**ARM926EJ-S AM1808 Mango1808 Linux Manual**

[**http://www.mangoboard.com/**](http://www.mangoboard.com/)

**http://cafe.naver.com/embeddedcrazyboys**

**Crazy Embedded Laboratory**

**Document History**

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# **필요한 Tool**

소스는

<http://crztech.iptime.org:8080/Release/mango1808/>

기초 매뉴얼은

<https://docs.google.com/open?id=0Bxdf_3fzbUgSYlB2T0pyT3JXTlE>

참조 링크는 아래와 같습니다.

<http://processors.wiki.ti.com/index.php/Download_CCS>

위의 링크에서 TI CCS v5 버전을 다운로드 합니다.

<http://sourceforge.net/projects/dvflashutils/files/OMAP-L138/v2.40/>

다운로드 하면 됩니다.

## Flash utility 준비하기

다운로드

<http://crztech.iptime.org:8080/Release/mango1808/utility/OMAP-L138_FlashAndBootUtils_2_40-20120810.tar.bz2>

리눅스 Host PC에서

$ tar xfj OMAP-L138\_FlashAndBootUtils\_2\_40-20120810.tar.bz2

$ cd OMAP-L138\_FlashAndBootUtils\_2\_40-20120810/

## 환경설정 및 도구

PC : Ubuntu 12.04 64bit

Toolchain 및 설치 Package

<http://cafe.naver.com/embeddedcrazyboys/19626>

## U-boot 컴파일 및 Write 하기

컴파일 툴 체인 설치

$ cd /opt/

$ sudo wget <http://crztech.iptime.org:8080/Release/Toolchain/arm-2009q1-203-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar>

$ sudo tar xf arm-2009q1-203-arm-none-linux-gnueabi-i686-pc-linux-gnu.tar

$ls

arm-2009q1

디렉토리 확인 합니다.

$ tar xf mango1808-uboot-20121128.tgz

U-boot 컴파일 하기

$ ./build\_uboot

$ cp u-boot.bin ~/work/Mango1808/mango1808-20121112/OMAP-L138\_FlashAndBootUtils\_2\_40-20120810/OMAP-L138/GNU/

Linux PC에서

# minicom

다른 터미널 창을 띄우고,

전원, uart를 연결하면, Minicom 창에 “BOOTME” 라고 메시지가 나타납니다.

Welcome to minicom 2.5

OPTIONS: I18n

Compiled on May 2 2011, 10:05:24.

Port /dev/ttyUSB0

Press CTRL-A Z for help on special keys

�BOOTME �����BOOTME

“BOOTME” 글자가 나오면, 이상없이 동작하는 것입니다.

이제 minicom 창을 닫습니다.

# cd OMAP-L138\_FlashAndBootUtils\_2\_40-20120810/OMAP-L138/GNU

# sudo apt-get install mono-runtime

# sudo apt-get install mono-devel

[root@HP-note-jji GNU]# sudo ./sfh\_OMAP-L138.exe -p /dev/ttyUSB0 -erase -flashType NAND

The assembly mscorlib.dll was not found or could not be loaded.

It should have been installed in the `/usr/lib/mono/2.0/mscorlib.dll' directory.

|  |
| --- |
| ***Under Linux***The Mono Framework must be installed and in the path. RPMs are available at '[http://www.mono-project.com/Downloads'](http://www.mono-project.com/Downloads%27). The below instructions assume the that GNU ARM cross-compiler tools (arm-arago-linux-gnueabi-gcc, etc.) are in the current PATH.The C6x Compiler Tools are also required to build some components. These are available free of charge at <https://www-a.ti.com/downloads/sds_support/TICodegenerationTools/download.htm>. You will need to add the bin directory to your PATH and to set the environment variables as directed by the installer. Edit the build.mak file under Common directory and add the paths to ARM and C6x compilers.Then go to the GNU directory of the package and run: |

**아래 명령을 실행하기전에 꼭 uart2에 linux host PC에 연결 후 minicom 또는 터미널 프로그램을 실행하면 안됩니다.**

부팅 모드는 uart2 부팅 모드로 합니다.



[root@HP-note-jji GNU]# sudo ./sfh\_OMAP-L138.exe -p /dev/ttyUSB0 -erase -flashType NAND

실행 후

(AIS Parse): Waiting for BOOTME... (power on or reset target now)

메시지가 나오면, 리셋 버튼을 누릅니다.

-----------------------------------------------------

 TI Serial Flasher Host Program for OMAP-L138

 (C) 2012, Texas Instruments, Inc.

 Ver. 1.67

-----------------------------------------------------

 [TYPE] Global erase

 [TARGET] MANGO1808

 [DEVICE] NAND

 [NAND Block] 1

Attempting to connect to device /dev/ttyUSB0...

Press any key to end this program at any time.

(AIS Parse): Read magic word 0x41504954.

(AIS Parse): Waiting for BOOTME... (power on or reset target now)

(AIS Parse): BOOTME received!

(AIS Parse): Performing Start-Word Sync...

(AIS Parse): Performing Ping Opcode Sync...

(AIS Parse): Processing command 0: 0x58535901.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Loading section...

(AIS Parse): Loaded 14376-Byte section to address 0x80000000.

(AIS Parse): Processing command 1: 0x58535901.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Loading section...

(AIS Parse): Loaded 1320-Byte section to address 0x80003828.

(AIS Parse): Processing command 2: 0x58535906.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Performing jump and close...

(AIS Parse): AIS complete. Jump to address 0x80000000.

(AIS Parse): Waiting for DONE...

(AIS Parse): Boot completed successfully.

Waiting for SFT on the OMAP-L138...

Erasing flash

 100% [ ████████████████████████████████████████████████████████████ ]

 Erase complete

Operation completed successfully.

다시 리셋을 합니다. NAND를 Erase한 것입니다.

 [root@HP-note-jji GNU]# sudo ./sfh\_OMAP-L138.exe -p /dev/ttyUSB0 -flashType NAND -flash ubl/ubl\_MANGO1808\_NAND.bin u-boot.bin

실행 후

(AIS Parse): Waiting for BOOTME... (power on or reset target now)

메시지가 나오면, 리셋 버튼을 누릅니다.

-----------------------------------------------------

 TI Serial Flasher Host Program for OMAP-L138

 (C) 2012, Texas Instruments, Inc.

 Ver. 1.67

-----------------------------------------------------

 [TYPE] UBL and application image

 [UBL] ubl/ubl\_MANGO1808\_NAND.bin

 [APP IMAGE] u-boot.bin

 [TARGET] MANGO1808

 [DEVICE] NAND

 [NAND Block] 1

Attempting to connect to device /dev/ttyUSB0...

Press any key to end this program at any time.

(AIS Parse): Read magic word 0x41504954.

(AIS Parse): Waiting for BOOTME... (power on or reset target now)

(AIS Parse): BOOTME received!

(AIS Parse): Performing Start-Word Sync...

(AIS Parse): Performing Ping Opcode Sync...

(AIS Parse): Processing command 0: 0x58535901.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Loading section...

(AIS Parse): Loaded 14376-Byte section to address 0x80000000.

(AIS Parse): Processing command 1: 0x58535901.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Loading section...

(AIS Parse): Loaded 1320-Byte section to address 0x80003828.

(AIS Parse): Processing command 2: 0x58535906.

(AIS Parse): Performing Opcode Sync...

(AIS Parse): Performing jump and close...

(AIS Parse): AIS complete. Jump to address 0x80000000.

(AIS Parse): Waiting for DONE...

(AIS Parse): Boot completed successfully.

Waiting for SFT on the OMAP-L138...

Flashing UBL ubl/ubl\_MANGO1808\_NAND.bin (13260 bytes) at 0x00000000

 100% [ ████████████████████████████████████████████████████████████ ]

 Image data transmitted over UART.

 100% [ ████████████████████████████████████████████████████████████ ]

 UBL programming complete

Flashing application u-boot.bin (393668 bytes)

 100% [ ████████████████████████████████████████████████████████████ ]

 Image data transmitted over UART.

 100% [ ████████████████████████████████████████████████████████████ ]

 Application programming complete

Operation completed successfully.

이제 NAND 모드로 부팅을 합니다.



부팅시 메시지가 아래와 같이 나옵니다.

MANGO1808 initialization passed!

Booting TI User Boot Loader

 UBL Version: 1.65

 UBL Flashtype: NAND

Starting NAND Copy...

Valid magicnum, 0x55424CBB, found in block 0x00000006.

 DONE

?mping to entry point at 0xC1080000.

U-Boot 2010.12, MANGO1808, r1\_00, 2012-08-07

NAND: 256 MiB

MMC: davinci: 0

Bad block table found at page 131008, version 0x01

Bad block table found at page 130944, version 0x01

nand\_read\_bbt: Bad block at 0x0000015a0000

nand\_read\_bbt: Bad block at 0x000005860000

nand\_read\_bbt: Bad block at 0x0000059c0000

nand\_read\_bbt: Bad block at 0x000005a80000

nand\_read\_bbt: Bad block at 0x0000062e0000

nand\_read\_bbt: Bad block at 0x000006500000

nand\_read\_bbt: Bad block at 0x000006740000

nand\_read\_bbt: Bad block at 0x000007420000

nand\_read\_bbt: Bad block at 0x0000075e0000

nand\_read\_bbt: Bad block at 0x000007b00000

nand\_read\_bbt: Bad block at 0x000007b20000

nand\_read\_bbt: Bad block at 0x000007cc0000

nand\_read\_bbt: Bad block at 0x000008040000

nand\_read\_bbt: Bad block at 0x0000086a0000

nand\_read\_bbt: Bad block at 0x000008880000

nand\_read\_bbt: Bad block at 0x00000c220000

nand\_read\_bbt: Bad block at 0x00000d5e0000

nand\_read\_bbt: Bad block at 0x00000e460000

In: serial

Out: serial

Err: serial

ARM Clock : 456000000 Hz

DDR Clock : 150000000 Hz

EMIFA Clock : 24000000 Hz

DSP Clock : 456000000 Hz

ASYNC3 Clock : 228000000 Hz

MMCSD0 Clock : 228000000 Hz

Net: Ethernet PHY: RTL8201F @ 0x00

DaVinci-EMAC

Hit any key to stop autoboot: 0

## 커널 컴파일 및 Write 하기

### 커널 컴파일 하기

$ cd kernel/

$ ./build\_kernel clean

$ ./build\_kernel defconfig

$ ./build\_kernel

하면 됩니다.

### Kernel Write 하기

u-boot 실행 후

ipaddress 설정

MANGO1808 > setenv ipaddr 192.168.3.20; setenv gatewayip 192.168.3.1; setenv serverip 192.168.3.9

MANGO1808 > saveenv

Saving Environment to NAND...

Erasing Nand...

Erasing at 0x0 -- 100% complete.

Writing to Nand... done

MANGO1808 > tftp c0700000 uImage

받은 커널 이미지 사이즈를 보고 Write 사이즈를 결정합니다.

MANGO1808 > nand erase 0x200000 0x400000;nand write 0xc0700000 0x200000 0x400000

부팅 후

MANGO1808 > setenv bootcmd “nand read 0xc0700000 0x200000 0x400000;bootm 0xc0700000”

MANGO1808 > saveenv

## Buildroot 컴파일 하기

$ cd buildroot-2012.05-mango1808/

$ ./build\_rootFS\_clean.sh

$ ./build\_rootFS.sh

$ cd buildroot-2012.05-mango1808/output/images

$ cp rootfs.tar ../../../image/

## Rootfs 만들기

“mmc 8GB “ Host PC에 삽입한다.

#sudo dmesg | tail

[10993.575042] sd 7:0:0:0: [sdb] Assuming drive cache: write through

[10993.576432] sdb: sdb1 sdb2 sdb3 sdb4

[root@HP-note-jji image]# sudo fdisk /dev/sdb

Command (m for help): p

Disk /dev/sdb: 8010 MB, 8010072064 bytes

214 heads, 8 sectors/track, 9138 cylinders, total 15644672 sectors

Units = sectors of 1 \* 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk identifier: 0x00000000

 Device Boot Start End Blocks Id System

/dev/sdb1 8192 15644671 7818240 b W95 FAT32

Command (m for help): d

Selected partition 1

Command (m for help): n

Partition type:

 p primary (0 primary, 0 extended, 4 free)

 e extended

Select (default p): p

Partition number (1-4, default 1):

Using default value 1

First sector (2048-15644671, default 2048):

Using default value 2048

Last sector, +sectors or +size{K,M,G} (2048-15644671, default 15644671):

Using default value 15644671

Command (m for help): p

Disk /dev/sdb: 8010 MB, 8010072064 bytes

214 heads, 8 sectors/track, 9138 cylinders, total 15644672 sectors

Units = sectors of 1 \* 512 = 512 bytes

Sector size (logical/physical): 512 bytes / 512 bytes

I/O size (minimum/optimal): 512 bytes / 512 bytes

Disk identifier: 0x00000000

 Device Boot Start End Blocks Id System

/dev/sdb1 2048 15644671 7821312 83 Linux

Command (m for help): w

The partition table has been altered!

Calling ioctl() to re-read partition table.

Syncing disks.

[root@HP-note-jji image]# mkfs

mkfs mkfs.ext2 mkfs.ext4dev mkfs.ntfs

mkfs.bfs mkfs.ext3 mkfs.minix mkfs.vfat

mkfs.cramfs mkfs.ext4 mkfs.msdos

[root@HP-note-jji image]# mkfs.ext4 -help

mkfs.ext4: invalid option -- 'h'

Usage: mkfs.ext4 [-c|-l filename] [-b block-size] [-C cluster-size]

 [-i bytes-per-inode] [-I inode-size] [-J journal-options]

 [-G meta group size] [-N number-of-inodes]

 [-m reserved-blocks-percentage] [-o creator-os]

 [-g blocks-per-group] [-L volume-label] [-M last-mounted-directory]

 [-O feature[,...]] [-r fs-revision] [-E extended-option[,...]]

 [-T fs-type] [-U UUID] [-jnqvFKSV] device [blocks-count]

# mkfs.ext4 -L mango1808 /dev/sdb1

# sudo mkdir fs

# sudo mount /dev/sdb1 fs

# cd fs/

# sudo tar xf ../rootfs.tar

# cd ..

# sudo sync

# sudo umount /dev/sdb1

Mango1808 Board에 MMC 카드를 삽입 후 부팅을 합니다.

setenv bootargs "root=/dev/mmcblk0p1 rootfstype=ext4 console=ttyS2,115200 rootwait"

## UBI FS 만들기

부팅 후

# ubiformat /dev/mtd4 -s 512 -O 2048

# ubiattach /dev/ubi\_ctrl -m 4 -O 2048

# ubimkvol /dev/ubi0 -N rootfs -m

# mkdir /mnt/nand

# mount -t ubifs ubi0:rootfs /mnt/nand

# tar xvf rootfs.tar -C /mnt/nand

## Nand Flash UBIFS 부팅 u-boot 설정

# setenv bootargs “noinitrd console=ttyS2,115200 rw ubi.mtd=4,2048 root=ubi0:rootfs rootfstype=ubifs rootwait”

# saveenv

# boot

## WiFi/BT Test

### 1.6.1. WiFi 테스트

WiFi 모듈을 삽입 후 커널 로그에서

mmc1: new SDIO card at address 0001

위의 메시지가 나오는 것을 확인 합니다.

# insmod mlan.ko

mlan: module license 'Marvell Proprietary' taints kernel.

Disabling lock debugging due to kernel taint

# insmod sd8787.ko

WLAN FW is active

# iwconfig

lo no wirnet eth0: DaVinci EMAC: ioctl not supported

eless extensions.

eth0 no wireless extensions.

mlan0 IEEE 802.11-DS ESSID:"" Nickname:""

 Mode:Managed Access Point: Not-Associated Bit Rate:1 Mb/s

 Tx-Power=8 dBm

 Retry limit:9 RTS thr=2347 B Fragment thr=2346 B

 Encryption key:off

 Power Management:on

 Link Quality=0/5 Signal level=0 dBm Noise level=0 dBm

 Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:2

 Tx excessive retries:0 Invalid misc:0 Missed beacon:0

uap0 IEEE 802.11-DS ESSID:""

 Mode:Master Frequency:2.437 GHz Access Point: Not-Associated

 Encryption key:off

 Link Quality:0 Signal level:0 Noise level:0

 Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:0

 Tx excessive retries:0 Invalid misc:0 Missed beacon:0

# ifconfig mlan0 up

ADDRCONF(NETDEV\_UP): mlan0: link is not ready

# iwlist mlan0 scanning

스캐닝 후 AP “iwconfig” 명령으로 ap 이름을 넣으면 됩니다.

# iwconfig mlan0 essid CRZ\_icanjji

# iwconfig

lo no wirnet eth0: DaVinci EMAC: ioctl not supported

eless extensions.

eth0 no wireless extensions.

mlan0 IEEE 802.11-DS ESSID:"CRZ\_icanjji" [14] Nickname:""

 Mode:Managed Frequency:2.437 GHz Access Point: 00:26:5A:23:0D:E8

 Bit Rate:39 Mb/s Tx-Power=8 dBm

 Retry limit:9 RTS thr=2347 B Fragment thr=2346 B

 Encryption key:off

 Power Management:on

 Link Quality=0/5 Signal level=-93 dBm Noise level=-101 dBm

 Rx invalid nwid:0 Rx invalid crypt:0 Rx invalid frag:43

 Tx excessive retries:11 Invalid misc:50 Missed beacon:0

# udhcpc -i mlan0

udhcpc (v1.20.1) started

Sending discover...

Sending select for 192.168.3.12...

Lease of 192.168.3.12 obtained, lease time 86400

deleting routers

route: SIOCDELRT: No such process

adding dns 192.168.3.1

ip를 할당 받아 옵니다.

Iperf 테스트

<http://cafe.naver.com/embeddedcrazyboys/20119>

### 1.6.1. BT(Bluetooth) 테스트

# insmod mbtchar.ko

# insmod bt8787.ko

# hciconfig

hci0: Type: BR/EDR Bus: SDIO

 BD Address: 00:00:00:00:00:00 ACL MTU: 0:0 SCO MTU: 0:0

 DOWN

 RX bytes:47 acl:0 sco:0 events:0 errors:0

 TX bytes:11 acl:0 sco:0 commands:0 errors:0

# hciconfig hci0 up

# hcitool -i hci0 scan

디버깅

# hciconfig hci0 up

Can't init device hci0: Operation not possible due to RF-kill (132)

위와 같이 에러가 발생 합니다.

커널에서 아래 configuration을 하지 않도록 수정

< > RF switch subsystem support --->

##  이더넷 테스트

# ifconfig eth0 up

# udhcpc -i eth0

Iperf 테스트

<http://cafe.naver.com/embeddedcrazyboys/20119>

##  SATA 테스트

SATA 테스트

커널 로그에서 아래와 같이 나오면 됩니다.

ata1: SATA link up 3.0 Gbps (SStatus 123 SControl 300)

ata1.00: ATA-8: INDILINX BAREFOOT-SATA, 2146, max UDMA/133

ata1.00: 62533296 sectors, multi 1: LBA48 NCQ (depth 31/32)

ata1.00: configured for UDMA/133

scsi 0:0:0:0: Direct-Access ATA INDILINX BAREFOO 2146 PQ: 0 ANSI: 5

sd 0:0:0:0: [sda] 62533296 512-byte logical blocks: (32.0 GB/29.8 GiB)

sd 0:0:0:0: Attached scsi generic sg0 type 0

sd 0:0:0:0: [sda] Write Protect is off

sd 0:0:0:0: [sda] Write cache: enabled, read cache: enabled, doesn't support DPA

 sda: sda1

sd 0:0:0:0: [sda] Attached SCSI disk

# mkdir /mnt/sata

# mount /dev/sda1 /mnt/sata/

EXT2-fs (sda1): error: couldn't mount because of unsupported optional features )

EXT4-fs (sda1): recovery complete

EXT4-fs (sda1): mounted filesystem with ordered data mode. Opts: (null)

# df

Filesystem Size Used Available Use% Mounted on

/dev/root 7.3G 215.4M 6.8G 3% /

devtmpfs 60.5M 0 60.5M 0% /dev

tmpfs 60.6M 0 60.6M 0% /dev/shm

tmpfs 60.6M 52.0K 60.6M 0% /tmp

/dev/sda1 29.3G 202.3M 27.7G 1% /mnt/sata