Android Sticks and Chips
Wednesday, April 17, 2013 at 6:30 pm
MIT Building E-51, Room 315

In the presence of
Whirlpools, Maelstroms, and Maytags
Presented by
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Baseline Discussion
• ARM vs Intel
• BSP binary vs Source code
• RISC vs CISC
• Standards vs Proprietary
• Open vs Closed
• Education, Commercial, Public Use
• Global vs Domestic
• Components vs Complete
• Android vs Linux

Benefits
• Low Cost
• Energy Efficiency (1W – 5W)
• Size (small, light)
• Capability
  – Dual Core / Quad Core
  – Fast Processors
  – HDMI, USB, Ethernet, WiFi etc.
• Large Number of Vendors

Questions
• Is Android certified on device?
• Is Android “Play Store” available?
• Is Licensing (e.g. GPL) followed and source code released?
• How do you update Android?
• Compatibility with Linux distributions?
• Hardware quality
  – USB ports, cases, power adaptors

Functionality
• Energy
  – Single Digit Wattage
• Price
  – Less than $100 for useful, new “micro”
• Availability
  – Multiple Vendors, Global Sourcing
• Size
  – Small, portable
Technology

- The last “nanometer” – size, power, price
- ARM Licensing
  - Lots of Chip Vendors
- SOC architectures
  - Memory, Processor, I/O
- HDMI “standard”
- Mass Production (eg. China)
- Android / Linux Converge? Mature!

Software

Android Growth


Android Architecture


Android Releases

  - Feb 2008: DAVinci
- A/W/S/M/I at API level
  - A: Adreno 200 (API level 1)
  - W: Warpshield (API level 1)
  - S: S3 graphics (API level 2)
  - M: Mali-400 MP (API level 3)
  - I: Imagination graphics (API level 4)
  - R: Reality (API level 5)
- The source code is available for Android before version 1.2
- For newer Android versions, the source code is available only for internal use and not released


Linux Kernel Releases

- March 1994, Linux 1.0.0 (176,250 lines of code)
- March 1995, Linux 1.2.0 (310,950 lines of code)
- June 1996, Linux Version 2
- January 1999, Linux 2.2.0 (1,800,847 lines of code)
- December 1999, [hmm manpage](http://developer.android.com) patches for 2.2.13 were published
- January 2001, Linux 2.4.0 (3,377,902 lines of code)
- December 2003, Linux 2.6.0 (5,929,913 lines of code)
- 2004, kernels start coming out every 2–3 months, 2.6.0 - 2.6.39
- July 2011 Linux Torvalds announced the release of Linux 3.0
- Linux 3.2 had 14,998,651 lines of code

Source: [http://en.wikipedia.org/wiki/Linux_kernel](http://en.wikipedia.org/wiki/Linux_kernel)
The Linux Boot Process


Hardware Showcase

UG008

$67.99 - UG008 TV Box Mini PC TV Dongle
Dual Core RK3066 Cortex-A9 1G/8G With HDMI AV Output
RJ45 WIFI External Antenna – Geekbuying.com

MK808

$46.22 - MK808 Dual Core Android 4.1 TV BOX
Rockchip RK3066 Cortex-A9 Mini PC Smart TV Stick – Amazon.com

MK808b Clone Wars

• How to Identify If it’s a clone?

• How to Open MK808b to check version
  – http://youtu.be/H6i6hqclwTc
**Measy U2C TV Dongle TV BOX RK3066 Dual Core 1G/8G**
Built-in 2.0MP Camera & Mic with BT AV Output – Geekbuying.com

**Measy Wireless Keyboard**

**Rikomagic MK 802IIIS**

**Rikomagic MK802IIIS**
$57.44 - Rikomagic MK802 III Dual Core Android 4.1 Jelly Bean Mini PC Rockchip RK3066 1.6Ghz Cortex A9 1GB RAM 8G ROM HDMI - Amazon

**Rikomagic MK702 II**

**Picuntu**

- Step by Step Install
  - https://www.miniand.com/wiki/Picuntu+Linux+Step+by+Step+Installation
- Upgrading to RC3
- Installer Flash
  - https://www.miniand.com/wiki/Appendix+C--Using+PicuntuRC3KernelInstaller
  - Adding a Swap File

All in One
- Wireless Keyboard
- Air Mouse
- IR Remote
- Audio Chat
Project Ideas

• Open source off-grid solar charge controller
  – sage.radachowsky@gmail.com

• Project for Wildland Security - embedded devices to catch poachers around the world
  – Steve Gulick <sgulick@wildlandsecurity.org>

• BluMicro
  – b delacey / gmail com
  – kkeville alum mit edu
  – The omniscient Charbax

BluMicro

http://www.blumicro.com/

Ideal Linux miniStick?


What are the major component of an OpenDesign?

Some Disassembly Required

• Clones / Roms

• Hacker Havens
  – http://www.armtvtech.com/
  – http://www.freaktab.com/

• rk30xx loader image unpacker

• Obtaining RK3066 boot ROM.
  – https://gist.github.com/sarg/5028505
Recompiling Linux for miniSticks

- Victor Lopez – Measy Work
  - [https://plus.google.com/u/0/106855711540189715134/posts](https://plus.google.com/u/0/106855711540189715134/posts)
- Others
  - [http://hwswbits.blogspot.com/2013_04_01_archive.html](http://hwswbits.blogspot.com/2013_04_01_archive.html)
  - [http://hwswbits.blogspot.com/2013_03_23_archive.html](http://hwswbits.blogspot.com/2013_03_23_archive.html)
- MiniPC Communities on Plus
  - [https://plus.google.com/u/0/110719562692786994119/posts](https://plus.google.com/u/0/110719562692786994119/posts)

The Arm-niscent Charbax

- RK3188 Tablets
  - [http://armdevices.net/2013/04/16/pyd-shows-190-rk3188-retina-13-3-tablet-and-more/](http://armdevices.net/2013/04/16/pyd-shows-190-rk3188-retina-13-3-tablet-and-more/)
- Message from China:
  - [http://armdevices.net/MessageFromChina.mp4](http://armdevices.net/MessageFromChina.mp4)
- Visit Armdevices.net
  - [http://armdevices.net/](http://armdevices.net/)
  - [http://armdevices.net/2013/03/18/allwinner-a31-9-7-retina-factory-tour-at-celeb-tech/](http://armdevices.net/2013/03/18/allwinner-a31-9-7-retina-factory-tour-at-celeb-tech/)
- Allwinner Stick Assembly
  - [http://armdevices.net/2012/06/18/mk802-android-4-0-mini-pc-allwinner-a10-hdmi-stick-factory-tour/](http://armdevices.net/2012/06/18/mk802-android-4-0-mini-pc-allwinner-a10-hdmi-stick-factory-tour/)

China Tour

- Celeb-Tech Touch Panel/Tablet Maker
  - [http://www.youtube.com/watch?v=nmn7uZ0lUJo](http://www.youtube.com/watch?v=nmn7uZ0lUJo)
- Shenzhen
  - Tour of Tablet Market
  - [http://www.youtube.com/watch?v=BP0QwzppnIQ](http://www.youtube.com/watch?v=BP0QwzppnIQ)

Q & A?

- Thanks!