Saal: Simulacron-3	21:15	01:00	Day: 2	Track: Hardware & Making	nA

Title: **Pushing the limits of DIY electronics**

Subtitle: Bridging the gap between DIY and professional electronics

Speaker: **hunz**

Short: *DIY electronics often means Arduinos and breadboards. But you can do so much more. Things like BGA soldering, DDRx-RAM, HDMI and PCI Express. This talk will show you how.*

Long: A while ago I built a custom FPGA-board. It was fine but, I decided I also want some RAM. So why not DDR2? That also meant BGA chips. Things escalated quickly and I ended up with a 384-balls FPGA, BGA-RAM and whatnot. Because I didn't have access to expensive software I hacked together quite a bunch of Lua scripts for analyzing and modifying Eagle XML boardfiles. I had the PCB made using a reasonably priced 6-layer pool process. For reflow soldering I got a cheap oven from China. Unfortunately it burned my dummy test-PCBs, so I had to reverse-engineer the firmware and write my own. After that I was able to solder the BGAs correctly and surprisingly the RAM did work without any errors at 800MHz. It was time for a new challenge, so I tried designing a board with PCI Express and Serial ATA. This one worked as well. The implications are amazing: with some time, software skills and electronics know-how you can use state-of-the art technology in DIY-electronics without spending plenty of money on professional software and equipment. In this talk I'll show you how it's done, things you need to consider (like wave impedance, terminations, length matching) and lessons I learnt along the way.