



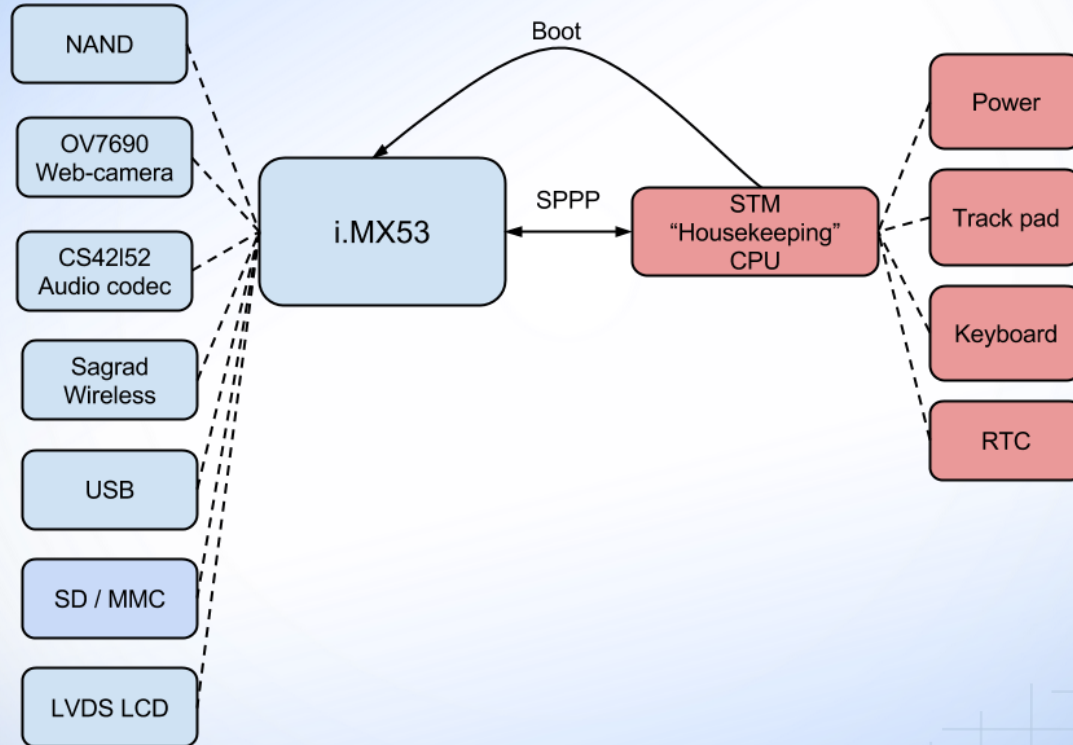
# Efika MX53: Overview

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# Efika MX53: Hardware Overview

- CPU: Freescale i.MX53 (ARM Cortex A8, 1GHz), designed to work well with a broad range of multimedia applications
- Dialog Semiconductor DA9053 PMIC
- 16 Gb NAND
- RAM: 1 GB (DDR3 SDRAM, 800MHz)
- “Housekeeping” CPU: ST Micro (ARM 32-bit Cortex M3 CPU, controls miscellaneous I/O functions)
- Audio codec: Cirrus Logic CS42L52 24-bit (Stereo, low-power)
- Video: OV7690 CMOS VGA Image Sensor (YUV), LVDS LCD connector
- Wireless: Sagrad W-LAN SG901-1098 (IEEE 802.11 B/G/N)
- Input: PS/2 touch interface, up to 128-key keyboard
- External Memory: USB 2.0, SD Card

# System Overview



# Efika MX53: Software Overview

- Boot: (more on next slides)
  - STM boot-loader
  - i.MX53 low-level boot-loader
  - U-Boot or “Das U-Boot”: Universal boot-loader, used on many embedded systems to boot different operating systems
- Operating System
  - Core: Linux Kernel 2.6.38: Unix-like operating system kernel lead by Linus Torvalds, released under GPL2 and the common core of all “Linux” operating systems
  - OS: Derivative of Ubuntu, with extensive customizations: Ubuntu is based on the established Debian Linux distribution and aims to be “Linux for Humans”.



# Efika MX53: Boot

Booting on the Efika MX53 is composed of a stage on the STM and multiple stages on the i.MX53

- STM Housekeeping CPU
  - Initialize power and peripherals at low level
  - Sets “BOOT\_MODE” pin to indicate where the i.MX53 should read boot program (initially UART)
  - Sets power-on pin of i.MX53
- i.MX53 Boot
  - Initial boot program is flashed onto STM firmware at production time and streamed to i.MX53 via UART and executed
  - Searches available boot media for special partition marked 0x12 (Compaq diagnostic), in either SD or NAND, to load low-level boot-loader
  - Loads U-Boot which executes a boot script (boot.scr) from supported filesystem (ext2, ext4, fat32) which then loads Linux kernel

# Efika MX53 Software: Linux Kernel Drivers

There have been a few modifications made to our kernel in order to better support peripherals and improve user experience

- “Simple Point-to-Point Protocol” (SPPP) devices: these devices require continued communication with the STM to function properly. These include: keyboard, touchpad, RTC, power. We achieve this through SPPP, in which the kernel decodes / encodes messages between device drivers and the STM. (Discussed more in “Simple Point-to-Point Protocol”)
- Multimedia devices: customizations / improvements to the web-camera, audio codec, and SD card reader
- Flash Memory: Raw NAND requires file system management at the software level, achieved via UBIFS (Unsorted Block Image File System)

# Efika MX53 Software: User Space

There have been a few modifications made to Genesi's Ubuntu-based distribution in order to improve the overall user experience

- Customized desktop environment (“Docky”)
- Other customized software (e.g. Firefox)
- Custom software repository
- Custom keyboard layout
- Modifications to multimedia software
  - Video: GStreamer (multimedia library) and Cheese (user application) for video capture
  - Audio: ALSA (Advanced Linux Sound Architecture) and PulseAudio (sound system in software)
- Customized installer (changes to default Ubuntu installer config, oem-config for pre-installing then reconfiguring).



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