# Extending the GC hardware

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Why? GC can be an embedded computer

- Home automation
- Cinema set
- Car Infotainment system
- ...

But: Essential hardware lacks:

- Data storage (harddisk and/or flash)
- Keyboard/mouse
- Generic I/O
- RAM is only 40MB (Main RAM+ARAM together)

# Required extra hardware for embedded systems

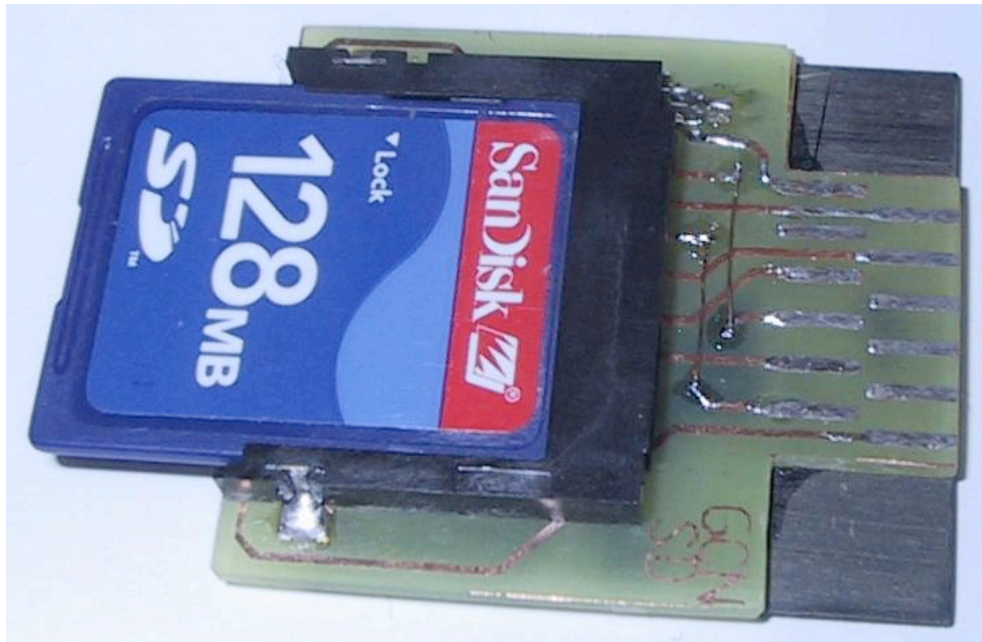
- Harddisk interface
- Flash storage interface (Compactflash, SD, MMC, ...)
- RAM extension
- USB interface (for all other devices)
- Keyboard/mouse interface
- Generic I/O interface

# Memory (EXI) interfaces (2)

- Standard SPI interface (Clk, /CS, DataIn, DataOut)
- 3.3V and 5V power available
- Connector is etched on PCB, so no special connector required

# Memory (EXI) interfaces (2)

- SPI: can easyly be interfaced to standard hardware: shift register IC's for digital I/O or SD and MMC cards for data storage
- Can be interfaced to USB 1.1 host controller with litte logic (USB 2.0 not possible: only PCI controllers available)



# Serial interfaces (for the controllers) (4)

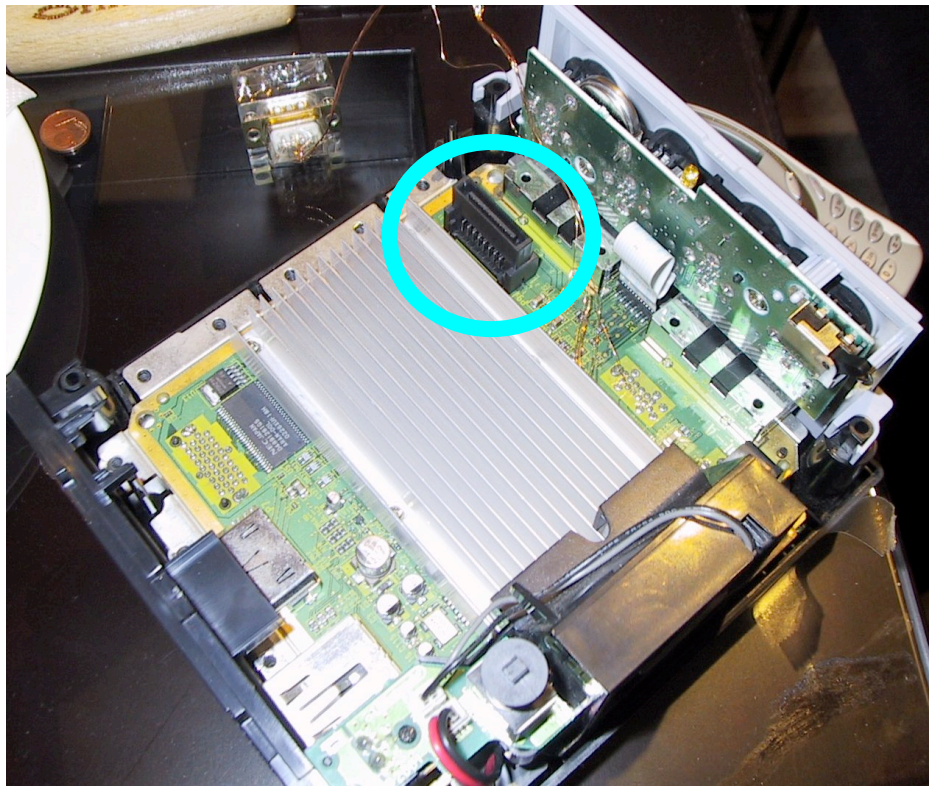
- 1 wire interface, open drain bus with custom protocol
- Speed is low enough to be bit-banged by standard microcontroller which can then be interfaced to PS/2 (mouse/kbd) or custom hardware (UART, digital I/O)

# High-speed interface (1)

- SDRAM interface 8 bit to extend the ARAM; can be interfaced to standard SDRAM chip(s), maximum RAM size unknown;

# DVD interface (1)

- 8 bit, bidirectional, DMA-able, interrupt
- Can be used to interface IDE HDD with CPLD
- DVD cannot be used anymore, so only for GC's with modchip
- Connector seems to be custom made or is hard to find



# Summary hardware extensions

- Harddisk interface → DVD interface
- Flash storage interface → SD, EXI interface
- RAM extension → High speed interface
- USB interface → EXI interface
- Keyboard/mouse interface → SI (controller) interface
- Generic I/O interface → SI (controller) interface

**For every required hardware extension a suitable interface is available!**