Antti-Brain

Issue 10

May 2009

CRUVI™

Revised on May 30, 2009

Editorial

I had the non-technical editorial story ready in my head, but maybe it better to be left for some other publication. As to the story from last issue, I did see the “well dressed man” another time, he’s first words: “how can I pay back, it was lot of money”. He used to be tailor in the national opera, but lost his job as he has also injury on one hand (what I did not notice the first time I did see him).

(the real editorial story saved for another time)

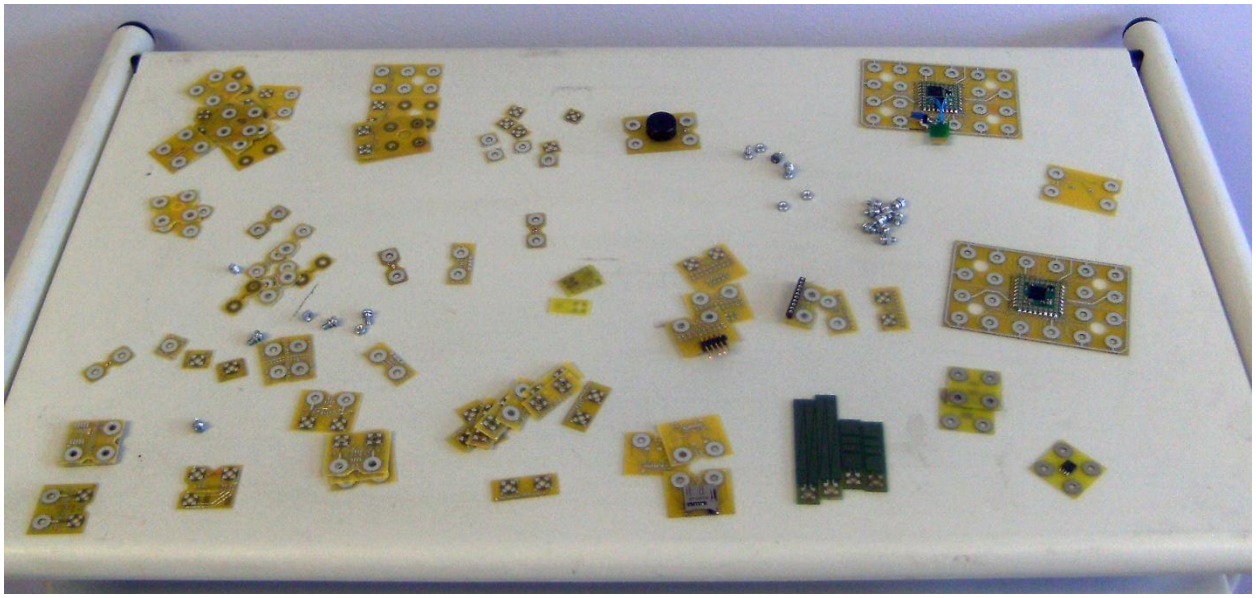
Antti Lukats
Antti.Lukats@googlemail.com

http://groups.google.com/group/antti-brain

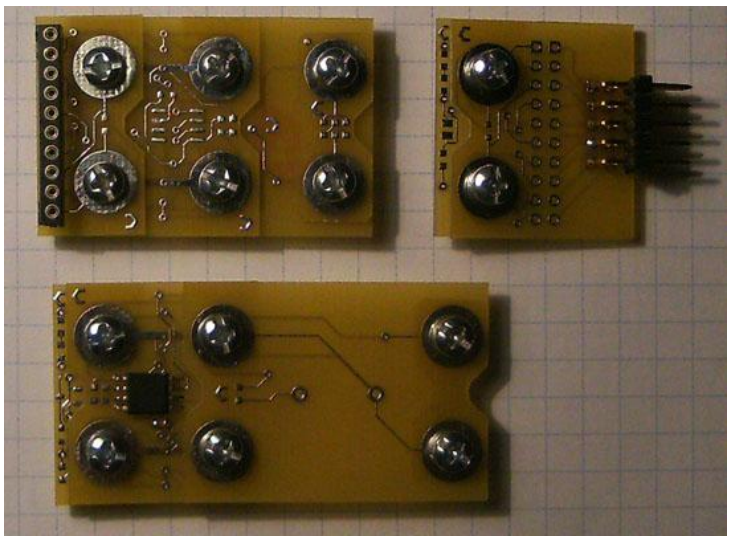
Cover Story

On front cover, view into my “office” where the TV shooting was.

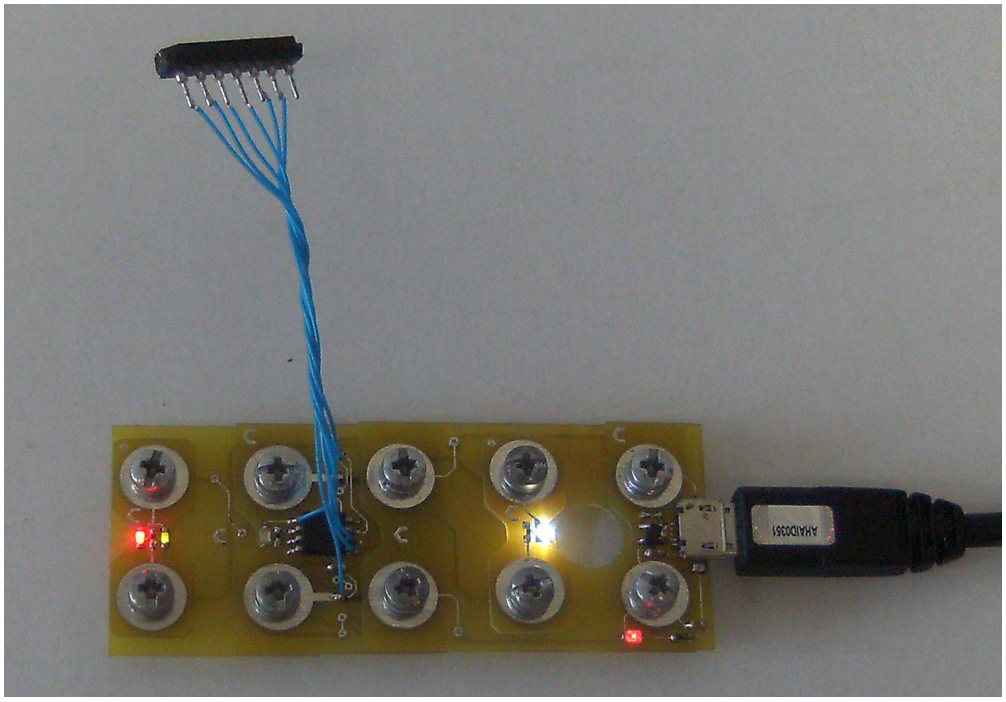
TV Team coming to make a shooting is good motivation to move on ☺ I had contacted a TV sender which was looking for DIY projects, they responded, yes we will come and shoot, so I had to rush my CRUVI concept. Here are the PCB’s prepared:



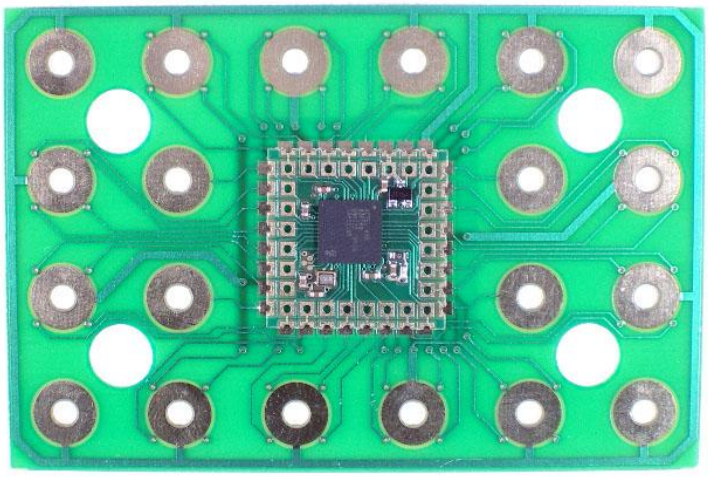
Lots of CRUVI™ boards and modules. Most from the 3rd proto PCB batch. The green ones are made earlier, for capacitive touch sensor testing.



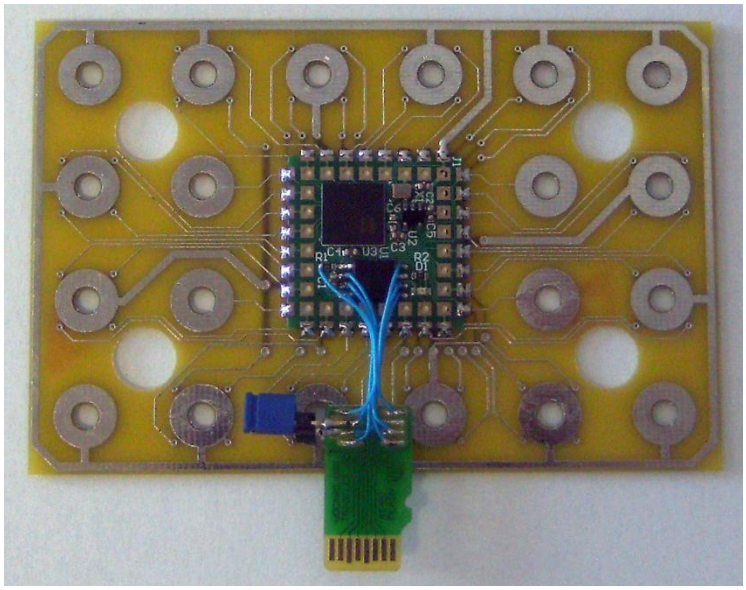
Some example of interconnect of small modules with either 2 or 4 holes.



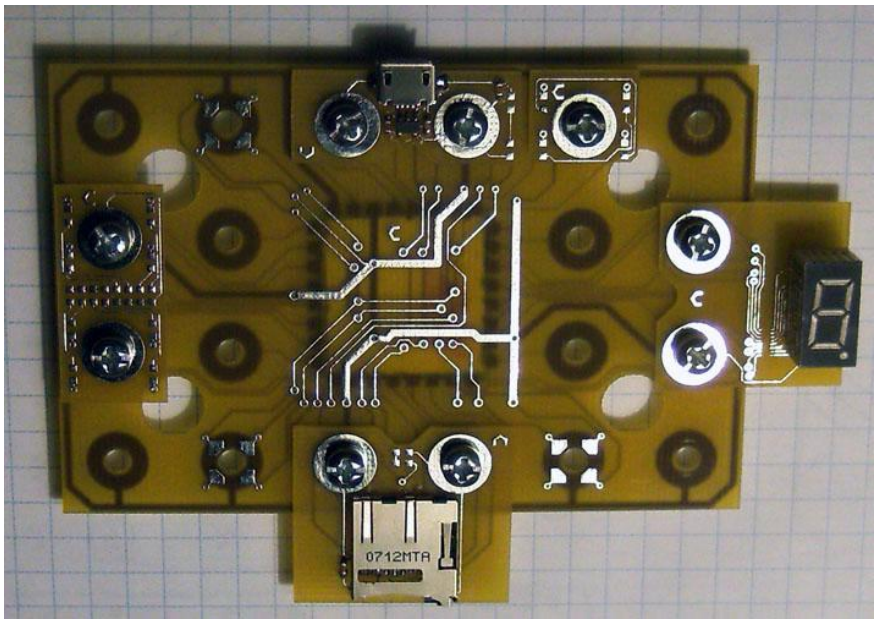
Test setup for small Microcontroller based CRUVI™ system, 6 boards are connected. The programming cable is just for development, the LED on the MCU board is (not lit!) is connected in bi-dir way so it will be used also as wireless update port to update the firmware.



AP32PA3 Processor module on CRUVI base board. First production PCB for the CRUVI family of products.



ST32ICE Board on CRUVI Baseboard. Development wires seen also. The module has ice65L04 ultra-low power FPGA and 2MByte Atmel Dataflash, that can store multiply FPGA hardware images. The bootstrap can update the flash, and then uses WARMBOOT feature to re-start FPGA configuration from user defined image.



Some different CRUVI modules attached to an baseboard.

The shooting

Well the time was agreed, so I had to make some sort of demo real quick. I had the PCB's just a few days before, so I had to assemble them, test and make some demo applications.

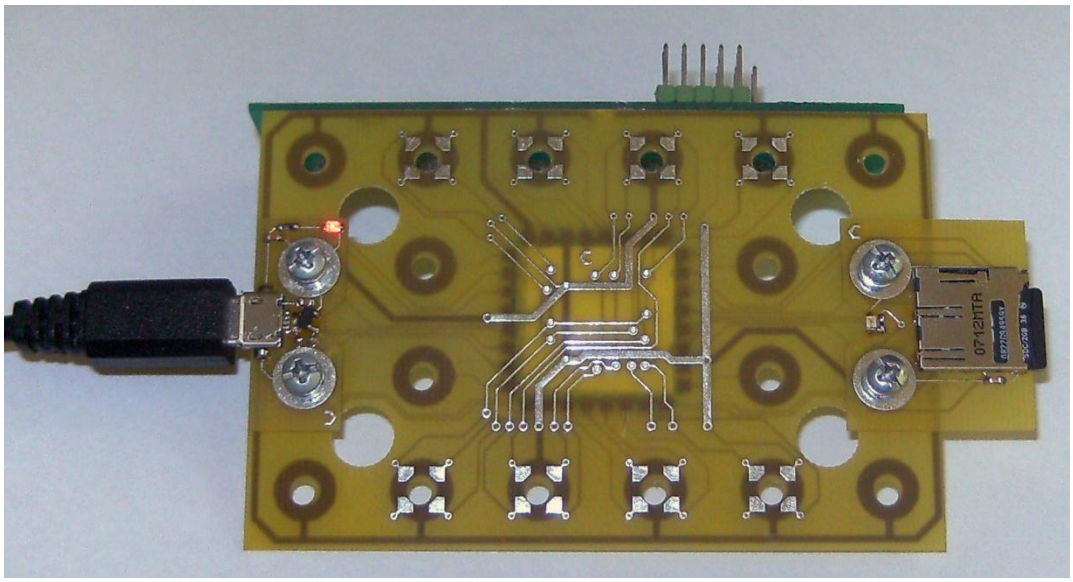
I had several ideas what would be nice to do but, well there wasn't really enough time, so I did some quick and dirty thing. To web www.fpga4fun.com download musicbox verilog code. Testing on Xilinx Spartan-3A Starterkit, works. Converting to Libero project, trying out on Actel Stamp, works. Added also some LED counter, so there was very annoying sound, and 8 LED's blinking. This was all the demo. But it was all prepared and tested within a few hours only.

The shooting itself did take somewhat over an hour, with at least 50 minutes of tape. For a clip of few minutes long. Well I am still curious as I haven't seen it myself yet. Those who have say was ok, and TV team self said also that it did come out nice (well they would say it otherwise anyway, or?).

The clip should be placed officially online so I can share the URL then.

My Own Processor II

It is still not yet fully finalized, there is still some room left in the FPGA, but it is getting more interesting already as it can now boot small applications directly from micro-SD Card.



AP32PA3 FPGA Processor Module (at the bottom), to the right is micro-SD Card adapter board, to the left micro-USB power connector board. The LED on the micro-SD Adapter board actually blinks under control of software loaded from the card, unfortunately the blinking cannot be visualized in static documents. At the far edge the JTAG connector is visible, it would not be on production version, just for development purposes.

The SD Card bootstrap code is optimized to fit into 64 instruction boot ROM. This was not so easy task at all, and unfortunately the first micro-SD Card I used for testing was the most easy to talk with. Other Cards did not work at all with the first bootstrap code, so it had to be modified in two places to support other Cards as well. Actually the second attempt also wasn't fully working so another troubleshooting round was needed. Luckily the code did still fit the 64 word instruction space.

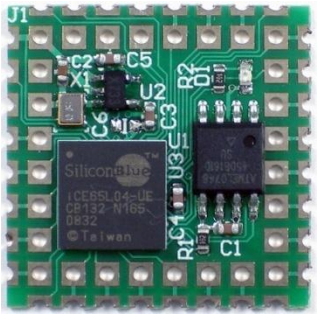
AP32PA3

- 8 Bit RISC Processor
  - Atmel AVR® ISA compatible
  - 1K Byte Instruction RAM
  - 128 Byte Flash BIOS (JTAG writeable)
  - 32 Registers
  - 4 Level hardware stack
  - Up to 25MIPS speed
- Clock manager
  - 50MHz Crystal Oscillator
  - NCO for system clock
  - Dynamic PLL
- Supported by free AVR Basic Compiler
- 30 User I/O's
- One user LED
- Single 3.3V Supply
- Easy solder: SMD or TH mountable
- Size 22.5x22.5x2 mm

This is like FIXED function Microcontroller with one single hardware configuration.

AP32ICE

- 8 Bit RISC Processor
  - Atmel AVR® ISA compatible
  - 8K Byte Instruction RAM
  - 32 Registers
  - 4 Level hardware stack
  - Up to 12.5MIPS speed
- Clock manager
  - 50MHz Crystal Oscillator
  - NCO for system clock
- 2M Byte Flash ROM
- Supported by free AVR Basic Compiler
- 30 User I/O's
- One user LED
- Single 3.3V Supply
- Easy solder: SMD or TH mountable
- Size 22.5x22.5x2 mm



This is RECONFIGURABLE Microcontroller, where the soft-processor can reflash the on board serial Flash and/or activate alternate hardware configuration (using WARMBOOT feature). So the board is instantly useable "as microcontroller" but it is also useable as generic FPGA based drop component that can be configured with users own FPGA bitstream.

Organize my Life™

The SVN on USB-stick approach is working fine, I am adding more and more projects to my portable repository. But it doesn't help for physical gadgets, for them I finally did also do something:

My project boxes, somewhat organized. Yes this is what made forced to the fact that TV team is coming to make the clip about CRUVI™.

IP Core Report

I have done some attempts to compile "IP Core Reports" before, hum I think I have even tried to sell them on eBay (without making big money). Well the issue is still there, namely there are way too many IP cores on the wild, and finding and evaluating them takes real time. So I have now one big document where I collect all my findings. Will be made publishing ready soon I hope.

Shorts

Stories.

Abound Logic

Another FPGA startup is shipping FPGA devices, at least as of their own announcement. Product datasheet is available under request, with product brief freely downloadable.

http://www.aboundlogic.com

Raptor RS750 FPGA samples are supposedly available now.

The Company name used to be M2000 (until 2008.10)

LS Software USB without crystal

Atmel AVR software only USB firmware has been around long time, I have tried it out also on some boards, even made some special PCBs', but not there is also a design that runs from internal oscillator, making it real small and low cost solution. An example design in SO-8 AVR is available. Well I still don't encourage the soft-USB, the price gain is not that big.

http://www.obdev.at/products/vusb/index.html

Well I did not see that design any more, but it was there (or somewhere..)

References

- http://www.trioflex.com
- http://www.cruvi.com

Instead of adding the URL links at the end of each issue, I will be adding them to the Trioflex online link collection, so they can be updated more frequently.