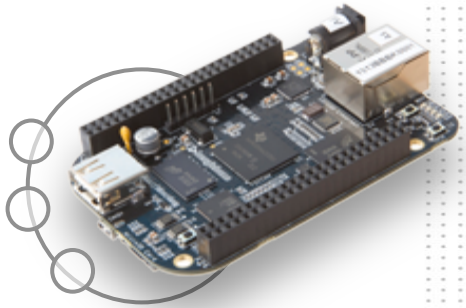
Linux and web servers for teaching electronics



Jason Kridner

Co-Founder

BeagleBoard.org

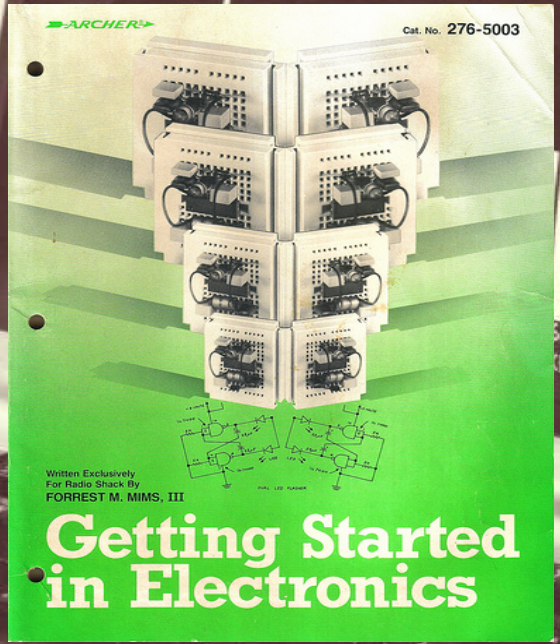
beagleboard.org™ Foundation

- US (Texas) 501 (c)3 non-profit corporation
- Board members from Texas Instruments, Rose-Hulman University, EmProDesign and CircuitCo
- Focus on education and collaboration around Linux, electronics and open source hardware
- Using TI processors

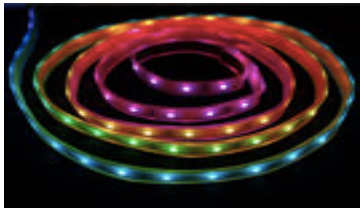
Getting Started With TRS-80® BASIC

For use with Models I, III & 4

Radio Shack
The biggest name in little computers®



http://www.sandywalsh.com/2012_07_01_archive.html
http://newcome.wordpress.com/2009/12/15/make-electronics-the-new-engineers-notebook/



digitalWrite()

SOCKET IO

node

http://www.adafruit.com/

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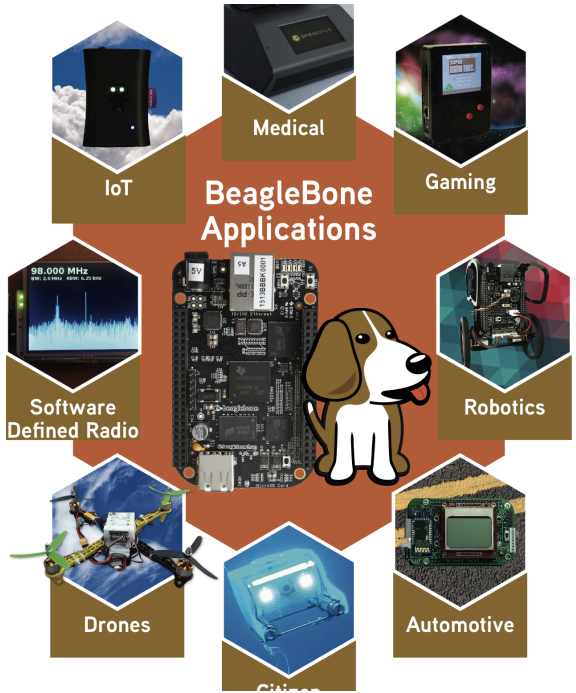
Huge base of existing projects



- Medical analysis, assistance and information management
- Home information, automation and security systems
- Home and mobile entertainment and educational systems
- New types of communications systems
- Personal robotic devices for cleaning, upkeep and manufacturing
- Remote presence and monitoring
- Automotive information management and control systems
- Personal environmental exploration and monitoring

http://beagleboard.org/project

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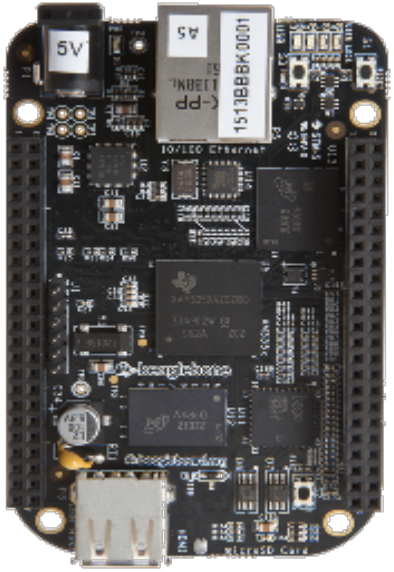
Cape expansion headers

DGND	1	2	DGND
VDD_3V3	3	4	VDD_3V3
VDD_5V	5	6	VDD_5V
SYS_5V	7	8	SYS_5V
PWR_BUT	9	10	SYS_RESETn
UART4_RXD	11	12	GPIO_60
UART4_TXD	13	14	EHRPWM1A
GPIO_48	15	16	EHRPWM1B
SPI0_CS0	17	18	SPI0_D1
I2C2_SCL	19	20	I2C2_SDA
SPI0_D0	21	22	SPI0_SCLK
GPIO_49	23	24	UART1_TXD
GPIO_117	25	26	UART1_RXD
GPIO_115	27	28	SPI1_CS0
SPI1_D0	29	30	GPIO_122
SPI1_SCLK	31	32	VDD_ADC
AIN4	33	34	GNDA_ADC
AIN6	35	36	AIN5
AIN2	37	38	AIN3
AIN0	39	40	AIN1
GPIO_20	41	42	ECAPPWM0
DGND	43	44	DGND
DGND	45	46	DGND



LEGEND
Power/Ground/Reset
Available Digital
Available PWM
Shared I2C Bus
Reconfigurable Digital
Analog Inputs (1.8V)

DGND	1	2	DGND
MMC1_DAT6	3	4	MMC1_DAT7
MMC1_DAT2	5	6	MMC1_DAT3
GPIO_66	7	8	GPIO_67
GPIO_69	9	10	GPIO_68
GPIO_45	11	12	GPIO_44
EHRPWM2B	13	14	GPIO_26
GPIO_47	15	16	GPIO_46
GPIO_27	17	18	GPIO_65
EHRPWM2A	19	20	MMC1_CMD
MMC1_CLK	21	22	MMC1_DAT5
MMC1_DAT4	23	24	MMC1_DAT1
MMC1_DAT0	25	26	GPIO_61
LCD_VSYNC	27	28	LCD_PCLK
LCD_HSYNC	29	30	LCD_AC_BIAS
LCD_DATA14	31	32	LCD_DATA15
LCD_DATA13	33	34	LCD_DATA11
LCD_DATA12	35	36	LCD_DATA10
LCD_DATA8	37	38	LCD_DATA9
LCD_DATA6	39	40	LCD_DATA7
LCD_DATA4	41	42	LCD_DATA5
LCD_DATA2	43	44	LCD_DATA3
LCD_DATA0	45	46	LCD_DATA1

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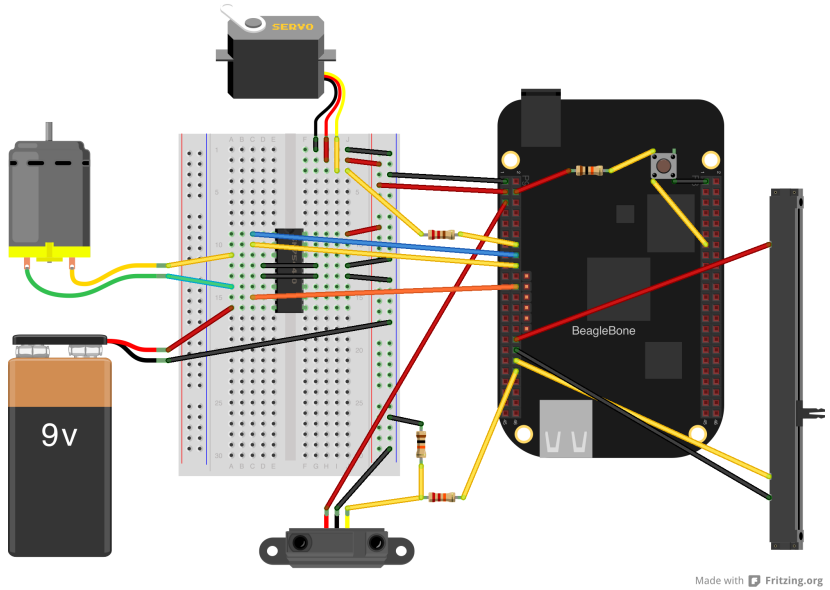
Some basic robotic components

- Analog sensors
  - IR range finder
  - Potentiometer
- Digital sensor
  - Button
- Servo and DC motors



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Button and Switch (6)
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Misc brick (1)
Cable and Wires (2)

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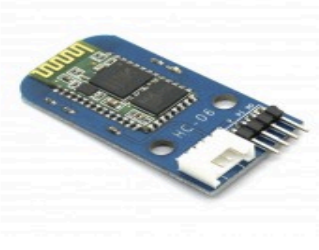

Electronic Brick - HC06 Serial Bluetooth Brick

2 Review(s) | Add Your Review

This Serial Bluetooth brick is easy to use module compatible with existing Stem Basic Shield. It designs for transparent wireless serial connection setup. Learn More

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~~$12.00~~
$10.00

ADD TO CART

Electronic Brick - DHT11 Humidity Temperature Sensor Brick

2 Review(s) | Add Your Review

DHT11 electronic brick of digital temperature & humidity sensor features a digital temperature & humidity sensor complex with a calibrated digital signal output. Its single-bus operation, extremely small size and low consumption enable it to be used in HVAC, automotive, weather stations, dehumidifier and other applications. Learn More

Add to Wishlist Add to Compare

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$3.00

ADD TO CART

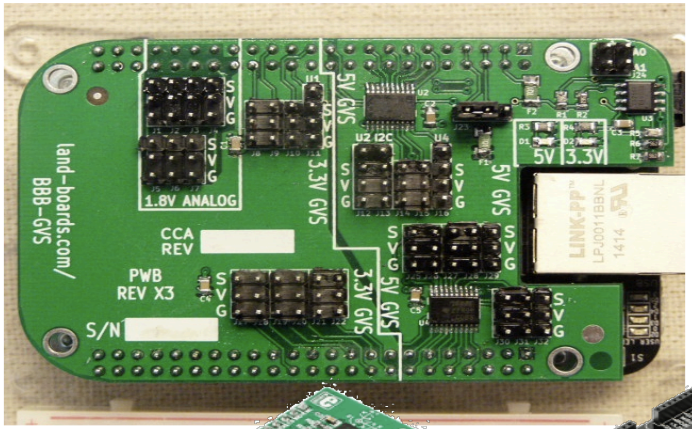
http://imall.iteadstudio.com/prototyping/electronic-brick.html

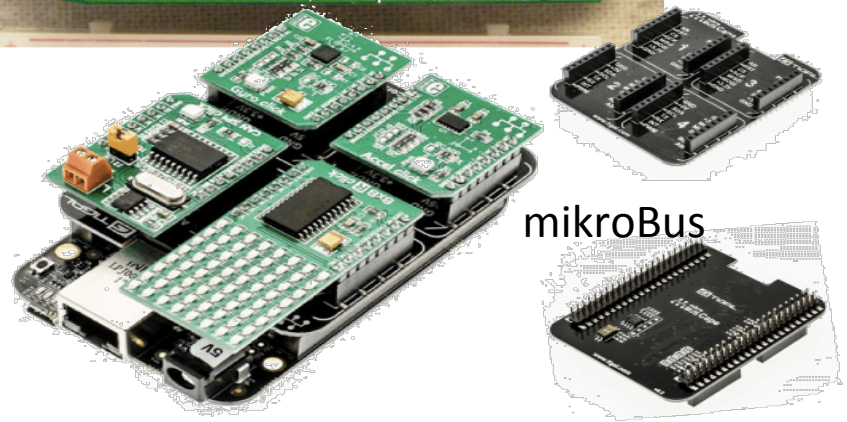
NEW | BLOG | SUPPORT | IMALL

Capes to make wiring even easier

BBB-GVS

GVS





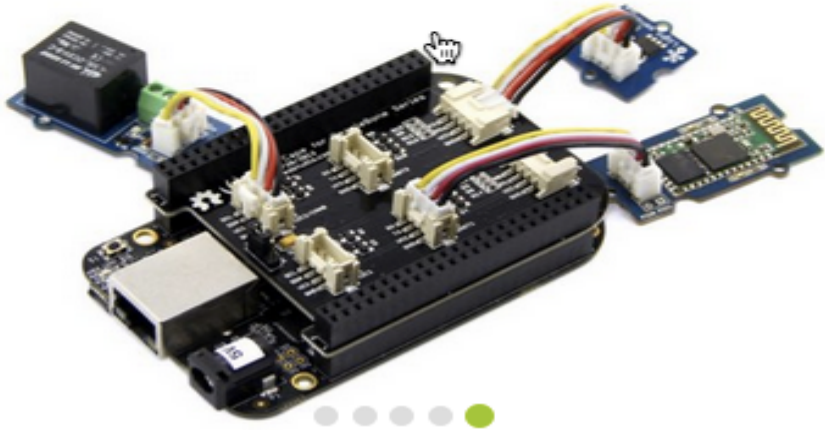
mikroBus

Grove Cape for BeagleBone Series

SKU: 811001001

USD $19.90

Grove



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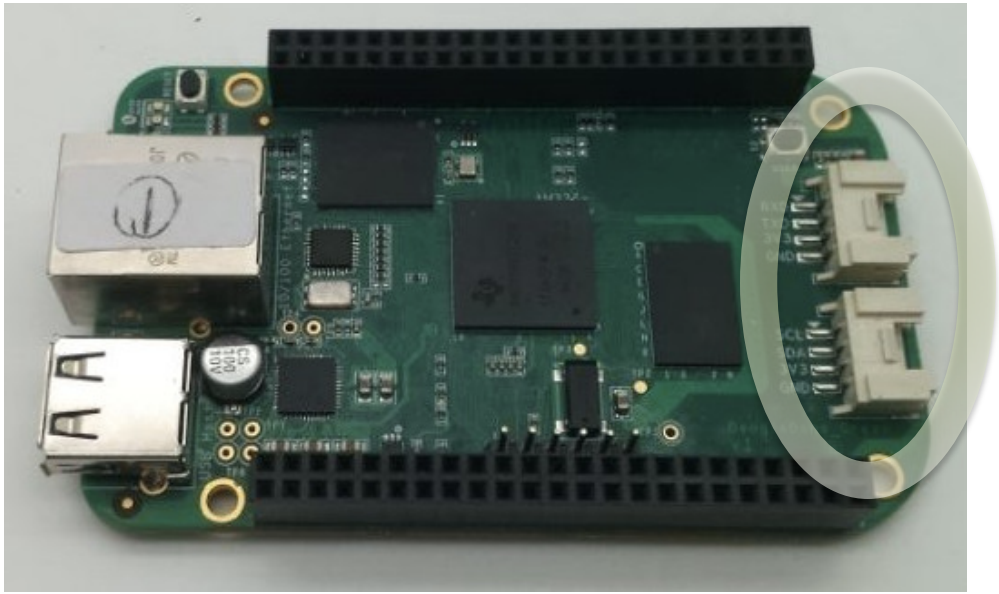
BeagleBone Green adds connectors

Cape or manual wire no longer required



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open source hardware

open source™

https://macpablodesigns.wordpress.com/2009/10/20/the-cathedral-the-bazaar-an-essay-about-open-source/

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Why web technology?

- It is the way we communicate today
- It is build on open standards that are certain to stand the test of time
- HTML is a declarative syntax that is easy to understand
  - You can start easy and build on the skills forever

Why Linux?

- Linux is everywhere
  - Android, stock exchange, Google servers, thermostats, navigation systems and much much more
- Linux runs on almost everything
  - From calculators to super computers, vendors and users of complex processors have chosen Linux to abstract the hardware
- Linux is collaborative
  - Around 10,000 developers from more than 1,00 companies have contributed to Linux

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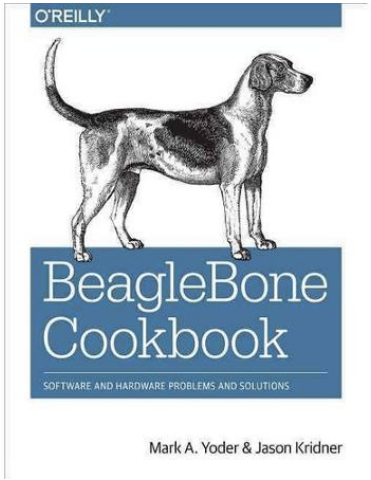
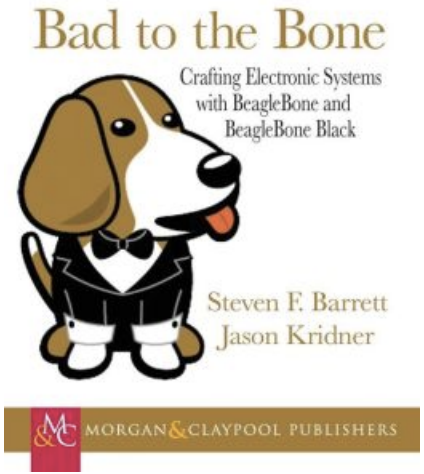
Don’t forget to teach the basic concepts of operating systems

- Where are my bits?
  - Every computer user should understand where their data goes
- What is a command line?
  - We should be exposing a repeatable and scriptable interface
- In Linux, everything is a file
  - open/read/write/ioctl/close/unlink

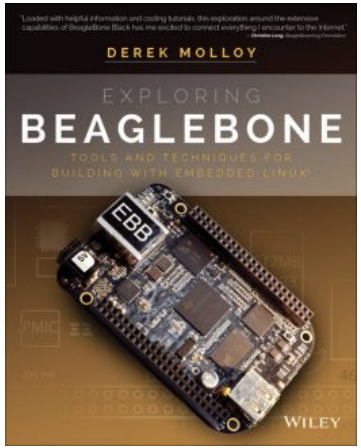
Some BeagleBoard.org related books



Quick start



Introductory level textbook



The missing software reference manual

http://bit.ly/bbb-books

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