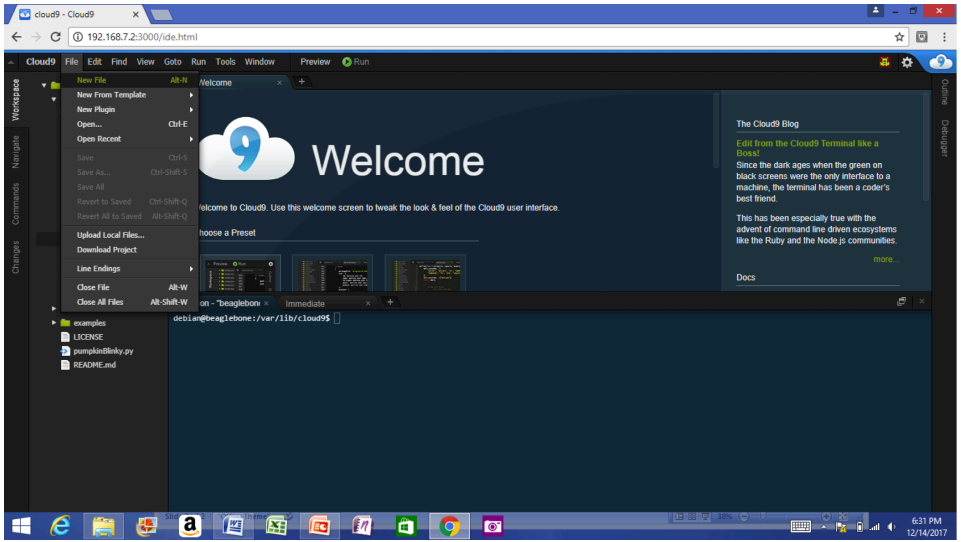


bbb.io/pb-start

How to start teaching with PocketBeagle

2) Get to the editor and command line





http://192.168.7.2

linuxcommand.org

How to start teaching with PocketBeagle

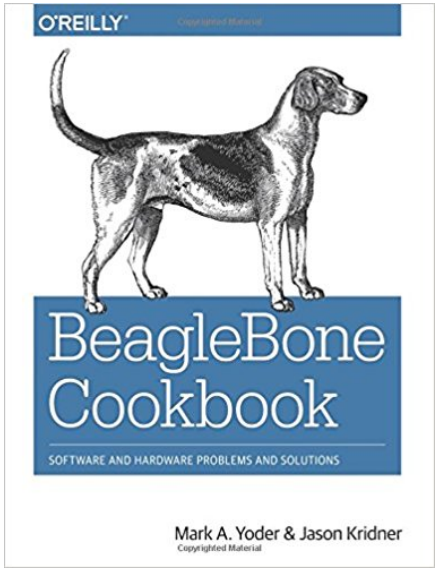
3) Blink an LED

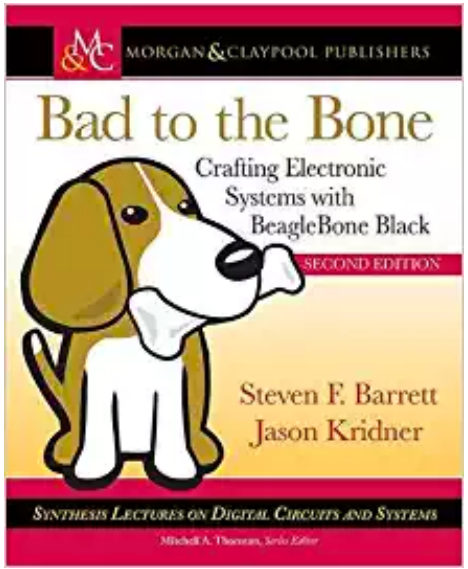
```
1. var b = require('bonescript');
2. var state = b.LOW;
3. b.pinMode("USR3", b.OUTPUT);
4. setInterval(toggle, 250);  // toggle 4 times a second, every 250ms
5. function toggle() {
6.     if(state == b.LOW) state = b.HIGH;
7.     else state = b.LOW;
8.     b.digitalWrite("USR3", state);
9. }
```

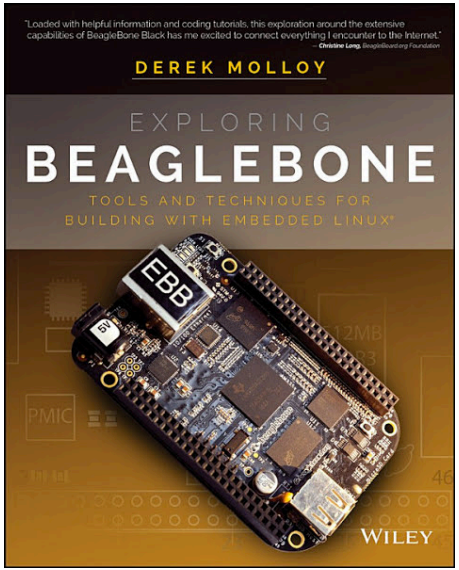
How to start teaching with PocketBeagle

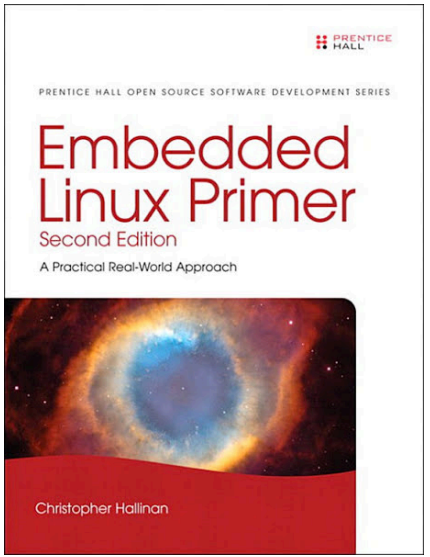
beagleboard.org®

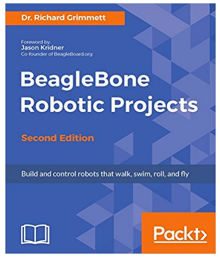
4) Explore some books

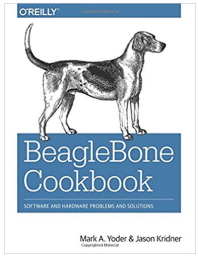


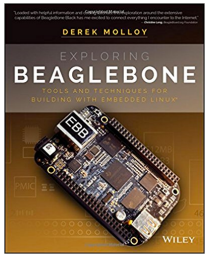


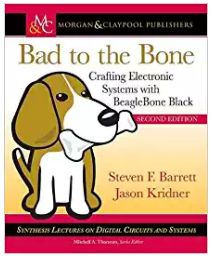


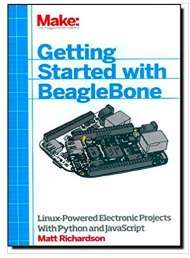


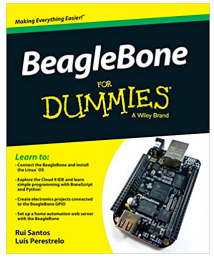

Dr. Richard Grimmett
BeagleBone Robotic Projects
Second Edition
Build and control robots that walk, swim, roll, and fly
Packt

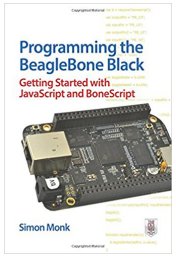

O'REILLY
BeagleBone Cookbook
SOFTWARE AND HARDWARE PROBLEMS AND SOLUTIONS
Mark A. Yoder & Jason Kridner


DEREK MOLLOY
EXPLORING
BEAGLEBONE
TOOLS AND TECHNIQUES FOR BUILDING WITH EMBEDDED LINUX
WILEY

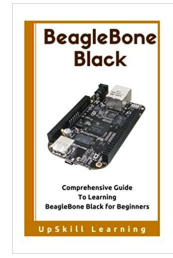

MORGAN & CLAYPOOL PUBLISHERS
Bad to the Bone
Crafting Electronic Systems with BeagleBone Black
SECOND EDITION
Steven F. Barrett
Jason Kridner
SYNTHESIS LECTURES ON DIGITAL CIRCUITS AND SYSTEMS

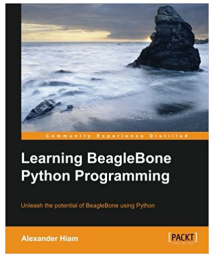

Make:
Getting Started with BeagleBone
Linux-Powered Electronic Projects With Python and JavaScript
Matt Richardson


Making Everything Easier
BeagleBone
FOR DUMMIES
A Wiley Brand
Learn to:
Rui Santos
Luis Perestrelo

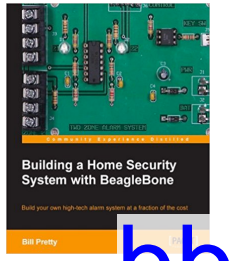

Programming the BeagleBone Black
Getting Started with JavaScript and BoneScript
Simon Monk

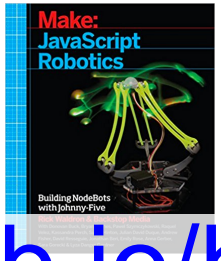

RASPBERRY PI 3
AND
BEAGLEBONE BLACK
FOR ENGINEERS
Pocket Reference For Beginners
UPSKILL LEARNING

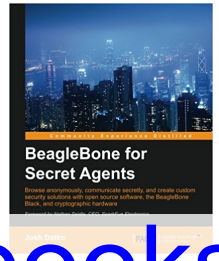

BeagleBone Black
Comprehensive Guide To Learning BeagleBone Black for Beginners
UpSkill Learning

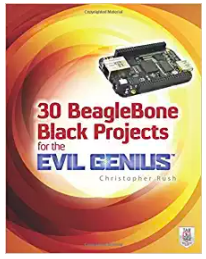

Learning BeagleBone Python Programming
Unleash the potential of BeagleBone using Python
Alexander Hiam
PACKT

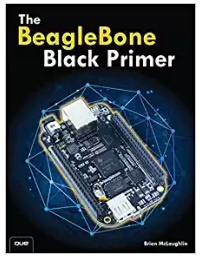

BeagleBone Home Automation
Live your sophisticated dream with home automation using BeagleBone
Juha Lumme
PACKT

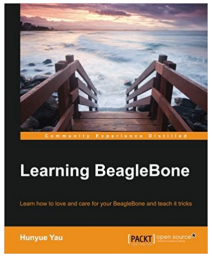

Building a Home Security System with BeagleBone
Build your own high-tech alarm system at a fraction of the cost
Bill Pretty
PACKT

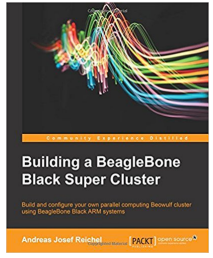

Make:
JavaScript Robotics
Building NodeBots with Johnny-Five

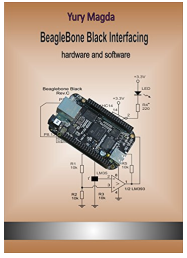

BeagleBone for Secret Agents
Browse anonymously, communicate secretly, and create custom security solutions with open source software, the BeagleBone Black, and cryptographic hardware
Josh Datko
PACKT


30 BeagleBone Black Projects for the EVIL GENIUS
Christopher Rush


The BeagleBone Black Primer
Brian McLaughlin


Learning BeagleBone
Learn how to love and care for your BeagleBone and teach it tricks
Hunyue Yau
PACKT

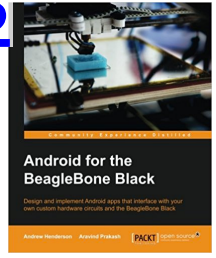

Building a BeagleBone Black Super Cluster
Build and configure your own parallel computing Beowulf cluster using BeagleBone Black ARM systems
Andreas Josef Reichel
PACKT


Yury Magda
BeagleBone Black Interfacing
hardware and software

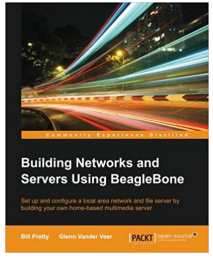

Mastering BeagleBone Robotics
Master the power of the BeagleBone Black to maximize your robot-building skills and create awesome projects
Richard Grimmett
PACKT

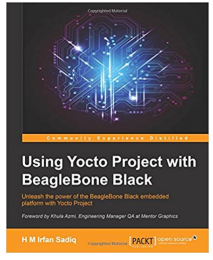

BeagleBone Black
Programming by Example
Agus Kurniawan

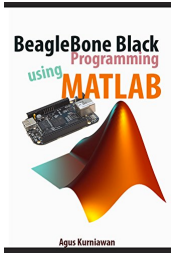

BeagleBone Media Center
A practical guide to transforming your BeagleBone into a fully functional media center
David Lewin
PACKT

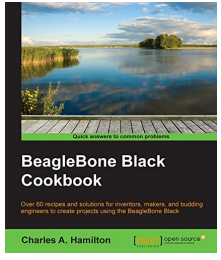

Android for the BeagleBone Black
Design and implement Android apps that interface with your own custom hardware circuits and the BeagleBone Black
Andrew Henderson
Aravind Prakash
PACKT


BeagleBone Essentials
Harness the power of the BeagleBone Black to manage external environments using C, Bash, and Python/PHP programming
Rodolfo Giometti
PACKT

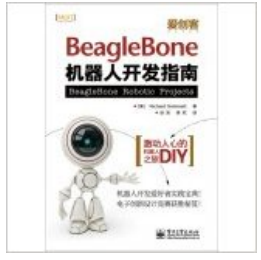

Building Networks and Servers Using BeagleBone
Set up and configure a local area network and file server by building your own home-based multimedia server
Bill Pretty
Glenn Vander Veer
PACKT

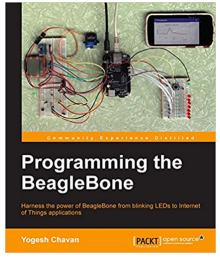

Using Yocto Project with BeagleBone Black
Unleash the power of the BeagleBone Black embedded platform with Yocto Project
Foreword by Khuta Azmi, Engineering Manager Q4 at Mentor Graphics
H M Irfan Sadiq
PACKT


BeagleBone Black
Programming
using
MATLAB
Agus Kurniawan

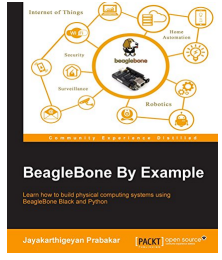

BeagleBone Black Cookbook
Quick answers to common problems
Over 60 recipes and solutions for inventors, makers, and budding engineers to create projects using the BeagleBone Black
Charles A. Hamilton
PACKT


ボクの
Beagle
Bone
Black
鈴木哲哉


BeagleBone
机器人开发指南
BeagleBone Robotic Projects
DIY


Programming the BeagleBone
Harness the power of BeagleBone from blinking LEDs to Internet of Things applications
Yogesh Chavan
PACKT


BeagleBone Home Automation Blueprints
Automate and control your home using the power of the BeagleBone Black with practical home automation projects
Rodolfo Giometti
PACKT

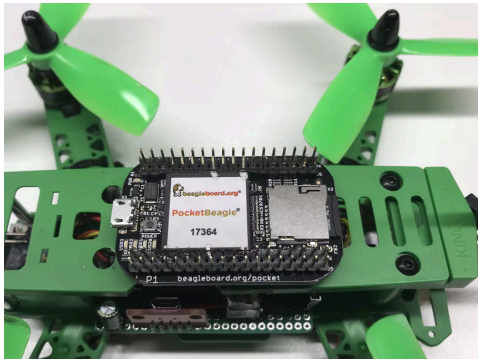

Internet of Things
Home Automation
Security
Surveillance
Robotics
BeagleBone By Example
Learn how to build physical computing systems using BeagleBone Black and Python
Jayakarthigeyan Prabakar
PACKT

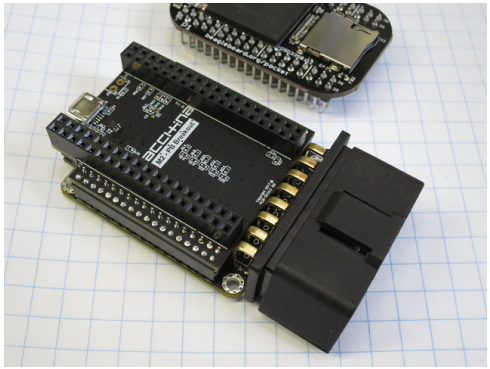
How to start teaching with PocketBeagle

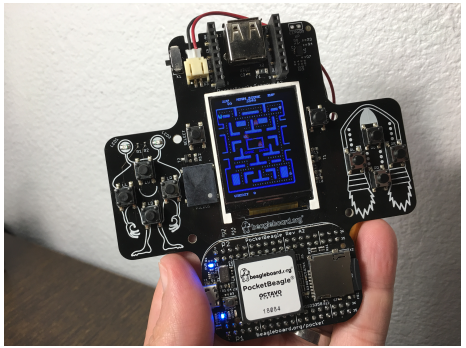
beagleboard.org®

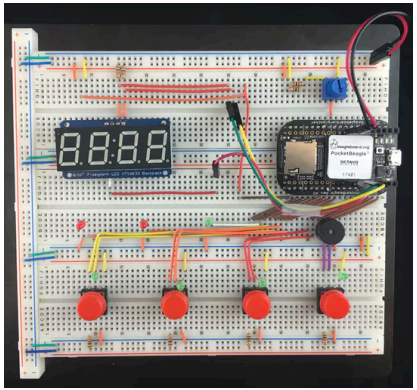
5) Build a project

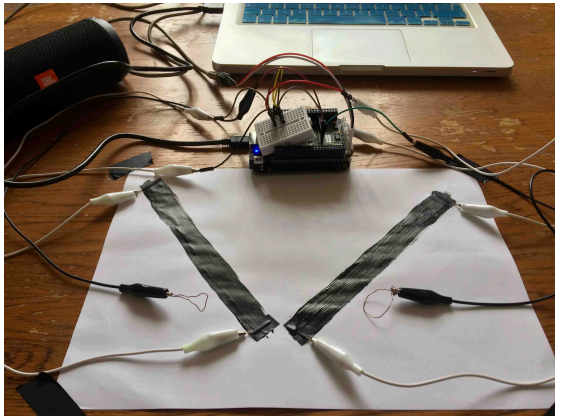
bbb.io/p-pocket





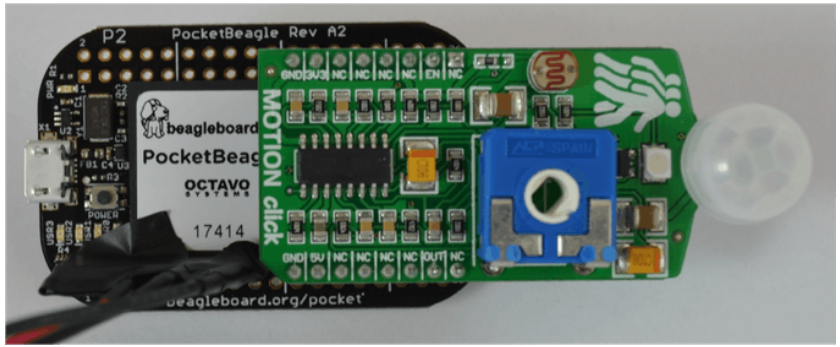






How to introduce Physical Computing

- Breadboarding an LED or a button can build a good intuition
- mikroElectronica Click Boards™ boards can connect directly to PocketBeagle and provide hundreds of sensors and actuators
- Getting to more interesting sensors quickly builds motivation
- Linux drivers provide a better opportunity to learn the “right” way to do things from the community
- Abstractions make the software easy



bbb.io/click

Example Lesson Plans

https://elinux.org/ECE497_Instructor%27s_Guide

Embedded Electronics
General purpose I/O
Analog sensors (V = IR, series/parallel)
Pulse width modulation
Standard busses (I2C, SPI, USB)

Software Applications
Languages (Python, JavaScript, C)
Revision control (git)
Debugging (gdb)
Project development (make)
Graphical Interfaces (qt, electron)

Signal Processing
Audio (alsa, bela.io, gstreamer)
Video (opencv, v4l2, frame buffer)
Threads

Networking
Configuration
Sockets
Transports and services

Device Drivers
Device abstraction
Kernel configuration
Subsystem APIs

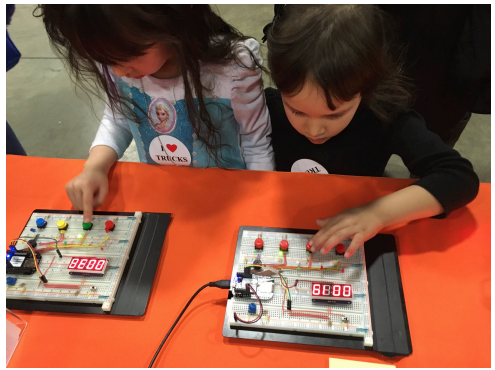
System Integration
Boot sequence and boot-loaders
Package management

Call for PocketBeagles-for-your-classroom participation

beagleboard.org®

Apply for up to 30 PocketBeagle boards for your classroom or makerspace by contributing a project

- Must submit a repeatable project for your students on beagleboard.org/p
- Document your procedures, learning outcomes & advice on how to integrate into a bigger classroom/course experience
- Projects must be well-documented, open source and available for reuse by the BeagleBoard.org Foundation
- Projects evaluated on:
  - Documentation quality in both appearance and understanding
  - Personal and educational value of lessons learned by students
  - Applicability across broad age range and skill levels
- Planned evaluation dates: Nov 29, 2018 & Feb 28, 2019



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