

Capitole du Libre - Toulouse

Pyra, successor
of Open Pandora



Summary

- Story
- Technical choices
- System
- Applications
- Planification
- Pyra team
- Links
- Thanks

Story

- Story
 - Gaming handhelds market is dominated by Nintendo since 1989 and the gameboys



Story

- A range of "dissidents" asiatic devices appears in 2002
- GP32 : south-korea competitor to Nintendo Gameboy Advance
 - Not really open source, not under Linux, but uses SmartMedia cards, SD/CF's ancestor



Story

- 2005, GP2X (125€) : 3 different versions, natively embed Linux
 - SD port, integrated TV-out
 - Community creates & ports programs : ssh, debug, open2x firmware, game etc.
 - A USB dock, serial & parallel helps development



Story

- 2009, WIZ (125€) : Linux, oled screen
- 2010, Caanoo (125€) : a bit enhanced WIZ



Story

- 2008, Open Pandora (from 180€ to 440€)



Story



Story

- Open Pandora
 - ARM mini-computer using Linux
 - CPU 600 MHz or 1GHz
 - Hardware freed 1st june of 2014
 - Open, easy hard & soft modifications
 - 2 SD ports, 2 USB ports, Wi-Fi, Bluetooth, touchscreen, TV-out, long battery life
 - Linux, huge set of applications + dedicated repository
 - Community project
 - Awesome for work and gaming
 - But especially for work

Story

- And here's now the Pyra (on the left) !

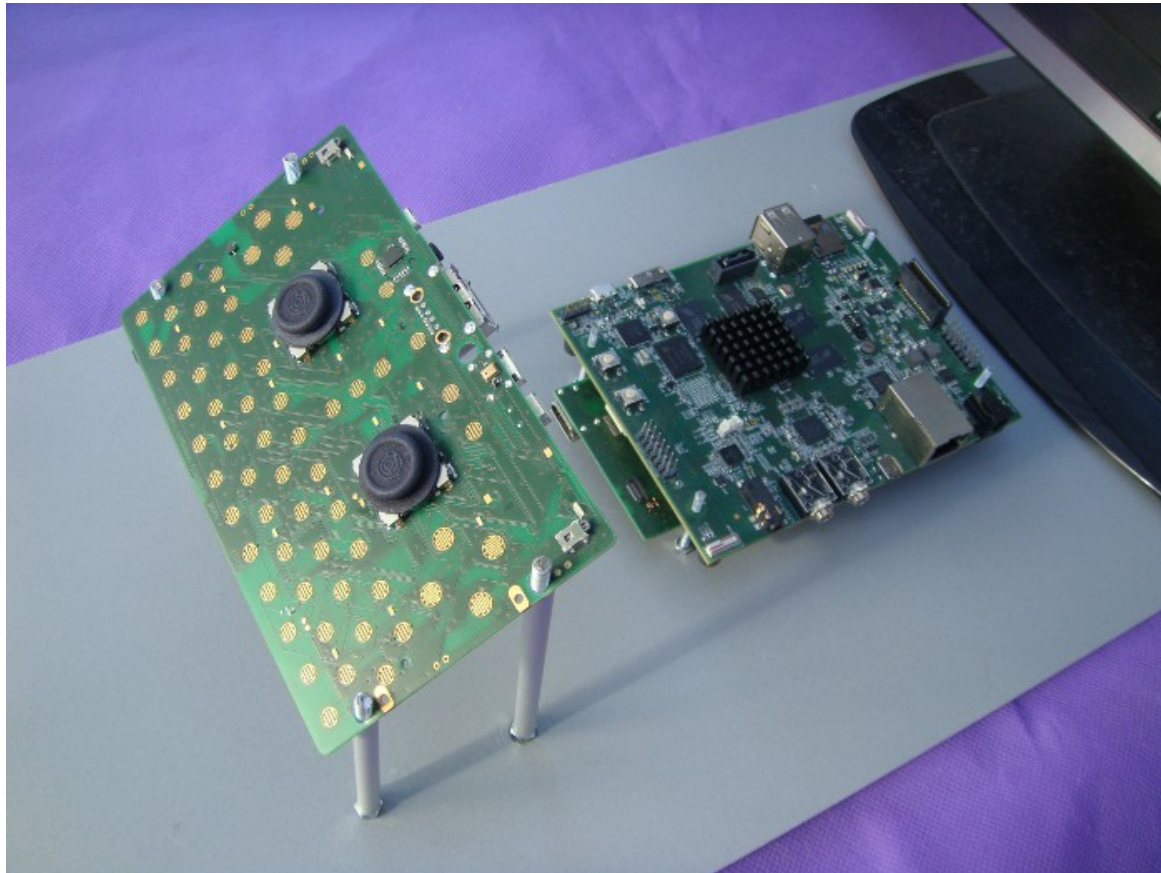


Technical choices

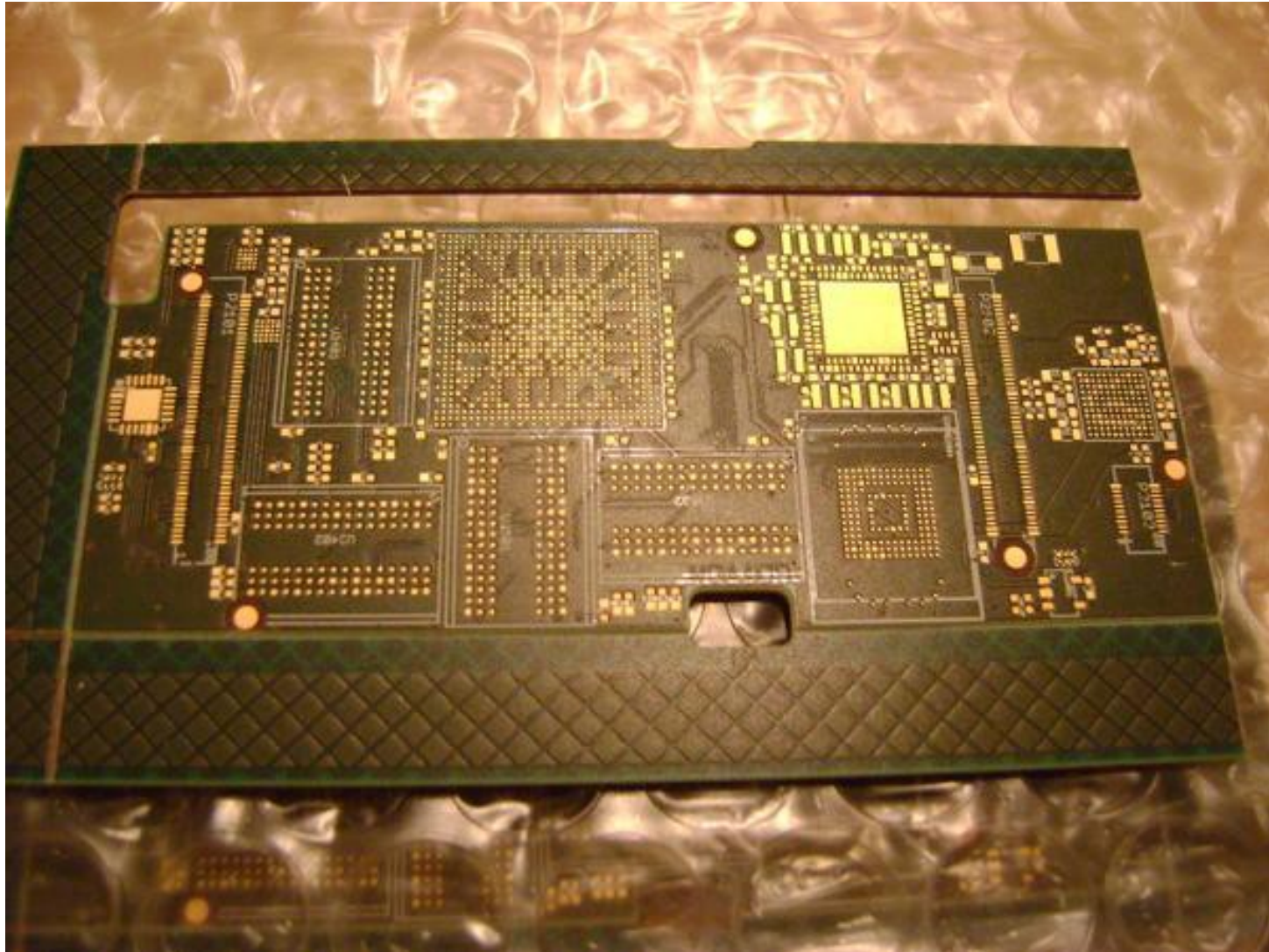
- Technical choices
 - CPU choice
 - ARM, what else ?
 - Lots of CPU makers sell only astronomic quantities
 - Texas Instruments is choosen, like Pandora
 - Industrial class, term support
 - Modularity
 - Keyboard & connectors on the motherboard
 - CPU & RAM on a daughterboard
 - Hardware upgrade possibility

Technical choices

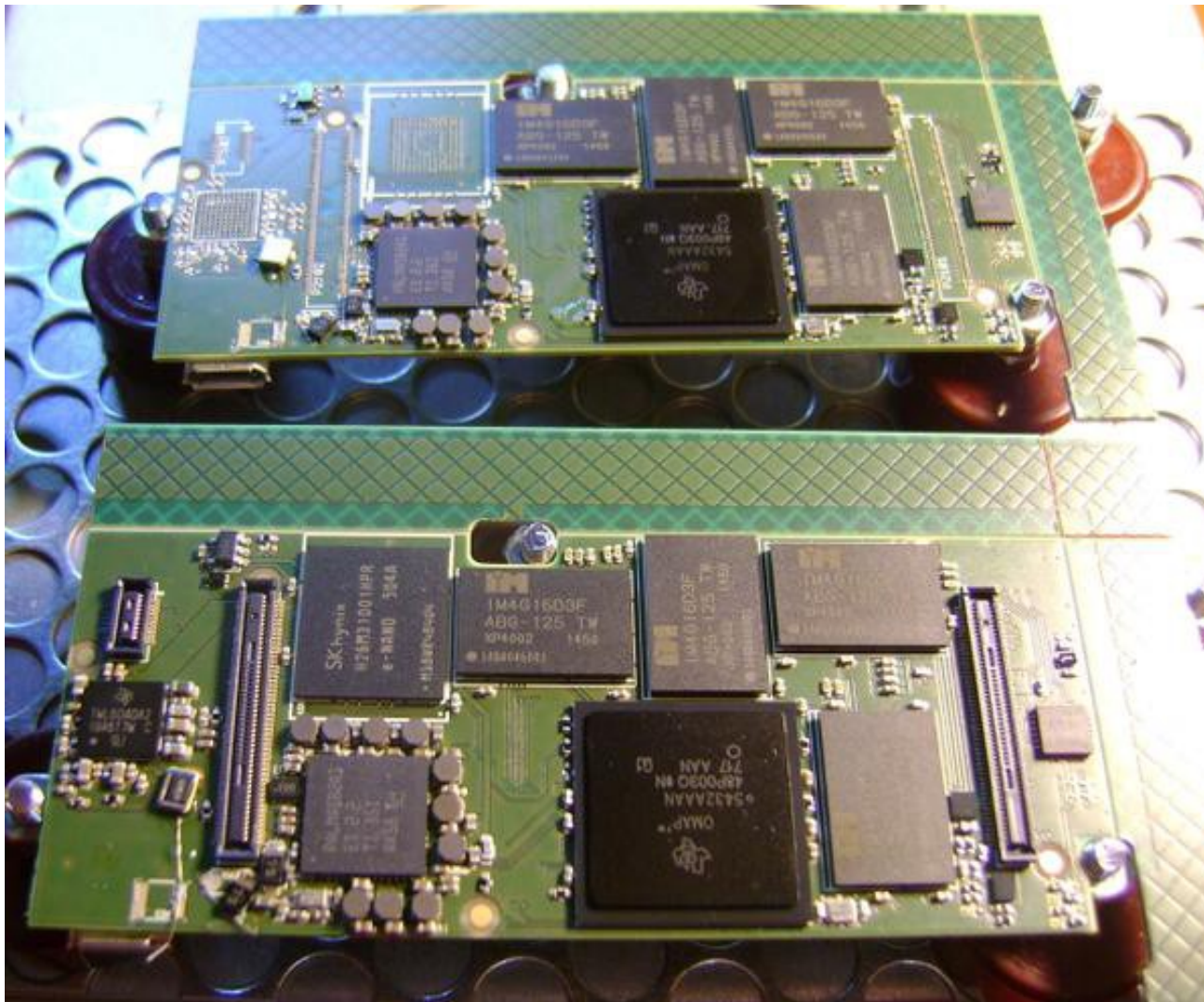
- Development platform
 - Pyra motherboard + SVTronics OMAP5432 EVM



Technical choices



Technical choices



Technical choices

- Screen
 - 1080p is too expensive & not really useful : 720p
 - Dedicated to mobiles, need « rotator chip »
- Shape
 - Clamshell, like Pandora
- Storage
 - 2 ports SD « big size » kept
- Connectivity
 - USB 3, eSATA
 - 3G/4G/UMTS (SIM card) + GPS
 - HDMI

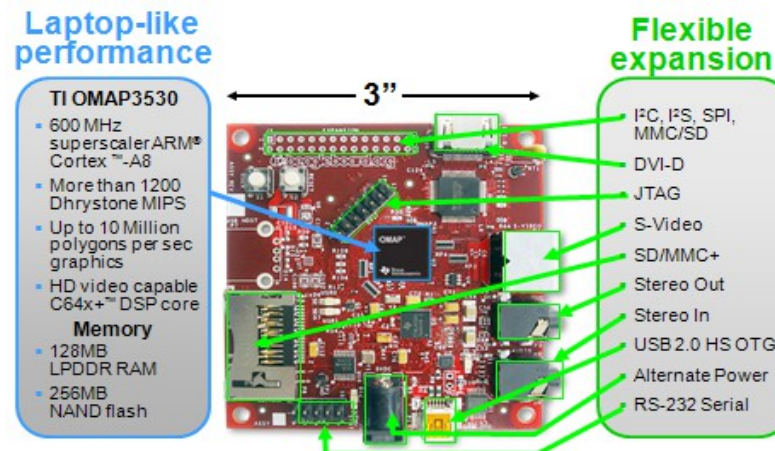
- System
 - ARM microprocessors family (1986)
 - RISC (reduced instruction set computer)
 - Originally conceived for the desktop
 - Simplicity adapted to low power consumption
 - Produced under license (Alcatel, Apple, Freescale, Marvell, Nvidia, Samsung, Sharp, Texas Instruments...)
 - 12 billions units made in 2014
 - Optimised versions for every usage
 - Used in **99%** of mobile devices (2014)
 - Comes to servers & desktop market (AMD, Cavium, Gigabyte, Nvidia etc.)

System

- ARM CPUs are also present in plug computers



- Or even in beagle/panda/cubie/etc. boards



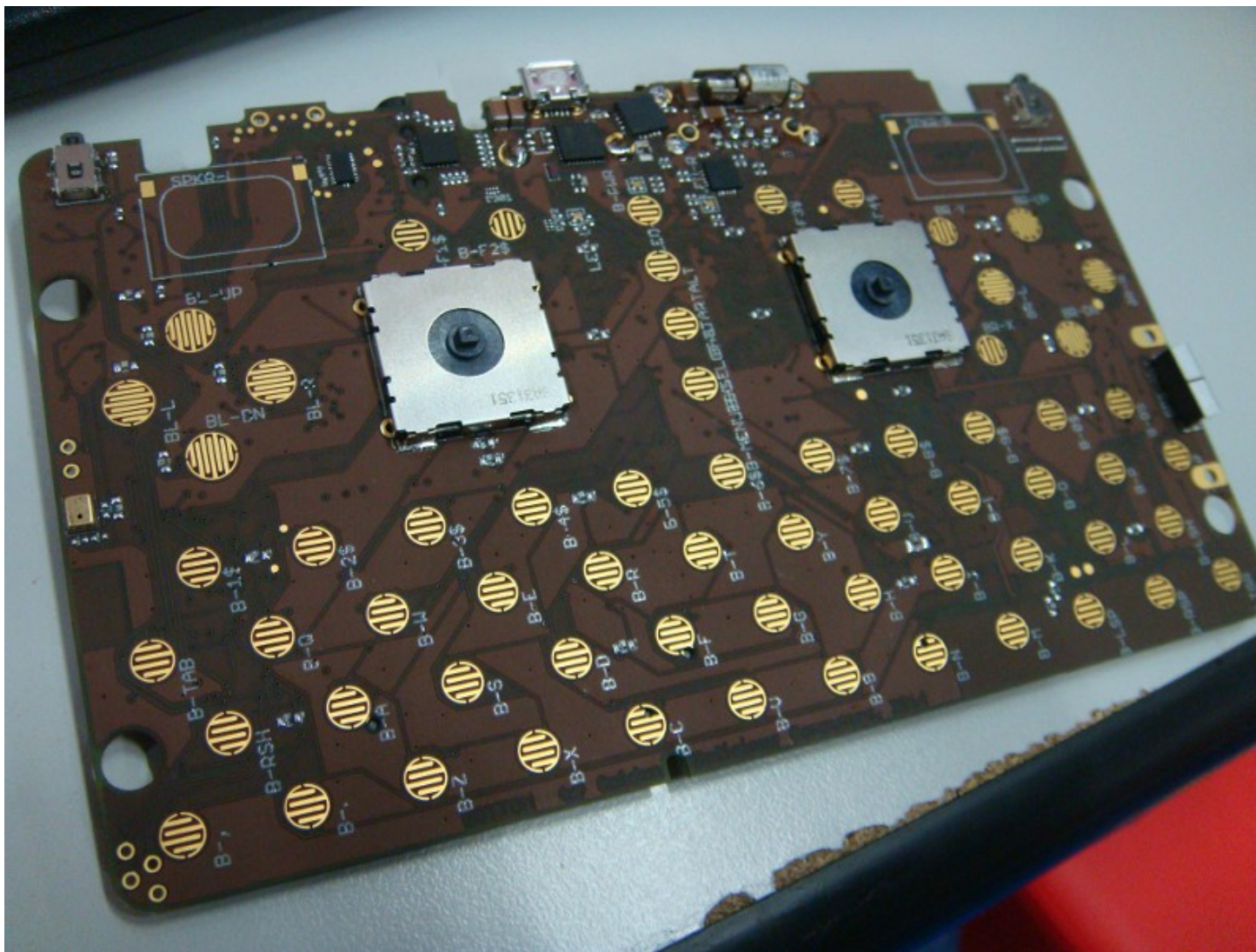
System

- Two Pyra versions
 - One with 3G/4G/UMTS (SIM card) + GPS
 - One without (cheaper)
- Hardware spécifications
 - CPU ARMv7 Cortex-A15 Texas Instruments
 - OMAP5432 1,5GHz (1,7GHz possibility)
 - System-on-chip (SoC), overclockable
 - Dual core, NEON SIMD, 2MB L2, DDR3
 - Virtualization
 - Two additional Cortex-M4 200MHz
 - 2 GB RAM
 - ~8 GB embedded eMMC

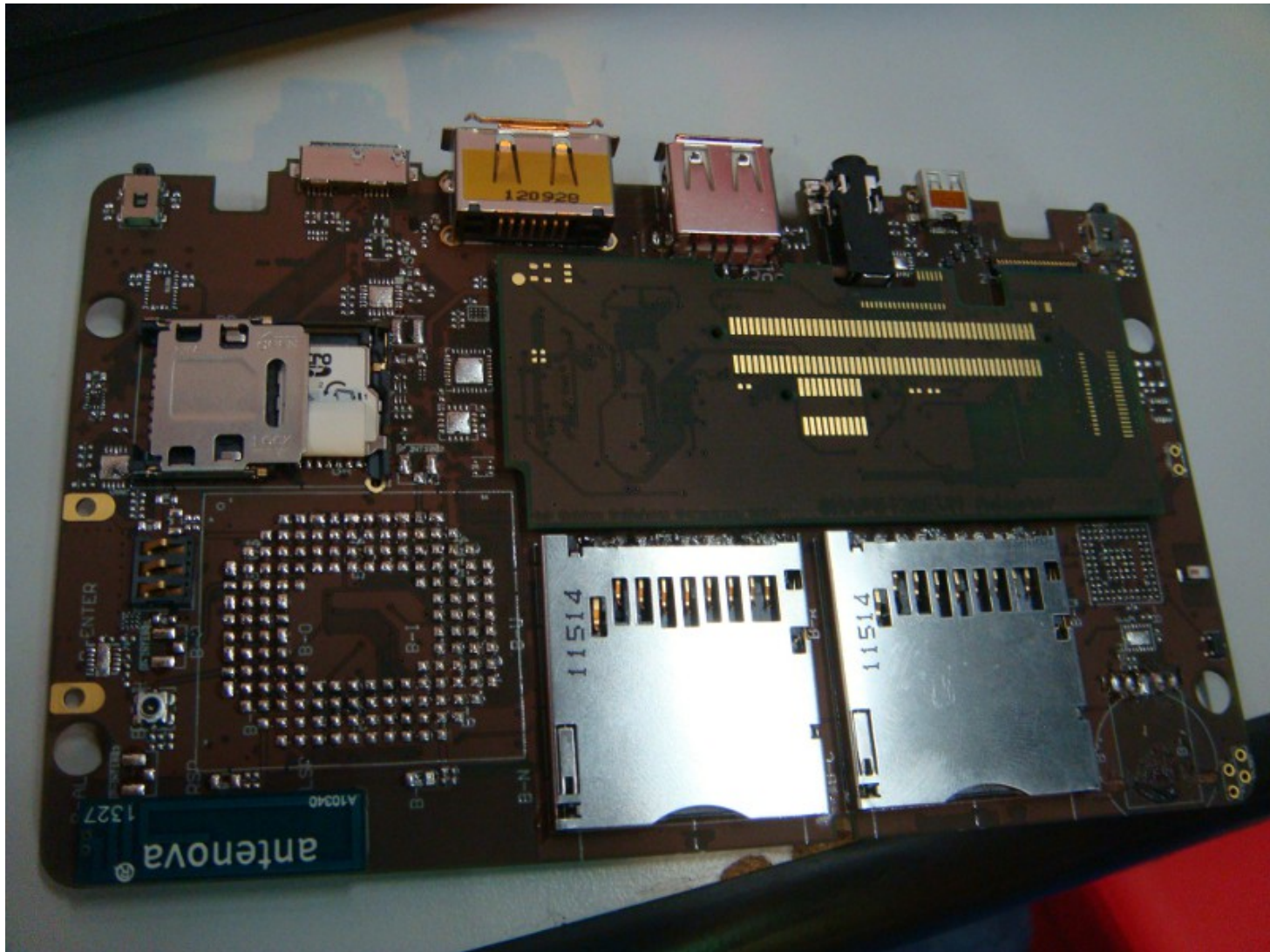
System

- GPU PowerVR SGX544-MP2 OpenGL ES 1.1/2.0+ OpenCL 1.1 EP
- 2D accelerator Vivante GC320
- Mini-C64x DSP
- "Unbrickable", thanks to a bootloader on ROM
- Embedded real-time clock (RTC)
- Size: 140 x 84 x 29 mm
- Weight: ~400 g

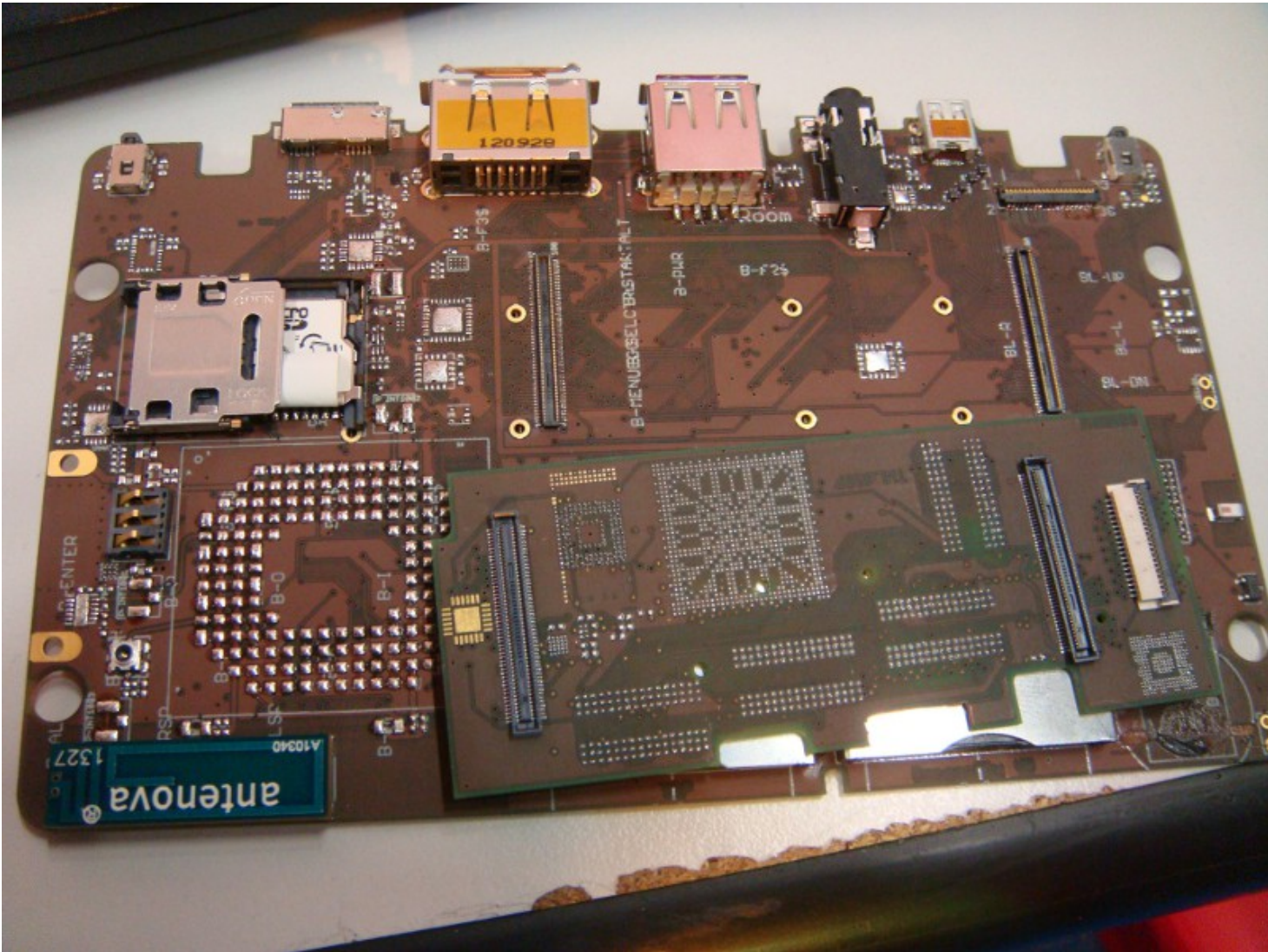
System



System



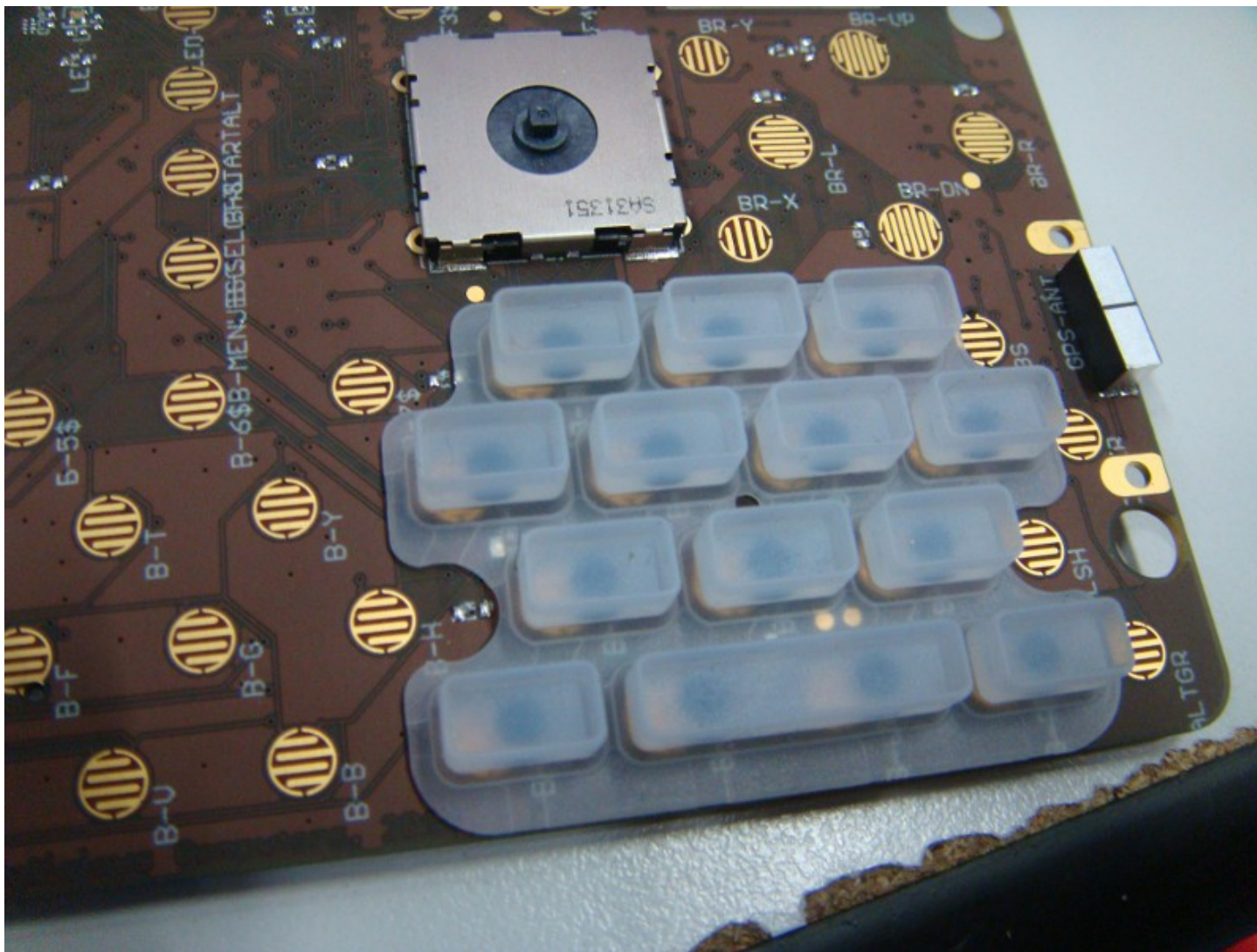
System



System



System



System

- Display
 - BOE BTL507212-W677L screen
 - 5 inches 720(RGB)x1280 (WXGA) 720p
 - 121 x 62,1 mm
 - 16,7 million colors
 - 16:9
 - 294 PPI
 - 800:1 contrast
 - Micro HDMI 1.4a output
 - 2D & 3D hardware acceleration

System



System

- Sound
 - PCM1773 & ampli op TPA6110A (prototypes)
 - High quality DAC & ADC
 - Second sound card TWL6040 on SoC
 - Pair of speaker on keyboard's sides
 - Volume wheel
 - Integrated microphone + 4-pins E/S headset/mini-jack
- Controls
 - 63 buttons, backlit keyboard, resistive touchscreen
 - D-pad, 4 lateral buttons
 - 2 clickable analog pads
 - Multilang ergonomic QWERTY keyboard

System

- Connectivity
 - 3 SDIO SD/SDHC/SDXC ports (e.g. 512Go)
 - Wi-Fi 802.11 b/g/n
 - Bluetooth 4.0
 - 2 USB 2.0 host ports, standard A
 - eSATA adapter for one of those ports
 - 1 USB 3.0 host port, micro-B
 - 1 micro USB port charge & serial
 - Any USB peripheral having a Linux driver can be used, powered USB hub may be required

System



System

- Power
 - Lithium-polymer battery, 6000 mAh
 - Autonomy > Pandora for the same tasks
 - Micro USB charge
 - Advanced power management : only the maximum clock frequency is set; when CPU does nothing it stops completely
- Various
 - Accelerometer, gyro-sensor
 - Vibrator



- OS
 - Name : Pyra OS
 - Based on Debian GNU/Linux armhf
 - A lot of available packages
 - Easy to update
 - Optimized kernel & almost mainstream
 - Possibility to boot an OS from a SD card

System

- Xfce, environnement graphique par défaut



System

- Pyra-dedicated .dbp package system
 - Dragon Box Package
 - Pyra-specific, iso or squashfs archives
 - To be loaded in some particular folders, e.g. on a SD inside /pyra/menu/
 - Libdbp handle them, icons appears automatically in the menus
 - On the fly mount & execution
 - "À la synaptic" system though [~repo.pyra.org](http://repo.pyra.org)
 - Pyra usage is "more complicated" than a console (buy, insert, power on), so potentiellaly limits the userbase

System

- Soft & hard hacking made easy
 - Linux == lots of languages
 - Easy PC ports in 2 or 3 hours
 - Friendly community
 - Almost complete hardware documentation
 - Connectors on the motherboard
- Other OS (WIP)
 - Slackware, Gentoo, Arch, OpenSUSE, Fedora...
 - Android possibility (why ?)

- Applications
 - Available programs
 - Linux-based, so huge applicative pool
 - Firefox, Chromium, Liferea, Pidgin
 - LibreOffice, AbiWord, Gnumeric
 - Audio players (audacious, xmms...), video (mplayer, vlc, codecs pack...), brasero (CD/DVD burning)
 - C/C++/Python/Perl/Fortran/Go/Julia/Ruby/Java etc.

Applications

- Gaming
 - Easy porting from previous ARM consoles
 - Non-free hardware games, even the simplest like puzzles, cost 30€ although they can be programmed in 2 days
 - Free software has a good spirit, it's not only about gaming but also about helping on game development or create own variations
 - Community is far less aggressive than those from commercial games (e.g. StarCraft)

Applications

- StarCraft/BroodWar (x86>ASM>C>ARM)
- Doom3/Quake 3/RtCW, N64 emulation, Dreamcast
- Playstation 1 in HD, Nintendo DS, PSP
- Megadrive/Genesis, SNES, 8 bit consoles
- Amiga, Atari ST, Amstrad CPC, C64
- Free games, non-free game engines (e.g. flashback, heroes 2, cannonball/outrun)
- Ginge, GP2X & WIZ "emulator"
- Qemu, WINE, DOSBox
- OpenGL (non-ES) with glshim
- And many other emulators & homebrew games
- Compo 4 All, on-line highscores

Applications

- Professional usage
 - Extremely mobile & complete device
 - Low power consumption, no heat, no noise
 - Battery can be used as an uninterruptible PSU
 - Many OS on many SD
 - Wi-Fi, USB RJ45 adapters, serial & // ports
 - USB or bluetooth keyboard/mouse
 - Tethering through dongle Wi-Fi/bluetooth phone
 - Clients/servers SSH, VPN, NFS, SAMBA/CIFS, VNC (remmina), FTP, mail, proxy, VOIP etc.

Applications

- Partitioning & formatting through GParted
- R, Freemind, Gantt Project, Bluefish, Geany, Dia, viewer PDF, qOrganizer, etc.
- HP48, TI92 calculators
- Burning software + USB burner
- HDMI cable + pico-projector
- USB keys, multcard readers
- Programming directly on the machine after installation of libraries & compilers
- Ideal for little wiring closets ^^
- SOLEIL project, heart of PXE network

- Planification
 - Pré-pré-production
 - Around 20 units end of november 2015
 - Pré-production
 - 200 units, maybe more
 - Date depending on eventual modifications
 - Pre-order possibility
 - Mass production
 - Price
 - 500€ minimum

- Pyra team
 - Hardware/business developers
 - Michael Mrozek (EvilDragon), Germany, hardware production, tests, marketing, webmaster
 - Nikolaus Schaller (hns), Germany, hardware design
 - notaz, Lithuanie, hardware tests/debug, magic

- Software developers
 - aTc, Netherlands, OS
 - Codifier, kernel drivers
 - Lunixbochs, graphic drivers, glshim
 - notaz, Lithuania, system, kernel, patches
 - ptitSeb, France, glshim, serial porter
 - ???, Texas Instruments developer
 - ???, kernel developer

- Links
 - Official website
 - <http://pyra-handheld.com>
 - Official forums
 - <http://boards.openpandora.org>
 - Official shop
 - <https://www.dragonbox.de/en>
 - Software
 - Not yet a repo
 - Wiki
 - Not yet a wiki

Thanks

- Thanks
 - Team Pyra
 - Unique project
 - Illimitée patience, availability
 - Activity on the boards
 - notaz for his omnipresent help
 - hns for his makesd script
 - Fantomid for his invitations at the Capitales du Libre
 - Askarus for some images & pictures

Thanks

- EvilDragon
 - A mené à bien le projet Open Pandora
 - A su en tirer des enseignements
 - Open Source à donf !
- La communauté
 - Beaucoup de programmes
 - Beaucoup de donateurs
 - Présence sur les salons

Thanks

Gamescom, Cologne



21 - 22 novembre 2015

Linux-SWAT - Pyra

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Thanks

RMLL, Montpellier



Thanks

- Team Pyra Bis
 - Conception & making of a **second** ultimate machine
 - Big companies hand-hurting spanking
 - Lesson of perseverance

