

Balloon Open Hardware Licence

Wookey
(Balloonz / Toby Churchill Ltd)
wookey@wookware.org

FOSDEM 2007,
Brussels

- 1 Open Hardware
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What is Open Hardware?

- Documented Interface/hardware
- Free firmware
- VHDL (CPUs, subsystems) - OpenCores.org
- Open designs
- RepRap machine



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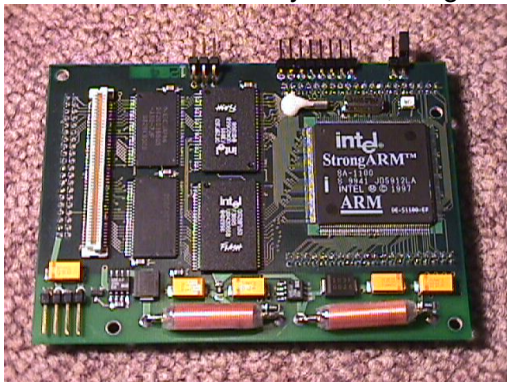
Open Designs

- LART
- Simputer
- Balloon
- Flavio Ribeiro ARM9 Camera
- Open Graphics Dev board
- Darell Harmon's SBC



Open Designs - LART

- SA1100, 32MB RAM, KSB add-ons
- MIT licence - do what you like, no guarantees.



<http://www.lart.tudelft.nl/>



Open Designs - Simputer

- StrongARM, Smart card, LCD
- Free manufacture, copyleft changes, licenced sales.
- 4000 sold

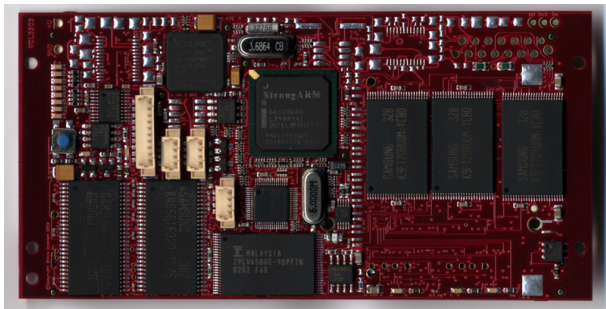


<http://www.simputer.org/>



Open Designs - Balloon2

- StrongARM, CPLD, USB, Audio, Expansion bus
- Free manufacture and sales, restricted changes

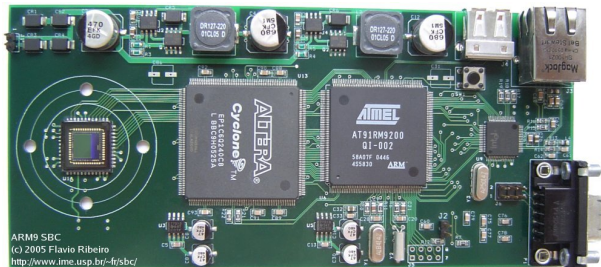


<http://Balloonboard.org/>



Open Designs - Flavio Ribeiro's ARM9 Camera

- ARM9, Altera FPGA, camera chip
- Distribution, acknowledgement, no changes.

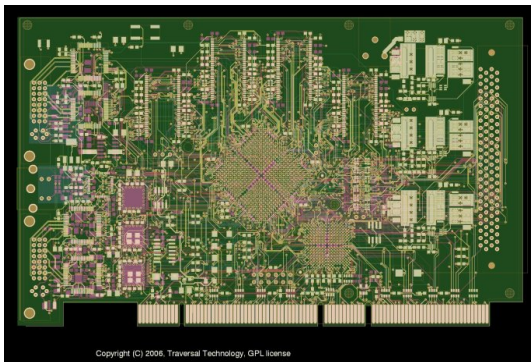


<http://www.ime.usp.br/~fr/sbc/>



Open Designs - Open Graphics Dev board

- Big FPGA between PCI and video
- GPLed schematics and Gerbers: Open PCB.

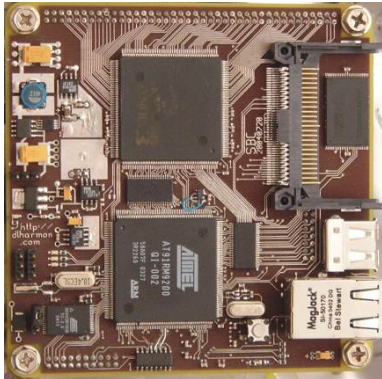


<http://opengraphics.org/>



Open Designs - Darell Harmon's SBC

- Atmel ARM9 CPU+ Xilinx FPGA
- GPL



<http://dlharmon.com/>



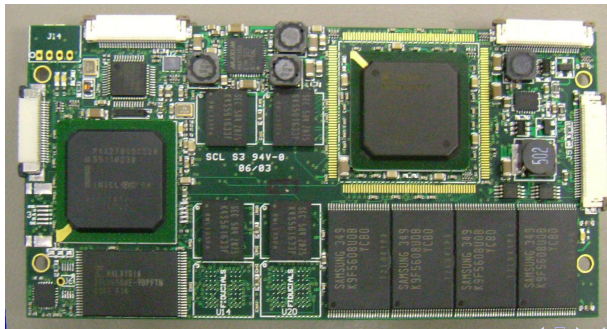
Balloon Project

- Followed on from LART
- Started 2000 - Steve Wiseman
- Balloon2 prototype 2002, shipping 2003 - ~3500 made
- Balloon3 started 2004, built 2006. Compatible size/bus.
- Companies - resources
 - Aleph One
 - Toby Churchill Ltd
 - Guralp
 - Cambridge University
 - iTechnic
 - Balloonz



Balloon Spec

- PXA 270 - 520Mhz
- 784MB RAM, 1GB NAND, Max 32MB NOR
- FPGA - (1 million gates) or CPLD
- USB host, slave, OTG
- CF, MMC interface, ADC, GPIO
- Expansion bus, 16-bit 'Samosa' bus
- LCD, I2C, Audio, Camera, Touch screen



Open Hardware Licences

- MIT
- Simputer - Lawyer-written, Trademark, Licence fee
- VHDL licences - Opencores, GPL
- Several GPL-based
 - Hardware Design Public Licence
 - Freedom CPU Licence
- BOHL



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Differences from Software

- Copying cost is large, often very large
 - 4 prototype balloons - €5000
 - balloon3 derived from balloon2 - €125000
- Legal requirements
 - Sale of goods act.
 - EMC
 - Component use restrictions - Medical equipment
 - Batteries - safety disposal
- Very expensive typos - duff boards



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Balloon Open Hardware Licence

- Open Source (copyleft) principles
- Distinguishes between designers, manufacturers, distributors and everyone
- Protect each group from litigation/liability
- Design group controls design
- Practical commercially
- Allows connection to proprietary hardware
- Has Logo to indicate licence terms
- Fully documented designs
- Firmware outside licence scope



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Design Groups

- Set of people responsible for design
- Structure and management is up to each group
- Releases matter
- Defined group needed by manufacturers and distributors



Types of info

- **Hardware Design Files (HDF) - The design itself**
- Manufacturing Info (MI) - Gerbers, BOM
- Design Documentation (DD) - Schematics, pinouts, memory map, user guide



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BOHL - Everyone

- May:
 - Redistribute DD
 - Manufacture
 - Make minor MI changes
 - Make Component changes
 - Install firmware
- Must:
 - Pass on changes
 - Be responsible for own use
- Must not:
 - Include in non-BOHL designs
 - Misrepresent or remove copyright notices/design mark
 - Apply for patents



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BOHL - Manufacturers

- May:
 - Manufacture freely
 - Add identifying marks
 - Provide warranty
- Must:
 - Comply with legislation, and show compliance on request
 - Provide MI and DD to users (nominal fee permitted)
- Obligations remain, but rights lapse, if licence broken.



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Designers

- May:
 - Access and modify HDF freely
 - Base a new (BOHL) design on Design Files
 - Perform simulations
 - Leave design group
- Must:
 - Record HDF modifications (in DD)
 - Include visible design mark
 - Include release ID
 - Pass on HDF modifications
 - Ensure additions do not infringe 3rd parties
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Licence Needs Review

- Potentially a widely-used licence
- Designers, manufacturers, distributors, users - please comment
- Legal review to follow
- <http://balloonboard.org/balloonwiki/OpenHardwareLicense>

