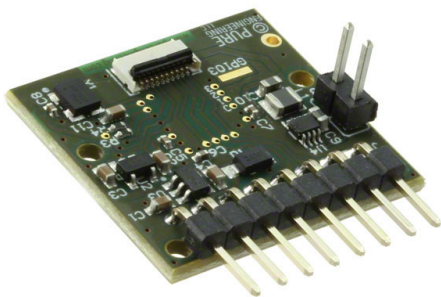


FLIR Lepton on BeagleBone Black and Green

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Introduction

This page will show you step-by-step how to interface a FLIR Lepton module to the BeagleBone Black/Green.

Hardware Requirements

[BeagleBone Black at Digi-Key](#)
[BeagleBone Green at Digi-Key](#)

LCD4/LCD7 for BeagleBone Black/Green:

[LCD4 at Digi-Key](#)

[LCD7 at Digi-Key](#)

FLIR Lepton:

[Lepton Breakout Board at Digi-Key](#)

[FLIR CAMERA IR 80X60 50 DEGREE 9HZ at](#)

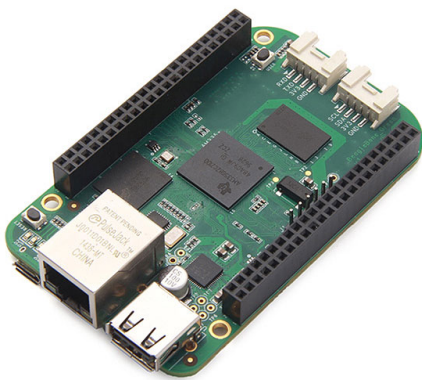
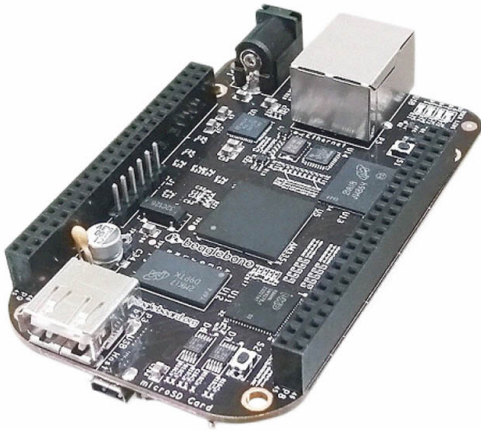
[Digi-Key](#)

[FLIR CAMERA IR 80X60 50 DEG W/SHUTTER at](#)

[Digi-Key](#)

[FLIR CAMERA IR 80X60 25 DEGREE 9HZ at](#)

[Digi-Key](#)



Software Requirements

- BeagleBone Black/Green running Debian Stretch (iot image) flash to the eMMC
 - Grab the Latest from: http://elinux.org/Beagleboard:BeagleBoneBlack_Debian#Stretch_IOT

Install latest console image to eMMC

Today the latest version is: **2018-10-07** (these are just monthly snapshots, so always check for the latest)

```
IOT Image: (BeagleBone Black/Green eMMC)
wget https://rcn-ee.net/rootfs/bb.org/testing/2018-10-07/stretch-iot/BBB-
blank-debian-9.5-iot-armhf-2018-10-07-4gb.img.xz

sha256sum: dcd36dcd330d2c6959f86ed13ce88c79515052dcd5c184dd75b0f19ec6c2be02
```

Insert microSD into pc adapter and check device node name (in our case /dev/sdd):

```
voodoo@hades:~$ lsblk
NAME     MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sde       8:64   1    3.7G  0 disk
sde1     8:65   1    3.3G  0 part
sda       8:0     0 465.8G  0 disk
sda1     8:1     0 465.8G  0 part /
```

Download the *.img.xz and write to microSD card via etcher.io:

```
voodoo@hades:~$ wget https://rcn-ee.net/rootfs/bb.org/testing/2018-10-07
/stretch-iot/BBB-blank-debian-9.5-iot-armhf-2018-10-07-4gb.img.xz

voodoo@hades:~$ sudo /opt/etcher-cli/etcher -d /dev/sdf BBB-blank-debian-
9.5-iot-armhf-2018-10-07-4gb.img.xz
? This will erase the selected drive. Are you sure? Yes
Flashing: 17.08 MB/s [=====] 100% eta 0s
Validating: 0 B/s [=====] 100% eta 0s

Checksums:
- /dev/sdf:
d3aae7d1a808c4826f1e0b45d6d1bac3876ea55cacbb38225d5428d27f4e990ec25ad3e85bd
503212a63da2e3fceda7cb666cb4977a02dbd94caf676c1d88cfd
```

Insert microSD into BeagleBone Black/Green and wait for flashing procedure to finish. (device should shutdown)

Utilize g_serial on usb mini connector

Since we will be using an LCD, we will be losing access to the J1 serial debug header on the baseboard, you can use the pre-loaded g_serial module via: (note, no boot logs will be shown)

```
gtkterm -p /dev/ttyACM0 -s 115200 &
```

Setup basic window manager

For this project we are going to use openbox & slim to provide a very basic desktop environment on the LCD.

```
sudo apt update ; \
sudo apt upgrade ; \
sudo apt install openbox slim xinit xserver-xorg-video-fbdev x11-xserver-
utils git libpam-gnome-keyring feh i2c-tools unclutter
```

Setup /etc/X11/xorg.conf

/etc/X11/xorg.conf

```
Section "Monitor"
    Identifier      "Builtin Default Monitor"
EndSection
Section "Device"
    Identifier      "Builtin Default fbdev Device 0"
    Driver          "fbdev"
EndSection
Section "Screen"
    Identifier      "Builtin Default fbdev Screen 0"
    Device          "Builtin Default fbdev Device 0"
    Monitor         "Builtin Default Monitor"
EndSection
Section "ServerLayout"
    Identifier      "Builtin Default Layout"
    Screen          "Builtin Default fbdev Screen 0"
EndSection
```

Check bootloader version

```
debian@beaglebone:~$ sudo /opt/scripts/tools/version.sh | grep bootloader
bootloader:[eMMC-(default)]:[/dev/mmcblk1]:[U-Boot 2018.03-00002-
gac9cce7c6a]:[location: dd MBR]
```

Update Kernel:

```
debian@beaglebone:~$ cd /opt/scripts/tools/
debian@beaglebone:/opt/scripts/tools$ sudo ./update_kernel.sh --lts-4_14
```

Install device tree overlays source for LCD4/LCD7

```
git clone https://github.com/beagleboard/bb.org-overlays --depth=1
cd ./bb.org-overlays
./dtc-overlay.sh
./install.sh
```

Shutdown system via:

```
sudo systemctl poweroff
```

Install LCD4/LCD7 and powerup BeagleBone Black/Green

Configure SLIM for autologin

Set Default User:

/etc/slim.conf

```
# default user, leave blank or remove this line
# for avoid pre-loading the username.
#default_user      simone
default_user debian
```

Enable auto-login

/etc/slim.conf

```
# Automatically login the default user (without entering
# the password. Set to "yes" to enable this feature
#auto_login        no
auto_login yes
```

Enable openbox:

```
echo "exec openbox-session" > /home/debian/.xsession
```

Lepton qt application

Build/Install Lepton application

```
sudo apt install build-essential qt4-dev-tools

git clone https://github.com/groupgets/LeptonModule
```

Apply this patch, to push the application to the upper left:

```
diff --git a/software/beagleboneblack_video/main.cpp b/software
/beagleboneblack_video/main.cpp
index 264b0a2..f31c467 100644
--- a/software/beagleboneblack_video/main.cpp
+++ b/software/beagleboneblack_video/main.cpp
@@ -18,7 +18,7 @@ int main( int argc, char **argv )
     QApplication a( argc, argv );

     QWidget *myWidget = new QWidget;
-    myWidget->setGeometry(400, 300, 340, 290);
+    myWidget->setGeometry(20, 20, 340, 290);

     //create an image placeholder for myLabel
     //fill the top left corner with red, just bcuz
```

and finally build the project

```
cd /home/debian/LeptonModule/software/beagleboneblack_video
/leptonSDKEmb32PUB/
make
cd ..
qmake && make
```

AutoStart this application on bootup:

```
mkdir -p /home/debian/.config/openbox/
echo "feh --bg-scale /opt/scripts/images/beaglebg.jpg" > /home/debian/.
config/openbox/autostart
echo "/home/debian/LeptonModule/software/beagleboneblack_video/bbb &" >>
/home/debian/.config/openbox/autostart
```

Increase LCD brightness

```
echo "echo 100 >> /sys/devices/platform/backlight/backlight/backlight
/brightness" >> /opt/scripts/boot/am335x_evm.sh
```

LCD4 Setup

Enable the "BB_SPIDEV0" overlay in /boot/uEnv.txt:

```
uboot_overlay_addr4=/lib/firmware/BB-SPIDEV0-00A0.dtbo
```

LCD7 Setup

We need P9.30 for SPIDEV1, which is the enter key on the LCD7, so disable P9.30 in BB-BONE-LCD7-01-00A3.dts

```

diff --git a/src/arm/BB-BONE-LCD7-01-00A3.dts b/src/arm/BB-BONE-LCD7-01-
00A3.dts
index alc7833..4fdfc2d 100644
--- a/src/arm/BB-BONE-LCD7-01-00A3.dts
+++ b/src/arm/BB-BONE-LCD7-01-00A3.dts
@@ -48,7 +48,6 @@
        "P9.15",          /* keys: gpio1_16 LEFT */
        "P9.23",          /* keys: gpio1_17 RIGHT */
        "P9.16",          /* keys: gpio1_19 UP */
-       "P9.30",          /* keys: gpio3_16 DOWN */
        "P9.21",          /* keys: gpio0_3 ENTER */

        "ehrpwmla",
@@ -57,7 +56,6 @@
        "gpio1_16",        /* LEFT */
        "gpio1_17",        /* RIGHT */
        "gpio1_19",        /* UP */
-       "gpio3_16",        /* DOWN */
        "gpio0_3",         /* ENTER */
        "lcdc",
        "tscadc";
@@ -111,7 +109,6 @@
                                BONE_P9_15 (PIN_INPUT |
MUX_MODE7) /* gpmc_a0.gpio1_16 */
                                BONE_P9_23 (PIN_INPUT |
MUX_MODE7) /* gpmc_a1.gpio1_17 */
                                BONE_P9_16 (PIN_INPUT |
MUX_MODE7) /* gpmc_a3.gpio1_19 */
-                               BONE_P9_30 (PIN_INPUT |
MUX_MODE7) /* mcasp0_axr0.gpio3_16 */
                                BONE_P9_21 (PIN_INPUT |
MUX_MODE7) /* spi0_d0.gpio0_3 */
                                >;
        };
@@ -222,14 +219,6 @@
        };
        button@4 {
-       -       debounce_interval = <50>;
-       -       linux,code = <108>;
-       -       label = "down";
-       -       gpios = <&gpio3 16 0x1>;
-       -       gpio-key,wakeup;
-       -       autorepeat;
-       -
        };
        button@5 {
-       -       debounce_interval = <50>;
-       -       linux,code = <28>;
-       -       label = "enter";
-       -       gpios = <&gpio0 3 0x1>;

```

Then rebuild:

```
cd ./bb.org-overlays
make clean
./install.sh
```

Enable the "BB_SPIDEV1" overlay in /boot/uEnv.txt:

```
uboot_overlay_addr4=/lib/firmware/BB-SPIDEV1-00A0.dtbo
```