Botic HOWTOs for driver & tools

- Check first these detailed HOWTOs for beginners
  - Squeezlite installation on Botic distribution for peeps who only know windows (by kinku)
  - Connecting music library on USB hard-drive to BBB for Botic/Debian distribution (by ced)
- Installation of Botic kernel and goodies into Debian based distribution (e.g. Volumio 1.5)
- Fix MPD music directory for Volumio 1.5
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- Disabling blinking blue LEDs on BBB
- Preparation for compilation of custom kernel module
- Compilation of custom kernel module (e.g. driver for UWN200 USB wifi stick)
- Mounting network drive with international characters
- Edit the uEnv.txt on the eMMC directly via virtual USB drive
- Example of I2C control for ES9018 using Botic v5

In case of troubles check Botic support thread on DIYaudio forum:
http://www.diyaudio.com/forums/twisted-pear/258254-support-botic-linux-driver-20.html

Notice: all bellow this notice is very outdated and might not work!

Check first these detailed HOWTOs for beginners

Squeezelite installation on Botic distribution for peeps who only know windows (by kinku)
http://www.diyaudio.com/forums/twisted-pear/258254-support-botic-linux-driver-31.html#post4320784

Notice: DIY audio has resolved URLs in step named “add multimedia wheezy-backport repository”, use these commands instead:

```
echo "deb http://www.deb-multimedia.org/ wheezy main" >> /etc/apt/sources.list
echo "deb http://www.deb-multimedia.org/ wheezy-backports main" >> /etc/apt/sources.list
```

Squeezelite runs on Botic:

```
squeezelite -o hw:CARD=BOTICAudio,DEV=0  -u hMX
```

http://manpages.ubuntu.com/manpages/utopic/man1/squeezelite.1.html

Connecting music library on USB hard-drive to BBB for Botic/Debian distribution (by ced)
http://www.diyaudio.com/forums/twisted-pear/258254-support-botic-linux-driver-31.html#post4320826

Installation of Botic kernel and goodies into Debian based distribution (e.g. Volumio 1.5)

```
### flash Volumio1.5BBB.img image to SD card

### boot BBB using that SD card

### connect to BBB via SSH as user "root" using password "volumio"

### execute following commands on the command line

### do not use jessie (testing) repositories (Volumio default), but
### use wheezy and wheezy-backports repositories only

# you can copy and paste following 5 lines into command line at once
cat > /etc/apt/sources.list <<EOT
```

```
deb http://http.debian.net/debian wheezy main non-free
deb http://http.debian.net/debian wheezy-backports main non-free
#deb-src http://http.debian.net/debian wheezy main non-free
EOT

### download and extract boticize scripts
cd /
wget http://bbb.ieero.com/botic4/botic4-beta.tar.gz
tar xvzf botic4-beta.tar.gz

### boticize volumio by calling following 3 scripts
# following script will also try to update all packages, you can answer N there and skip it
/source/boticize/01-addrepos.sh
# this will try to install packages from Botic repository
/source/boticize/02-install.sh
# this enables power management of Power button press .. systemctl action will fail
/source/boticize/03-enablepm.sh

### force to install MPD with native DSD support
apt-get install mpd=0.18.22-dsd-rt-4
### force to install ALSA with extended rate and DSD support
apt-get install libasound2=1.0.27.2-102 libasound2-data=1.0.27.2-102 libasound2-dev=1.0.27.2-102

###Choose v4 or v5 kernel using following three commands and then reboot.

### use (previously installed) Botic v4 kernel
### Notice: this version has missing USB storage support and Right Justified data format does not work
apt-get install linux-image-3.18.7-botic4
cp -f /boot/vmlinuz-3.18.7-botic4 /boot/zImage
cp -f /boot/dtbs/3.18.7-botic4/am335x-boneblack.dtb /boot/dtbs/am335x-boneblack.dtb

### OR use (previously installed) Botic v5 kernel
apt-get install linux-image-4.0.0-botic5
cp -f /boot/vmlinuz-4.0.0-botic5 /boot/zImage
cp -f /boot/dtbs/4.0.0-botic5/am335x-boneblack.dtb /boot/dtbs/am335x-boneblack.dtb
```

```
### change botic kernel options
### add options at the end of optargs=fixrtc line
### separate multiple options by spaces
### list of all available options is on http://bbb.ieero.com/index4.shtml
### notice there are differences from botic v3 (e.g.: mcasp_format -> dai_format)

mount /dev/mmcblk0p1 /boot/uboot
nano /boot/uboot/uEnv.txt
umount /boot/uboot

### reboot BBB into boticized Volumio
reboot

### verify that Botic kernel was booted
### expected output is: 3.18.7-botic4 (or something 'newer' with botic)
uname -r

### verify that changed kernel options is loaded
### for example if you set snd_soc_botic.ext_masterclk=0 then following should print 0
cat /sys/module/snd_soc_botic/parameters/ext_masterclk
```

Fix MPD music directory for Volumio 1.5

Edit the /etc/mpd.conf and change value of "music_directory" back to the "/var/lib/mpd/music".
It will be compatible again with Volumio GUI after the reboot.

```
nano /etc/mpd.conf
```

(edit file and then exit editor with Ctrl+X)

The easiest alternative option to edit file:

1. download file from BBB to your computer (e.g. using WinSCP from Windows)
2. edit file at your computer with editor that does not damage lines in the file (e.g. PSpad)
3. upload edited file back to BBB at same place (works with WinSCP too)

Fix MPD configuration after change in Volumio 1.5 GUI

Volumio GUI removes DSD native and Real-time options. You can add them (bold in following text) back using editing the MPD configuration file.

```
nano /etc/mpd.conf
```

(edit file and then exit editor with Ctrl+X)

Default mpd.conf content for Botic:

```
music_directory "/var/lib/mpd/music"
playlist_directory "/var/lib/mpd/playlists"
db_file "/var/lib/mpd/tag_cache"
log_file "/var/log/mpd/mpd.log"
pid_file "/run/mpd/pid"
state_file "/var/lib/mpd/state"
sticker_file "/var/lib/mpd/sticker.sql"
user "mpd"
bind_to_address "localhost"
input {
plugin "curl"
}
audio_output {
type "alsa"
name "Botic"
device "hw:0,0"
dsd_usb "no"
dsd_native "yes"
dsd_native_type "3"
priority "FIFO:32"
period_time "1"
mixer_type "software"
}
filesystem_charset "UTF-8"
id3v1_encoding "UTF-8"
realtime_option {
```

```
 memlock "yes"
 stack_reserve "1024"
 heap_reserve "10240"
 main_priority "OTHER:0"
 player_priority "FIFO:32"
 decoder_priority "FIFO:31"
 update_priority "OTHER:0"
 }
```

Fixing serial console on boticized Debian/Volumio

In the /etc/inittab replace the existing T0 line with following one:

```
T0:23:respawn:/sbin/getty -L ttyO0 115200 vt102
```

Fix saving MPD state

Something went wrong during packaging MPD and you need to fix perms in the MPD directory:

```
chown -R mpd.audio /var/lib/mpd/
```

Forcing 32bit output mode for MPD

Edit the /etc/mpd.conf and add following line into Botic audio output block:

```
format "*:32:1"
```

You can verify format during playback by executing:

```
cat /proc/asound/Botic/pcm0p/sub0/hw_params
```

Speeding up the BBB start with Wireless dongle

Install wireless regulatory database and set the country to speed up start of BBB.

```
apt-get install crda wireless-regdb
```

Set the country in the /etc/default/crda file.

```
nano /etc/default/crda
```

(edit file and then exit editor with Ctrl+X)

Installing Squeezelite

```
### add multimedia wheezy-backport repository (needed only once)
```

```
echo "deb http://www.deb-multimedia.org wheezy main" >> /etc/apt/sources.list
echo "deb http://www.deb-multimedia.org wheezy-backports main" >> /etc/apt/sources.list
### update package list and install needed dependencies
apt-get update
### package with signing keys for multimedia packages
apt-get install deb-multimedia-keyring
### packages needed for soxr && squeezelite compilation
apt-get install git gcc make libasound2-dev libavcodec-dev libavformat-dev libavutil-dev libflac-dev libmad0-dev
libfaad-dev libmpg123-dev cmake libvorbis-dev
### clone, build and install soxr resampling library (if this fail, try to synchronize time as described above)
git clone git://git.code.sf.net/p/soxr/code soxr-code
cd soxr-code
cmake ./
make
make install
cd ..
### symlink to enable squeezelite using libsoxr (resampling)
ln -s /usr/local/lib/libsoxr.so.0.1.0 /usr/lib/libsoxr.so.0
### clone, build and install squeezelite player (with soxr support)
git clone https://code.google.com/p/squeezelite/
cd squeezelite
make OPTS="-DDSD -DFFMPEG -DRESAMPLE"
cp squeezelite /usr/local/bin/
```

Disabling blinking blue LEDs on BBB

```
for i in /sys/devices/platform/leds/leds/beaglebone:green:usr*/trigger; do echo none > $i; done
```

TODO: In botic5 the name to trigger file might be different.

Installation of botic5 kernel

TODO: this will work fine for botic4 distribution (probably not for volumio)

```
apt-get install linux-image-4.0.0-botic5
# reboot
```

Preparation for compilation of custom kernel module

Install the kernel headers, make tool, needed gcc and fixing build path and kernel scripts:

```
apt-get install make gcc-4.7 linux-headers-$(uname -r)
rm -f /lib/modules/$(uname -r)/build
ln -sf /usr/src/linux-headers-$(uname -r) /lib/modules/$(uname -r)/build
cd /usr/src/linux-headers-$(uname -r)
rm -f ./scripts/genksyms/genksyms ./scripts/selinux/genheaders/genheaders ./scripts/selinux/mdp/mdp ./scripts/kallsyms
./scripts/sortextable ./scripts/mod/mk_elfconfig ./scripts/mod/modpost ./scripts/kconfig/mconf ./scripts/kconfig/conf
./scripts/unifdef ./scripts/dtc/dtc ./scripts/conmakehash
make -k scripts CC=gcc-4.7
# some errors will be printed by previous command, ignore them
```

Compilation of custom kernel module (e.g. driver for UWN200 USB wifi stick)

```
apt-get install git
git clone https://github.com/kuba-moo/mt7601u
cd mt7601u
make clean
make -C /lib/modules/$(uname -r)/build M=$PWD CC=gcc-4.7
# following command assumes that kernel module is in the current directory
cp *.ko /lib/modules/$(uname -r)/
depmod -a
# for this driver, the firmware have to be installed too
wget https://github.com/porjo/mt7601/raw/master/src/mcu/bin/MT7601.bin
mv MT7601.bin /lib/firmware/mt7601u.bin
### add module mt7601u to load automatically during boot
echo "mt7601u" >> /etc/modules
### In "/etc/network/interfaces" change LAN network parameters (to speed up WIFI boot) from "auto eth0" to
"allow-hotplug eth0"
### complete your wifi SSID (name) and passwords in the '/etc/network/interfaces' file  (three lines below should not
be commented in the file)
#iface wlan0 inet dhcp
#   wpa-ssid YOUR-ESSID-HERE
#   wpa-psk YOUR-PASSWORD-HERE
```

Mounting network drive with international characters

Incorrect international characters on mounted CIFS drive can be fixed by mounting it with “iocharset=utf8” option.

```
//IP_ADDRESS_OR_HOSTNAME/REMOTE_DIRECTORY /data/remote cifs
user=USER_NAME,pass=PASSWORD,cache=none,gid=audio,iocharset=utf8
```

TODO:VERIFY Above option might not work well if locales data are not installed and generated.

```
apt-get install locales
```

Edit the uEnv.txt on the eMMC directly via virtual USB drive

Prerequisites: serial console to BBB via UART USB converter

0) remove SD card and disconnect power cable
1) prepare serial console for BBB
2) start BBB via plugging it using microUSB cable >>directly<< into USB slot of PC
3) in the serial console enter into bootloader by pressing space (reset and repeat if you missed it)
4) in the bootloader command prompt enable sharing eMMC into PC by executing "ums 0 mmc 1"; if this reports an error it will not work...
5) on the PC open the first partition of the BBB virtual USB drive that should be now detected
6) there should be uEnv.txt file:
 - backup it first
 - edit and save using UNIX newline compatible editor, e.g. PSpad
7) disconnect the virtual USB drive in your OS
8) reset BBB via button (or power it down safely by holding power button for 8 seconds)

Example of I2C control for ES9018 using Botic v5

Simple shell script for basic configuration of ES9018 via I2C:
https://github.com/miero/botic-tools/blob/master/daccfg_es9018

Helper for Botic V5 driver to control volume and set HW params:
https://github.com/miero/botic-tools/blob/master/botic_helper

This have to be enabled at boot by executing:

```
echo "/sbin/botic_helper" > /sys/module/snd_soc_botic/parameters/helper_cmd
```

HW volume control in /etc/mpd.conf can be enabled this way:

```
audio_output {
type "alsa"
name "Botic"
device "hw:0,0"
format "*:32:1"
dsd_usb "no"
dsd_native "yes"
dsd_native_type "3"
priority "FIFO:32"
period_time "1"
mixer_type "hardware"
mixer_control "MasterTrim"
}
```