



ROOMBANOMICS

An Example of Hardware Hacking

A collection of tips and tricks by Oliver Baltzer



Hardware Hacking

Disclaimer & Definitions

Hardware Hacking:

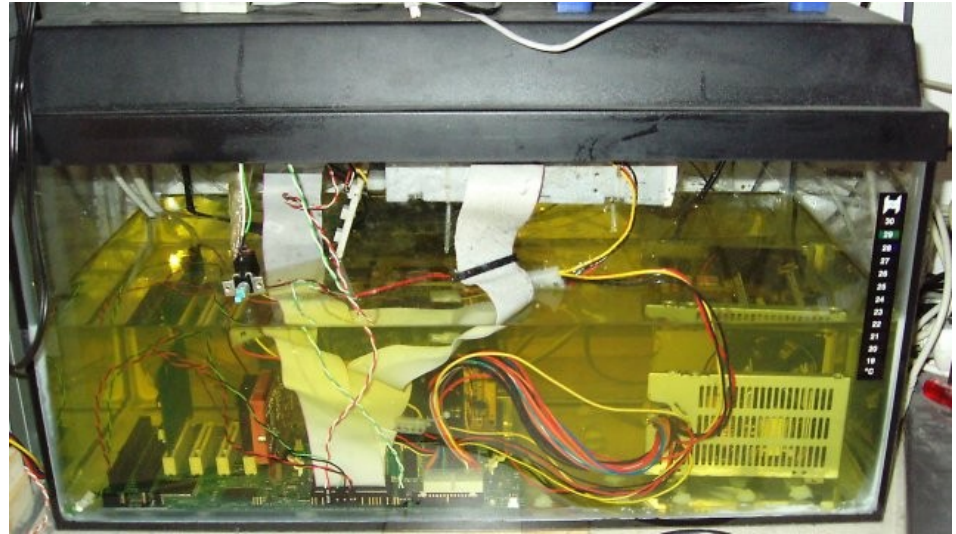
is the process of building, rebuilding, modifying or amateur creation of electronic hardware either to make it better, faster, give added features or to make it do something it was never intended to do.

-- Wikipedia

Hardware Hacking



Oil Cooled PC →



↑ MP3-enabled Wireless Router

Wireless-enabled Xbox →





How to start?

- **You need an idea!**

- old devices you have at home
- look around what other people do
 - <http://www.hackaday.com>
 - <http://www.makezine.com>
 - <http://slashdot.org>
- build your project on exiting ones
 - OpenWRT, DS Linux, Xbox Linux, PSP Hacking, GPS, Ham, RC Cars/ Plane/ Boats, Aibo, Robosapien
- combine different ideas – **be creative!**



How to start?

- **Roombot:**
 - hear people talk about a Canadian Tire Special
 - iRobot Releases SCI Specification
 - experience with OpenWRT
 - remainder is creative glue



What are the challenges?

- **Combine one device with another:**
 - **Robosapien + Computer**





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What are the challenges?

- **Combine one device with another:**
 - when mobile problems with weight and power consumption
 - use PDAs or embedded devices (e.g. wireless routers)
 - smart furniture may have problem with heat
 - use low-voltage devices (e.g. VIA EPIA, Intel Pentium Mobile)
 - use consumer devices
 - avoid processor development boards (too expensive)
 - alternatively get pre-built embedded controller boards (uCsim, gumstix)





What are the challenges?

- **Use a platform that:**
 - is easy to develop on
 - already has a lot of software available
 - has a large community for support
 - is well documented



Where to get support information?

- **Hardware Support:**

- many hacking projects start on a specific device but are often compatible with clones and similar devices (e.g. OpenWRT)

- **Missing Parts:**

- use Google to find what you need
 - Example: USB to RS232 to TTL → USB to TTL
- everything else you have to build yourself, but you should improvise





How to get ...?

- **Where to buy?**

- use Google to find what you need
- Online Stores
- RadioShack
- DigiKey

- **How much does it cost?**

- Depends on what you already have and how long you want to wait.
- Ebay: cheap, takes a little longer, you will void the warranty anyway
- Buy new: fast, you know what you buy, you might be able to give it back

- **Roombot: ca. \$600**



What about Software?

- **use Open Source!!!!**
- **use mature projects with useful tools**
 - OpenWRT comes with a complete build-chain for the target platform and has package support
- **stick with C on embedded systems**
 - Java will most likely be not available
 - interpreters (e.g. Python) don't like cross-compiling
- **Keep it simple!!!**
 - Roombot: 280 LOC + Netcat + Shell Scripts



What's left?

- **play, experiment and have FUN!**
- **Things are often not the way they are supposed to be!**
 - iRobot's SCI Spec. lies about power supply
- **trial & error**
 - You want to make mistakes. In most cases you won't break anything, but you may **set your pants on fire.**





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This space for sale!

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<http://nobits.org/>