URLAP Current state & future work

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Outline

• Hardware
  - URLAP Main Board
  - URLAP Extension Board
  - URLAP Watch

• Software
  - GNU Toolchain
  - Emulator
  - Support software
  - BIOS
  - Test programs
  - Terminal
  - Bugs

• Planned Current/Future work
URLAP Main board

- Processor
- up to 2MB Serial Flash
- Progr. IF
- LCD IF
- PS2 IF
- Prog. Clock
- 32Kb BIOS Flash
- Core control + data bus + I2C bus
URLAP Extension board

- **8 MB RAM** (Cypress CY7C1049CV33)
- **2 CPLDs** (Xilinx XCR3128XL)
  - Core addr & data bus interfacing
    - mem access
    - fpga reconfigurability
URLAP Extension board

- 512KB // Flash (ST M29W040B)
- 2 FPGA (Xilinx XCS30XL)
  - 8 GIO pins / FPGA
  - 2 x UART level TX/RX
  - I2C bus connection
Mainboard + Extension

- Implemented:
  - full (word, halfword, byte) access to RAM
  - byte access to FLASH
  - at boot up: copy of FLASH into RAM
  - FPGA reprogramming (through SFR mmap)

- FPGA interfacing:
  - copro
  - mmaped
URLAP Watch

- RF Interface
- keyboard
- LCD display
- Uses internal chip ring oscillator (5MHz)
GNU Toolchain

- gcc 3.4.3
- binutils 2.15
- Support for C/C++ development
Emulator

- Cycle- and bit-true C model of:
  - Core
  - profiling copro
  - debug copro
  - partial LKM copro support (LCD part)
  - emulates full memory range (2GB)

- to be done:
  - SPI copro
  - full LKM copro
Support Software

- urlap_bios_utility
- urlap_clock_utility
- urlap_mp25p20_flash_utility
- urlap_check_parallel_expanders
- urlap_scan_i2c_bus
- urlap_jtag_detect
- urlap_elf2bin
- urlap_elf2flash
- urlap_ps2adapter_programmer
BIOS

- initialize the processor
- run first program found in serial flash
- provide shared routines through SWI
  - printf
  - load programs from serial flash
  - execute program
  - enable/disable IRQs
  - getc
Test programs

- graph_demo
- memtest
- lkmttest*
- spitest*
- ps2 if tests
- extmemtest
- external flash programming
Terminal

• simple command interpreter
  - ls
  - run
  - dbg (limited support)
  - help
  - exit
Bugs

- PS/2 timing bug
- IRQ
- Profiling copro
- some processor instr. (bic, \{ldc, stc\}, \{ldm, stm\}) not fully working (but workarounds in toolchain integrated)
- JTAG not functioning
- some bugs in gcc (some fixed some not yet)
Planned Current/Future work

- eCos [Claudio]
  - UART implementation in FPGA
- power management in FPGA
- reconfigurable computing
- Multi-Processor platform (next presentation by T. Kluter)
Questions?