

Embedded Prototyping

EP - Mostly for Digital

- Wired Control
- Wireless Control

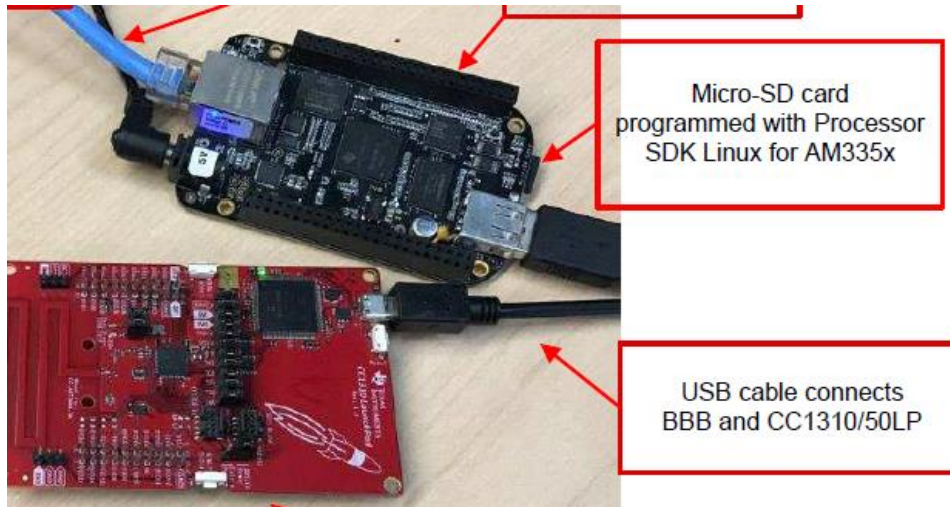
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Agenda

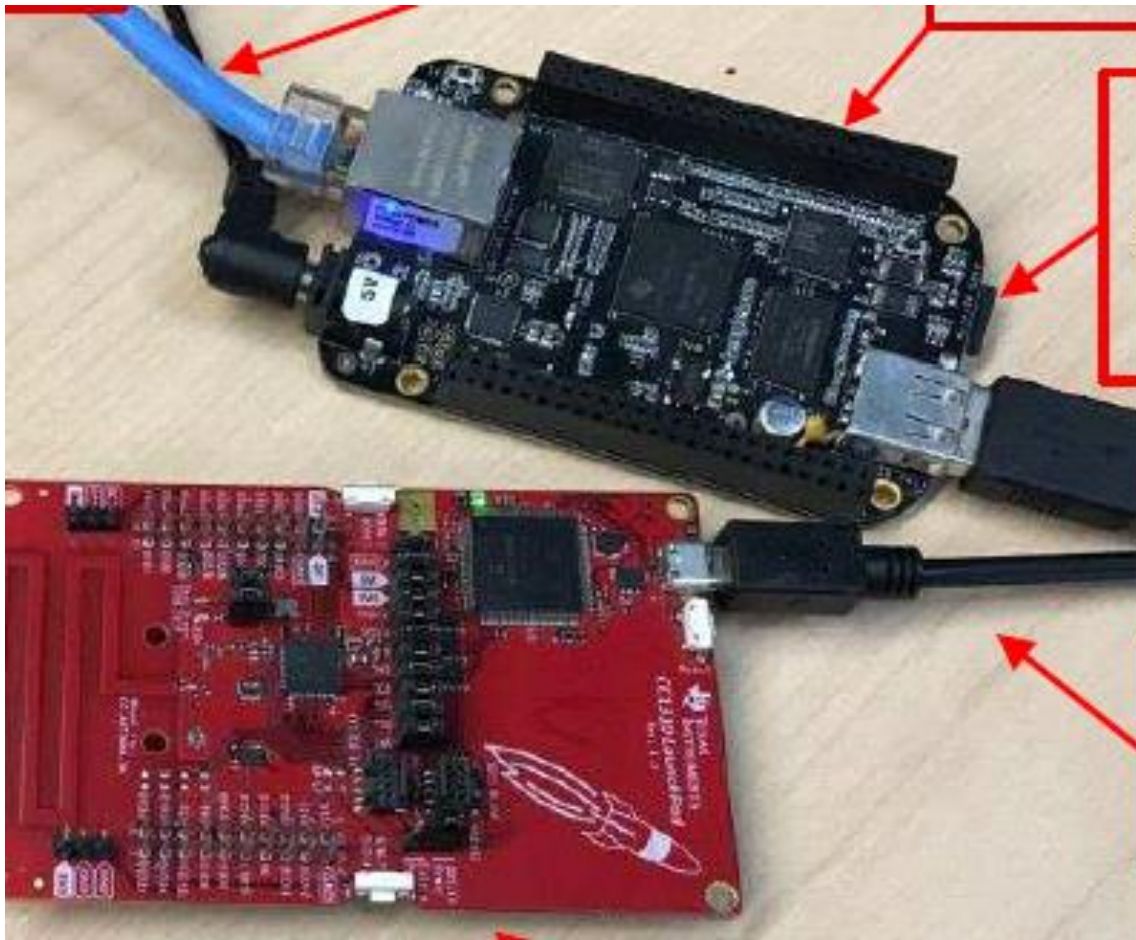
- Fundamentals (mostly for Analog)
 - Implementing necessary prototyping functions such clocks/GPIO, Read A/D, I2C/SMBus, etc.
 - Seamless interface of various Analog EVM's for system “proof of concept”
 - Standalone UI - Button (GP Input - GPIO), LCD Display (“Hello”), Music, Serial Interface (Putty)
- More UI (i.e. GUI Advanced Comm Tab basically Putty/Serial I/F) - Lessons learned from home networking (if you can setup the WiFi in your house, you can prototype with a few steps)
- EP - Embedded prototyping (mostly for Digital)
 - **Wired** and Wireless Control
 - Use of TI Cloud Computing Tools for prototype
- Advanced Topics
- Conclusion Demos (Simple and Complex)

Embedded (App Processor/MPU) Prototyping

- Beaglebone to Launchpads like p. 10 <http://www.ti.com/lit/ug/tiduci9c/tiduci9c.pdf>
- Linux expertise and programming not necessary. Just type on a command line. Can even use a Windows PC): <http://beagleboard.org/getting-started#step2>



- Can use a Windows PC to Get Started.
- Connect to BBB/BBGW using:
 - Putty SSH connection:
 - Or even BBGW over WiFi:



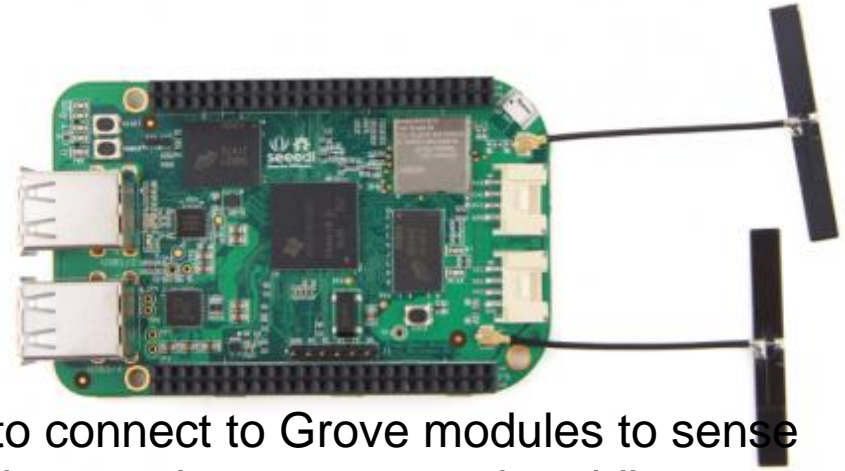
On-board eMMC
programmed with Debian
Linux for AM335x (more like
Ubuntu) for prototyping

- BeagleBone Green Wireless (or Beaglebone Black if you want HDMI output/[Gnome Desktop](#) and don't mind adding a USB hub and/or Wilink8 Cape)

USB cable connects
BBB and CC1310/50LP

Embedded (AP/MPU) prototyping - BBGW

- The SeeedStudio **BeagleBone Green Wireless**, like the BeagleBoard.org BeagleBone Black, runs on a Texas Instruments [Sitara AM335x processor](#).



- The [fundamental differences](#) are:
 - USB host with 4-port hub
 - Two Grove connectors that make it easy to connect to Grove modules to sense orientation, location, distance, water, touch, sound, temperature, humidity, barometric pressure, heart rate, finger print and much more
 - WiFi 802.11 b/g/n 2.4GHz (optional)
 - Replaced 5V barrel and miniUSB with a single microUSB connectionboards
 - Removal of the **microHDMI** video output to save cost
- <http://beagleboard.org/green-wireless>

Embedded (App Processor/MPU) Prototyping

- ttyACMx is just COMx from Windows (use Teraterm or Putty):
<http://www.ti.com/tool/tidep0084> or p. 15
<http://www.ti.com/lit/ug/tiduci9c/tiduci9c.pdf>

```
ls -l /dev/ttyACM*
```

at the BeagleBone Black console. There are two ttyACM devices that correspond to the serial ports from the CC13x0 or CC13x2 LaunchPad Development Kit (similar to [Figure 8](#)).

```
root@am437x-evm:~# ls -l /dev/ttyACM*
crw-rw----  1 root    dialout  166,  0 Oct 24 16:52 /dev/ttyACM0
crw-rw----  1 root    dialout  166,  1 Oct 24 16:52 /dev/ttyACM1
root@am437x-evm:~#
```

Figure 8. /dev/ttyACM0 Device Check

Embedded prototyping - Wired control

- Wired PC Control of Embedded Application Processor from Beaglebone command line

```
debian@beaglebone:~$ screen /dev/ttyACM0 115200
```

- Also (Need `sudo apt-get install picocom`)

```
debian@beaglebone:~$ sudo picocom -b 115200 /dev/ttyACM0 )
```

```
Hello World
```

```
ABCDE - Alpha
```

```
12345 - Numeric
```

```
Enter a number from 1-10
```

```
Number entered, counting up from 7
```

```
Counting 78910
```

```
Enter a number from 1-10
```

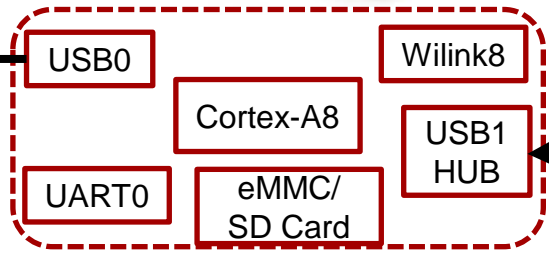
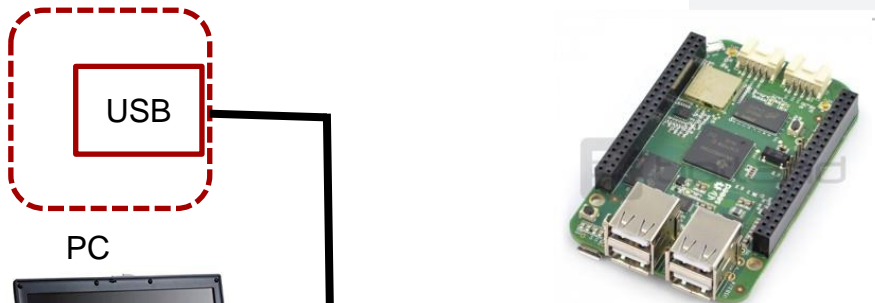
Firewall version:

```
sudo bash -c 'http_proxy="http://yourproxyserver.yourcompany.com:80/" apt-get update'
```

```
sudo bash -c 'http_proxy="http://yourproxyserver.yourcompany.com:80/" apt-get install picocom'
```

Embedded prototype demo Wired Control of LCD

beagleboard.org/getting-started#step3



BB Green Wireless AM3358 (WiFi STA)

IP Address	Connection Type	Operating System(s)	Status
192.168.7.2	USB	Windows	Active
192.168.6.2	USB	Mac OS X, Linux	Inactive

- Ports (COM & LPT)
 - ECP Printer Port (LPT1)
 - Gadget Serial (COM56)
- Processors



Energia



MSP430FR4133 LCD

