



## Android ICS Fast boot in 9 seconds

Renjith Thomas | PathPartner Technology

### What is demonstrated

Android ICS boot up in less than 9 seconds which was earlier 35 seconds

- Android 4.0
- Linux 3.0 kernel
- eMMC driver throughput improved to 15.9MB/s
- Includes Dual-M3 subsystem bootup for enabling multimedia



### What was improved

#### X-loader

- eMMC throughput improved from 1.1 MB/s to 15.9 MB/s
- ARM and DDR clocks tuned for best performance

#### U-boot

- eMMC throughput improved from 1.01 MB/s to 13.5 MB/s
- Reduced the size and removed unwanted delays
- Removed unnecessary relocation

#### Kernel

- Uncompressed kernel image to load the image faster
- Reduced unwanted delays and cleaned up the drivers
- Removed logs and standard optimizations applied

#### Android

- RAMDISK size reduced for faster bootup
- Optimized init script
- Disable class preloading

Source code or detail technical information availability

<http://www.pathpartnertech.com/downloads/Software>

### Hardware Information

TI OMAP4460 with dual cortex-A9 @ 1.2GHz

1GB lpDDR2 + 32GB eMMC

10.1" WXGA LCD + Capacitive touch screen



## Geiger Cape + Weather Cape + LCD/Camera

Koen Kooi + Pantelis Antoniou + Matt Ranostay

### What is demonstrated

Weather station, LCD + Camera, and Geiger Counter cape designs for the Beaglebone AM335x platform.



### Hardware Information

Beaglebone cape design demos.

### What was improved

Beaglebone support for multiple new cape designs as well as utilizing the Capebus subsystem.



### Source code or detail technical information availability

See speakers' slides



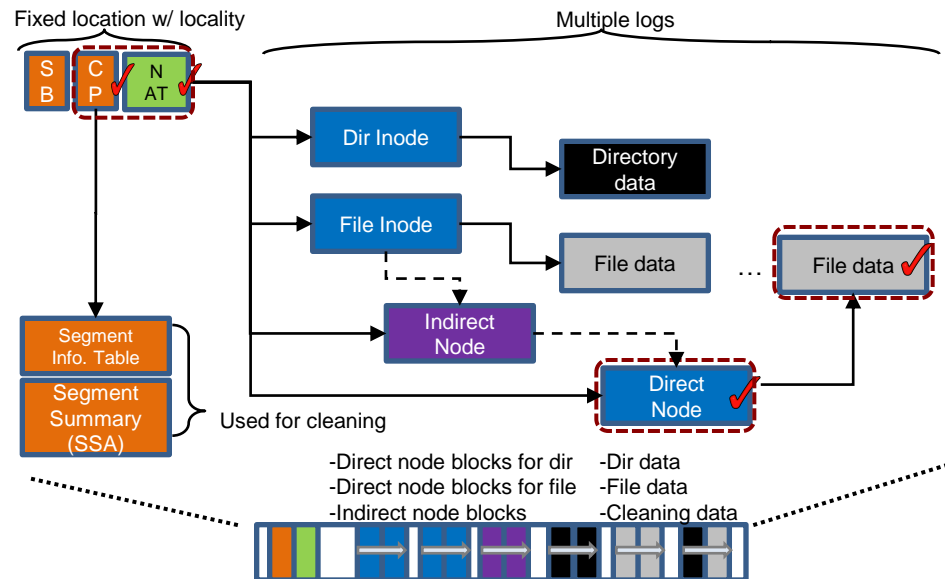
## Flash-Friendly File System (F2FS)

Jaegeuk Kim / Samsung Electronics

### What is demonstrated

A New Linux File System exploiting NAND flash-based Storages (e.g., eMMC, SSD, SD-cards, and so on)

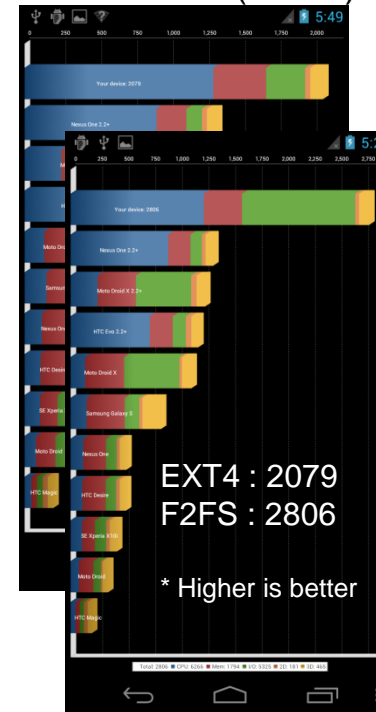
\* Running +7days in Galaxy Nexus w/o errors



### What was improved

\* Optimize IO throughput and fsync performance

#### Quadrant (Score)



#### RLbench (Elapsed Time)



EXT4 : 80.095 s

F2FS : 54.558 s

\* Lower is better

Source code or detail technical information availability

<http://lkml.org/lkml/2012/10/5/205>

<http://lwn.net/Articles/518717/>

<http://lwn.net/Articles/518988/>

### Hardware Information

Galaxy Nexus (ICS 4.0.4)

OMAP Linux 3.0.8

Mount /data as F2FS



## Embedded Android Device

Matthias Brugger

### What is demonstrated

**IGEP Berlin running Android Ice Cream Sandwich**



### What was improved

#### **Integration of basic Android functionality**

- Wi-Fi
- Ethernet
- Touchscreen
- Audio output
- Video output
- LCD and DVI output

#### **Possibilities**

- Hardware acceleration
- CAN Bus
- RS485
- GPIO
- Audio Input
- ADC
- Bluetooth

### Source code or detail technical information availability

Full **source-code** available at **[git.isee.biz](http://git.isee.biz)**

Further **documentation** at **[labs.isee.biz](http://labs.isee.biz)**

### Hardware Information

TI DM3730

ADS7846 Touchscreen

Libertas Wi-Fi





## Radar Device based on ARM Cortex A8 and Linux

Agustí Fontquerni

### What is demonstrated

Embedded Linux RADAR Device



### Hardware Information

ARM Cortex-A8 1Ghz

SPI ADC 1MSps

RADAR FMCW at 24Ghz ISM K-Band

### What was improved

- RADAR device is based on standard microprocessor without FPGA
- ADC data acquisition uses SPI DMA transfer that doesn't block CPU calculation process
- LINARO toolchain optimizes binary code and speeds up RADAR signal measure
- HTML5 features allows for rich visualization
  - AJAX
  - CANVAS
  - jQuery FLOT
  - CSS
- Improved JSON Data time-critical data path
  - Direct JSON HTTP request to application
  - Application "proxypasses" all other requests

### Source code or detail technical information availability

**Source-Code** available at [git.isee.biz](http://git.isee.biz)

Further **documentation** at [labs.isee.biz](http://labs.isee.biz)



## Lancero PCI Express FPGA SGDMA for Linux

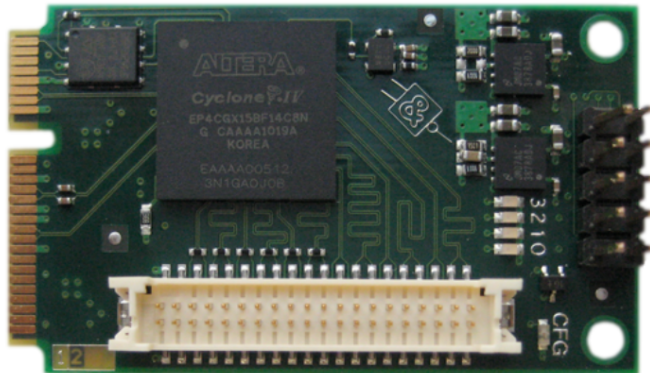
Leon Woostenberg



### What is demonstrated

Use of FPGA with PCI Express link to a SoC / CPU.

FPGA IP core with Linux device driver, to easily add peripherals with MMIO, interrupts and SGDMA support.



Custom 2D display driver with a low-cost PCI Express FPGA on a Mini-PCI Express Card

### Hardware Information

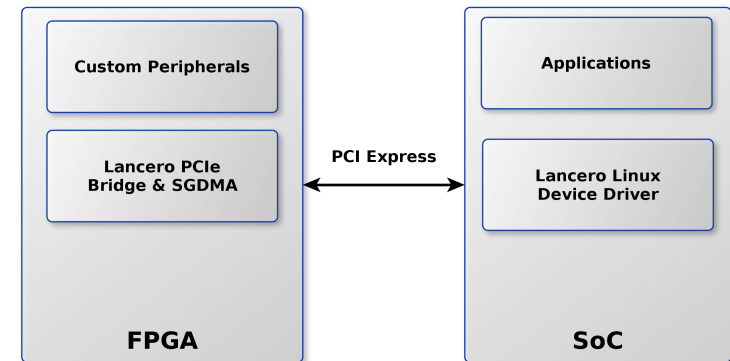
Any SoC or CPU with PCI Express (ARM, PowerPC, x86, Tiler, MIPS) and Altera FPGA's with PCI Express (Cyclone IV/V GX, Arria II/V GX, Stratix IV/V).

### What was improved

True asynchronous I/O support in the kernel driver; back-to-back I/O on the PCI Express link.

SGDMA direct copies from/to user space buffers in virtual memory (no in-kernel copy overhead).

Low Latency (1.4  $\mu$ s loopback) over PCI Express



### Source code or detail technical information availability

staging/altpciexhdma.c (in 2.6.32+)  
bridge driver available open-source (LKML soon)



## TREASUREHUNTER

SIPROP PROJECT

AR (Augmented Reality) Treasure Hunting Game

<http://www.siprop.org/>

### What is demonstrated

A product world is trying to change focusing on “Content-Centric”. Like a Kindle which is designed by “E-Book Centric”. Then, it is necessary to design our products by “Content-Centric”. For that purpose, it is necessary to perform a trial production and a products design quickly flexibly.

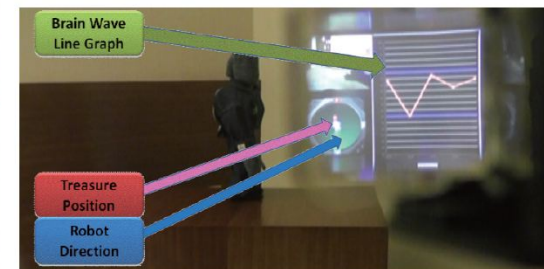
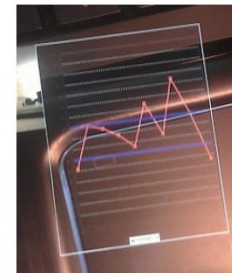
Therefore we created one robot based on the soul of “DIWO (Do It with Others)” used as basic concepts, such as Make: (<http://makezine.com/>) In order to realize it. It is created by combining various products used as SoC which Pandaboard (<http://pandaboard.org/>).

### Key technologies

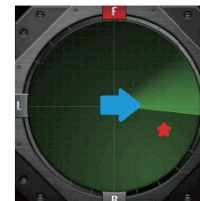
- Tracking a robot  
Detecting a robot by a bone skeleton  
Calculating direction and position of a robot by a depth camera
- Sensing brain waves  
Sensing brain waves and translate to commands

### Implementation

Hardware	Base Computer	Panda board
	Brain Wave Sensor	MindWave (NeuroSky)
	Depth Sensor	Xtion pro live (ASUS)
	Display	AiRscoter (Brother Industries)
	Walking Robot	KHR-2WL (Kondo science)
Software	Ubuntu & Android	Linaro 11.11
	Depth Sensor	OpenNI
	Bone Skeleton Tracker	NITE for ARM
	UI Framework	openFrameworks Android



Radar view and wave graph are shown on your sight.

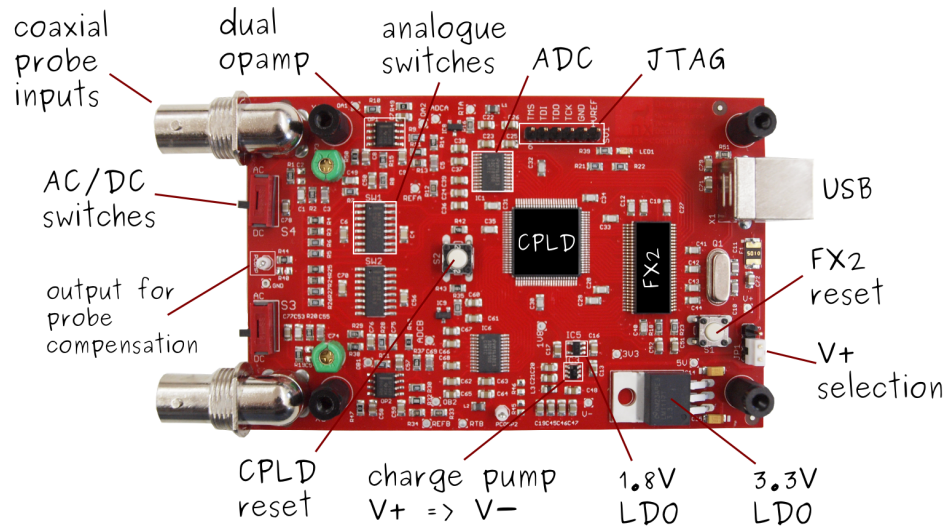




## OsciPrime an Open Source Android Oscilloscope

Andreas Rudolf, Manuel Di Cerbo

### What is demonstrated



### Hardware Information

- + High Speed USB based Data Acquisition
- + Multi-Touch Android Application
- + Dual Channel 6 Msps / 8 Bit
- + Single Channel 24 Msps / 8 Bit
- + Active Development for 2 years now

### What was improved

#### Hardware Front End

- + High Speed USB Powered
- + Complete Print-Layout Revamp
- + Improved Firmware for CPLD
- + Analogue Gain Levels
- + Android Compatibility, Plug and Play

#### Android Application

- + Complete Revamp
- + Performance Boost
- + Smooth as butter Multi-Touch
- + 30 FPS Rendering
- + High Speed Data Processing
- + Trigger, Singleshot, Run/Stop Acquisition
- + Shipped precalibrated!

### Source code or detail technical information availability

- + <http://www.osciprime.com> , GPLv2
- + Schematics, Layout available online



## PandaBoard everywhere

Texas Instruments

### What is demonstrated

Ubuntu 12.04 with Graphics/  
Multimedia acceleration

7" capacitive touch display with  
Android ICS running on the  
PandaBoard

3D Display Panel enabled by the  
PandaBoard

### Hardware Information

OMAP4-based PandaBoards

### What was improved

Updated PPA for Ubuntu  
New hardware supported in ICS



### Source code or detail technical information availability

<http://pandaboard.org>

<http://linaro.org>





## Mainline Linux for i.MX / Barebox / PTXdist

Sascha Hauer, Wolfram Sang, Robert Schwebel, Philipp Zabel

### i.MX Kernel News:

- Unified ARM Kernel + Baseboard Abstraction (oftee)
- Common Clock Support
- USB OTG: ci13xx Bugfixing
- SocketCAN, FlexCAN
- Watchdog with Framework

### i.MX Multimedia Kernel Drivers:

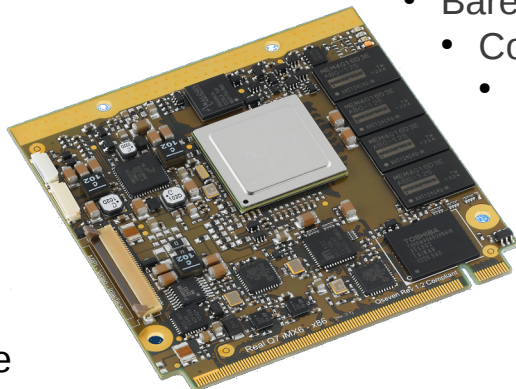
- CSI - Camera Sensor Interface
- IPU - Video Acceleration Infrastructure
- Scaler, Deinterlacer, Color Space Converter
- VPU/CODA: MPEG4 / H.264 Encoder/Decoder

### Current i.MX Challenges:

- Vivante GPU / OpenGL (not mainline quality yet)
- Qt 5 with GL/ES, Wayland

### Barebox Bootloader News:

- LVDS Graphics Mode Setting (via oftee)
- Barebox Initialization from oftee
- Complex Flash Handling
- Menu Framework
- Login Infrastructure
- Redundancy Boot with Persistent State Handling
- Fastboot



### PTXdist Cross Build System News:

- GStreamer 0.11 (1.0 soon), Dynamic Pipelines
- Genimage: New Flash Image Tool
- Devel Net-Boot with Userspace NFS
- Systemd, systemd-watchdogd (Now Mainline!)

### Hardware Information

i.MX6 Quad: Cortex A9, 1.2 GHz (eDM-QMX6 QSeven)  
Video Accel. (IPU), Encoder/Decoder (VPU), 3D (GPU)

### Source Code Availability

<http://www.kernel.org>  
<http://www.barebox.org>  
<http://www.ptxdist.org>

**More Mainlining  
Continuously in Progress!**





## ROW I/O scheduler and MMC Event based support

Konstantin Dorfman & Tatyana Brokhman

### What is demonstrated

#### MMC New Event Mechanism

A new event driven engine has been added to MMC driver, currently serves:

##### •NEW\_REQUEST Event:

Allows notification on a request arrival even if the MMC currently waits on a previous request completion.

**With the new event mechanism the READ throughput is improved by 16%**

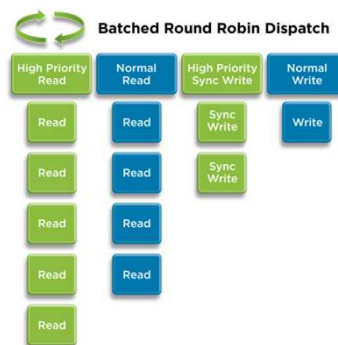
##### •URGENT\_REQUEST Event:

In eMMC4.5 allows to stop and ongoing transfer in favor of the urgent request.

**With the URGENT\_REQUEST Event (and ROW scheduler) the READ latency is improved by 41%**

#### ROW (Read Over Write) I/O Scheduler

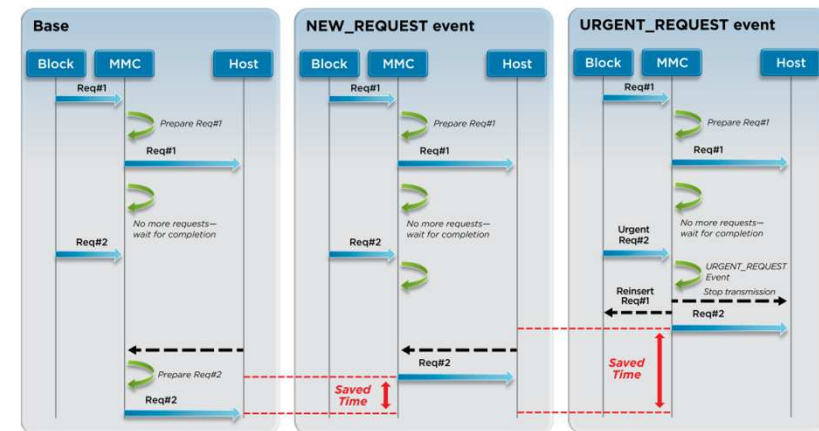
- Designed for mobile devices
- Uses priority based queues but follows a much simpler design than CFQ
- Main purpose is reduce the READ latency and improve the READ throughput
- Utilizes the URGENT\_REQUEST
- Introduces a mechanism to re-insert an already dispatched request as if it was never dispatched



### Hardware Information

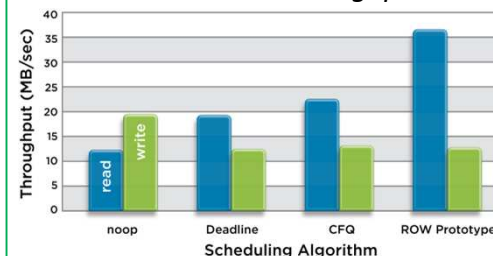
**Qualcomm® Snapdragon™ S4 ProAPQ8064, eMMC4.5 HS-200**

### What was improved



#### READ-WRITE Collisions

*Increase READ throughput*



*Shorten READ latency*

READ Latency (msec)	Average	Worst
CFQ	18	77
ROW	10	45

### Source code or detail technical information availability

**The patches are available at linux-mmc**

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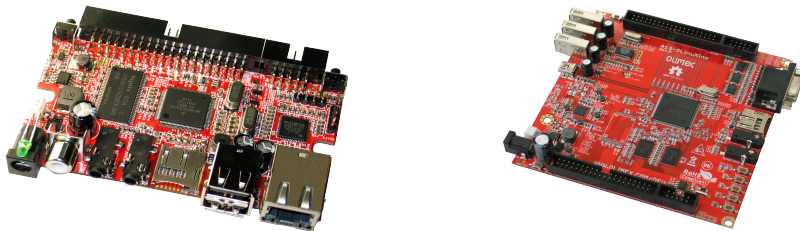


## Software support for two new open hardware Linux boards

Radoslav Kolev - Free/open source software&hardware enthusiast

### What is demonstrated

All board schematics, PCB and Gerber files available under CC-BY-SA license.



iMX233-OLinuXino	A13-OLinuXino
oe-core + meta-fsl-arm	Android, Debian
Full datasheet for SoC	Limited SoC info
Micro/Mini/Maxi variations	Nano-ITX form factor
Easy SoC availability, 10 years after launch supply	Not so easy in single quantities
Easy Soldering, no BGAs	BGA RAM

### What was improved

#### iMX233-OLinuXino

- All versions supported in meta-fsl-arm-extra
- Effort to port drivers to 3.x kernels underway
- Barebox port
- ArchLinux support

#### A13-OLinuXino

- Community interested in Allwinner A10/13 SoCs formed at <http://linux-sunxi.org>
- U-boot ported
- Various distro support

**Conclusion:** Shortly after introduction both boards have fully featured software stacks! The community loves open hardware and will work to support it, even with limited documentation or vendor assistance.

Source code or detail technical information availability

<https://github.com/OLIMEX/OLINUXINO>

### Hardware Information

- \* iMX233, 454Mhz ARM9, 64MB RAM
- \* Allwinner A13, 1GHz Cortex A8, 512MB RAM