Webcam and servo motor installation guide

By Group MK2J, Fall 2014 CMPT 433

Environment pre-conditions

- BeagleBone Black running version 3.8.13-bone68
- BeagleBone Black must have connected internet access to download the open source libraries
    - ie) Via Ethernet to Router

Webcam how-to-setup

1.Building x264:

Install the following libraries for webcam:

```
# git clone git://git.videolan.org/x264.git
# cd x264
# ./configure --enable-shared --prefix=/usr
# make
# make install
```

2.Building ffmpeg:

```
# git clone git://git.videolan.org/ffmpeg.git
# ./configure --enable-shared --enable-libx264 --enable-gpl
# git remote set-url origin git://source.ffmpeg.org/ffmpeg
# make
# make install
```

3.Fixing library problem:

```
# vi /etc/ld.so.conf
```

add “/usr/local/lib” to the file and then type:

```
# ldconfig
```

4.v4l2-ctl libraries setup:

```
# sudo apt-get install v4l-utils
```

5. Install the imagemagick

```
# sudo apt-get install imagemagick
```

6.Run the script

After the library installed and set-up,
In `/Webcam_part/` folder, run the shell script webcam.sh and it will automatically start taking frames in the background.

```
# cd Webcam_part/
# ./webcam.sh
```

The record.sh script is available for saving the frames for recording purpose.
The build script is to make the compiled c code.

7.Run the server

After the webcam setup is finished,
Go to `/webServer_part/`, and run "`nodejs server.js`" to start the server. After this, you can go to url of (`ip_addr`):3001 to view the webpage of our security system.

```
# cd webServer_part/
# nodejs server.js
```

Controlling Servo with BeagleBone Black

1.Equipment:

1. BeagleBone Black
2. Pan/Tilt bracket
3. 2x Micro servo
4. Male to Male jumper wires

2.Connecting the Servos

1. Connect the ground wire to P9 pin 1
2. Connect the positive wire to P9 pin 3
3. Connect the PWM wire to P9 pin 14

- Refer to the "Cape Expansion Headers" image below if more than one servo is used
- Note that the ground wire is usually black or brown and the PWM wire is usually orange or yellow

3.Setting up the PWM pin

1. Backup the current Linux bootfile

```
# cd /boot/uboot
# cp uEnv.txt uEnv.bak
```

2. Edit uEnv.txt

```
# nano uEnv.txt
```

- add the following line into the uEnv.txt

```
optargs=quiet drm.debug=7 capemgr.enable_partno=am33xx_pwm,bone_pwm_P9_14
```

- we could also manually do this by using the following commands(Will need to do it every reboot):

```
# echo am33xx_pwm > /sys/devices/bone_capemgr.@/slots
# echo bone_pwm_P9_14 > /sys/devices/bone_capemgr.@/slots
```

- Note that the value for the @ sign is different for each user

4.Controlling the Servos

1. Initialize servo

```
# cd /sys/devices/ocp.3/pwm_test_P9_14.@
# echo 0 > run
# echo 0 > polarity
# echo 20000000 > period
# echo 1000000 > duty
# echo 1 > run
```

- Note that the value for the @ sign is different for each user

3. Move servo

```
# echo 2000000 > duty
```

4. Turn off servo

```
# echo 0 > run
```

Troubleshooting

1. When trying to manually control the servo motor via CLI command in the user space, it does not move!

- There is a minimum and maximum limit for the `duty` at which the servo motor can move to.

If the number for the `duty` is currently set higher than the maximum limit (2400000), or lower than (600000), then it does not move. (This applies to both left/right, up/down)

- Try setting the duty to be within the range of 600000 and 2400000

2. When we have the frames being taken in ".ppm" format, we spend a lot of time converting the pictures formats so that we can pass it by socket.io and display them on webpage.

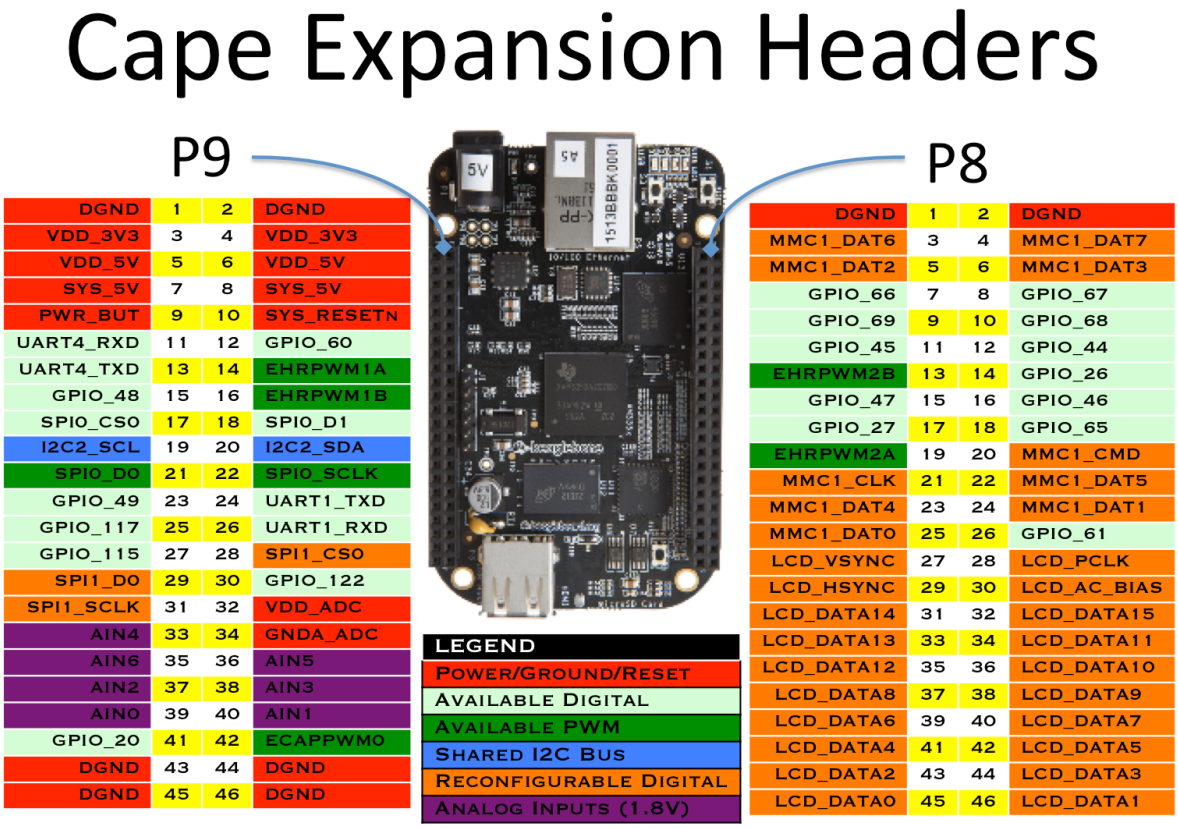

image from:http://rabbit-note.com/2014/08/23/beaglebone-black-power-meter-hard/