

Bachelor PO – RIOT in the Internet of Things



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- IoT Motivation
- What is RIOT?
- Projects and Events

What is IoT?

„Der Name ist wörtlich zu nehmen: Jedes Ding soll einen Netzanschluss und eine IP-Adresse bekommen. Ob Auto, Kaffeemaschine, Zahnbürste oder Telefon, alle sollen miteinander vernetzt und übers Internet erreichbar sein.“

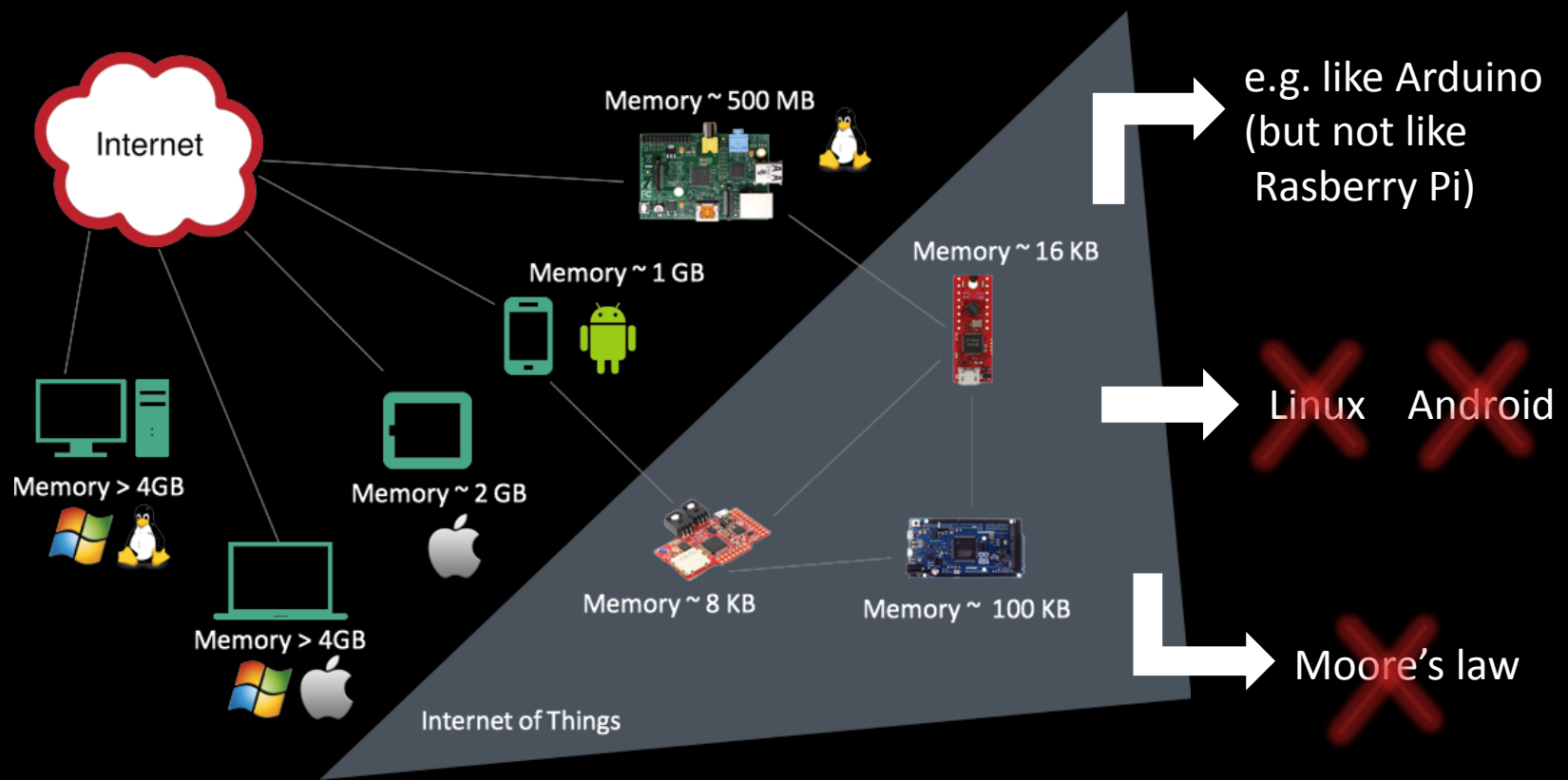
<http://www.heise.de/thema/Internet-der-Dinge>, Sept. 2015

„In Zukunft werden immer mehr Maschinen, Waren und Alltagsgegenstände mit Sensoren und Funkchips ausgestattet, damit sie selbstständig miteinander kommunizieren können. Das "Internet der Dinge" kann aber nur Realität werden, wenn es einheitliche Vernetzungsstandards gibt.“

<http://www.cebit.de/de/news-trends/trends/internet-der-dinge/>, Sept. 2015

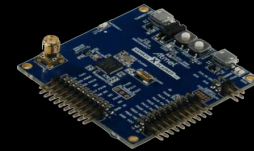
Software Platforms for IoT?

- Great expectations for IoT, but...
...no standard platform yet, to program most IoT devices!



Why a software platform for IoT?

- ~~Linux~~, ~~Android~~... bare-metal?



Memory ~ 32kB



Memory ~ 8kB

- But as IoT software evolves...
 - more complex pieces, e.g. an IP network stack
 - evolution of application logic
- ... **non-portable IoT software slows innovation**
 - 90% of IoT soft. should be hardware-independent
 - this is achievable with a good software platform
(but not if you develop bare-metal)

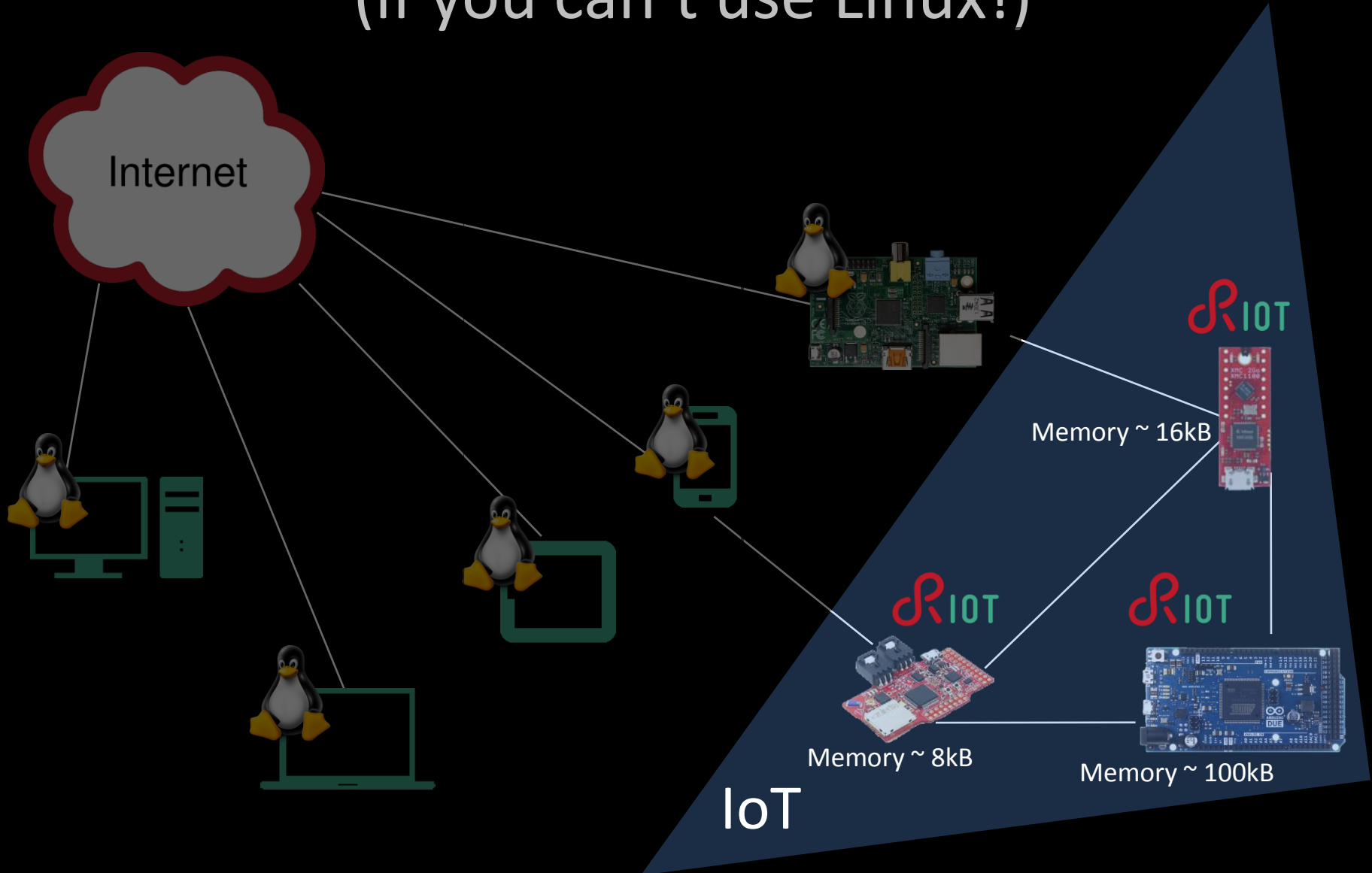
Goals for an IoT software platform

- ✓ **faster innovation** by spreading IoT software dev. costs
- ✓ long-term IoT **software robustness & security**
- ✓ **trust, transparency & protection of IoT users' privacy**



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RIOT : an OS that fits IoT devices (if you can't use Linux!)



RIOT Roots & Evolution

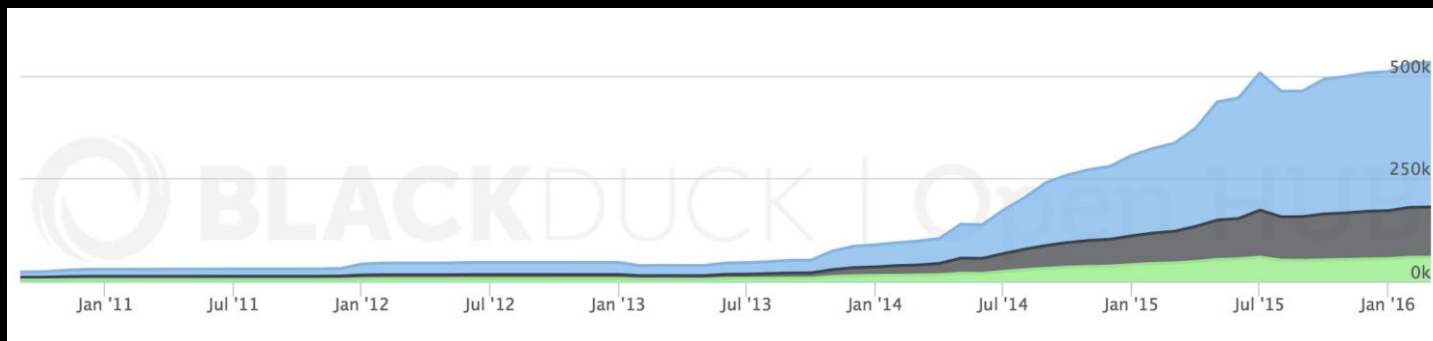
- **2008 – 2012**
Ancestors of RIOT kernel developed in research projects (FireKernel, uKleos).
- **2013 – 2016**
Branding of RIOT started, source code moved to Github, major development of the network stack & the OS as such.

Founding institutions



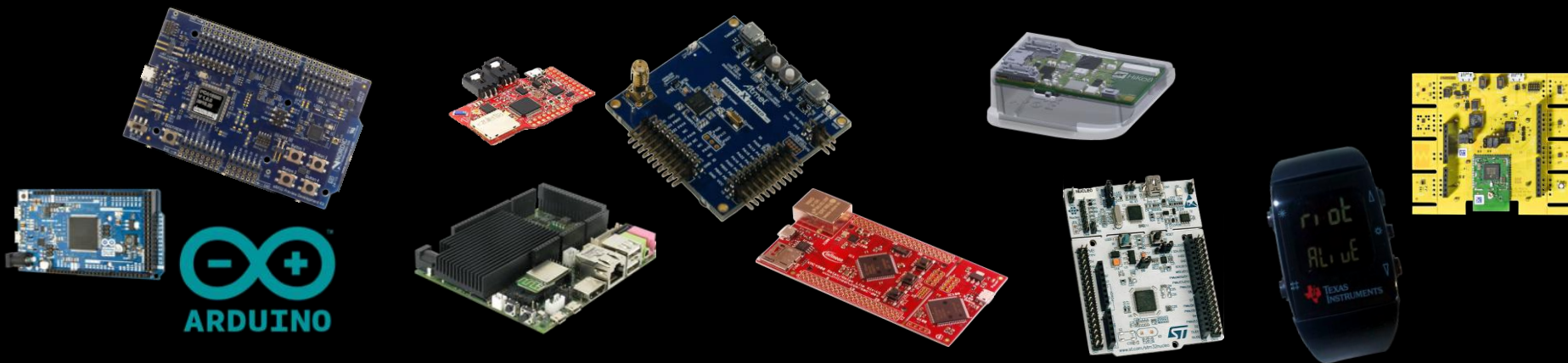
RIOT Today

- 115+ contributors from all around the world
- Contributions from industry academia, makers/tinkerers



RIOT Commits/Month. Source: BlackDuck OpenHUB

- 60+ boards: various CPU architectures, radios, sensors...



Some supporters/users

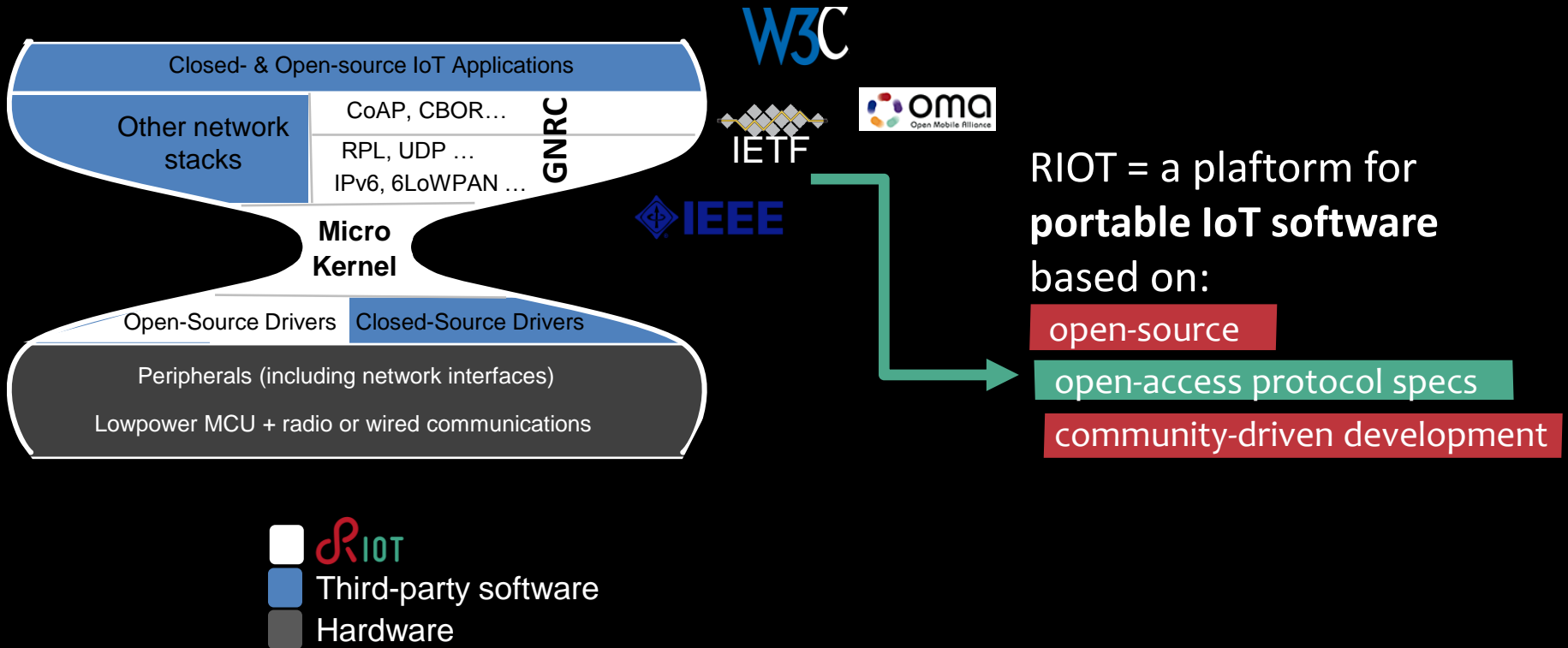


... and dozens of independent developers around the world!

RIOT : an OS that fits IoT devices

- RIOT is the combination of:
 - ❑ memory & energy efficient design to fit IoT devices
 - ❑ functionalities of a full-fledged operating system
 - ✓ Real-time capabilities, multi-threading, ...
 - ✓ Advanced, consistent APIs across 32-bit, 16-bit, 8-bit hardware
 - ✓ Full-featured, extensible network stacks
 - ✓ Well-known dev. tools, standard C and C++ programming
 - ✓ Easy integration of third-party software packages

RIOT in one slide





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Watr.li



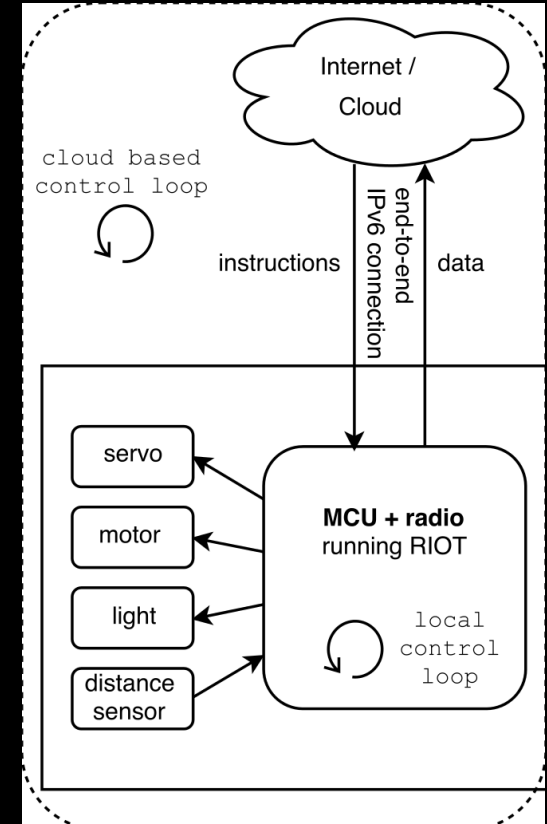
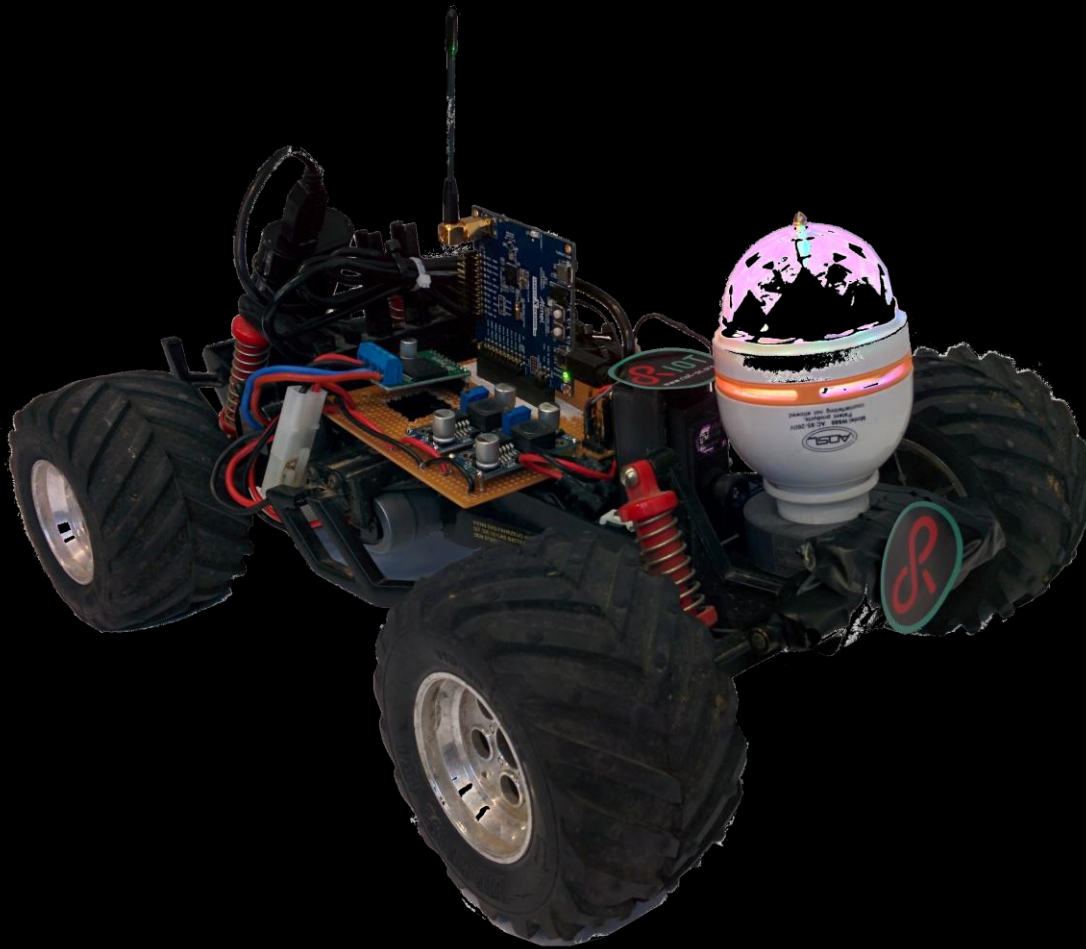
<http://watr.li>
Twitter: @watr_li



Eclipse IoT Challenge
2015

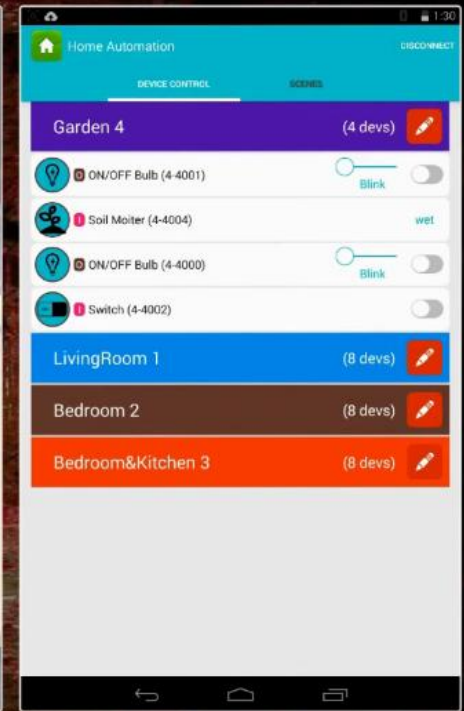
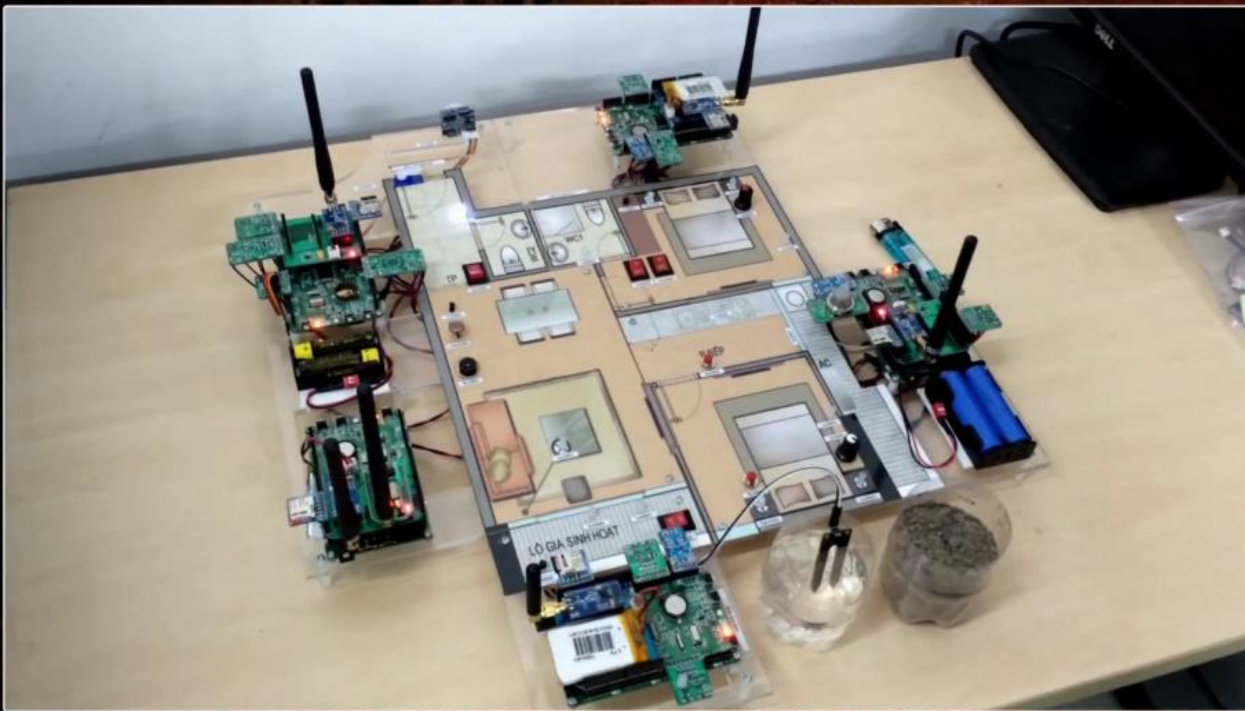
The screenshot shows the Watr.li website with a dark, cracked soil background. The navigation bar includes 'Blog' and 'About' links, and the 'inet' and 'RIOT' logos are in the top right. The main content area features two blog posts. The first post, 'It's a wrap!', is dated March 23, 2015, and discusses the Eclipse Open IoT Challenge 2015. The second post, 'Sensing the humidity of a plant's soil', is also dated March 23, 2015, and describes setting up a SAM R21 sensor. Both posts include a 'read more' link and the author's name, Peter Kottmann.

Petabot



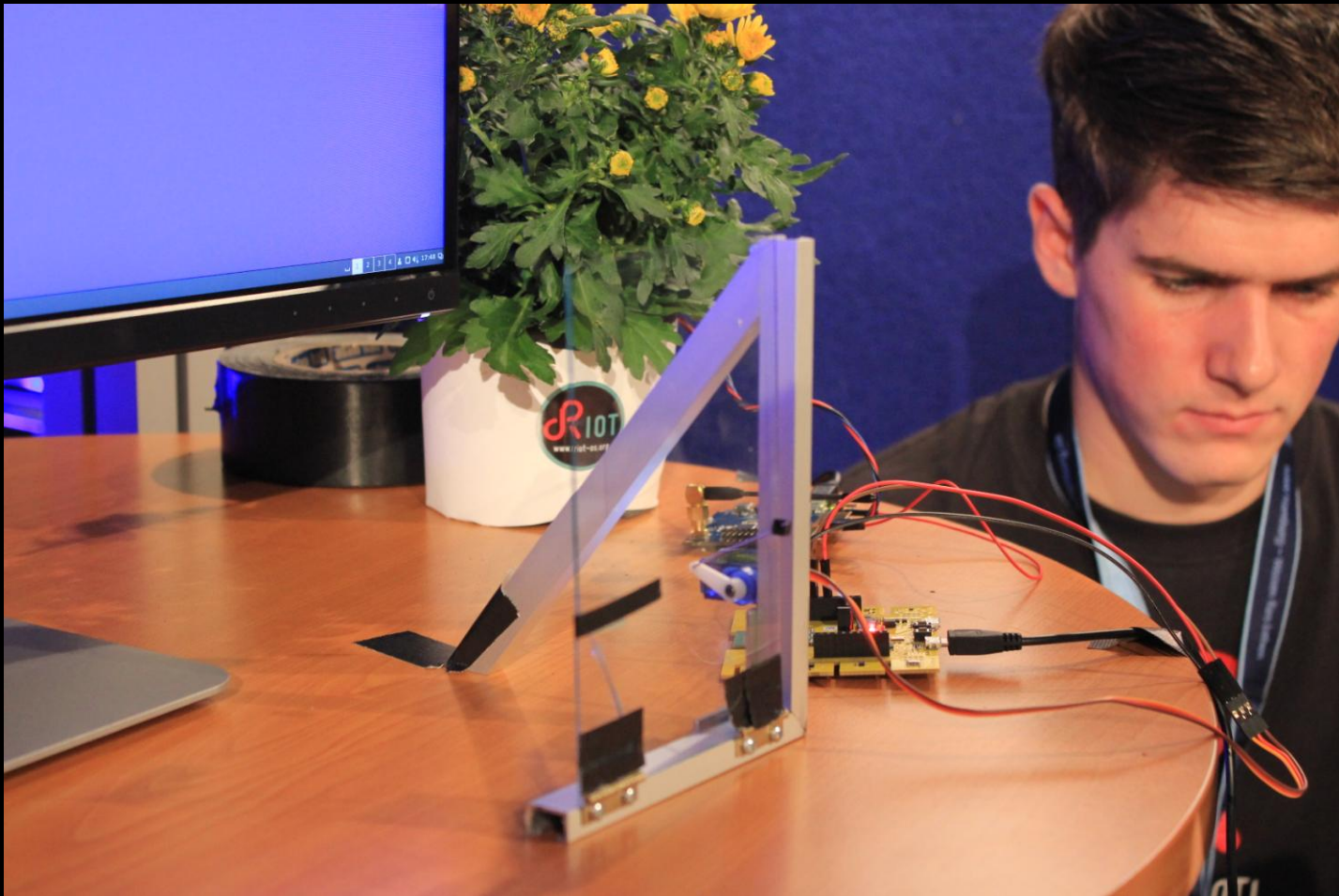
International Conference on Embedded Wireless Systems
and Networks 2016

Home Automation System



HoChiMinh City Universtiy of Technology (HCMUT), Vietnam

SmartWindow



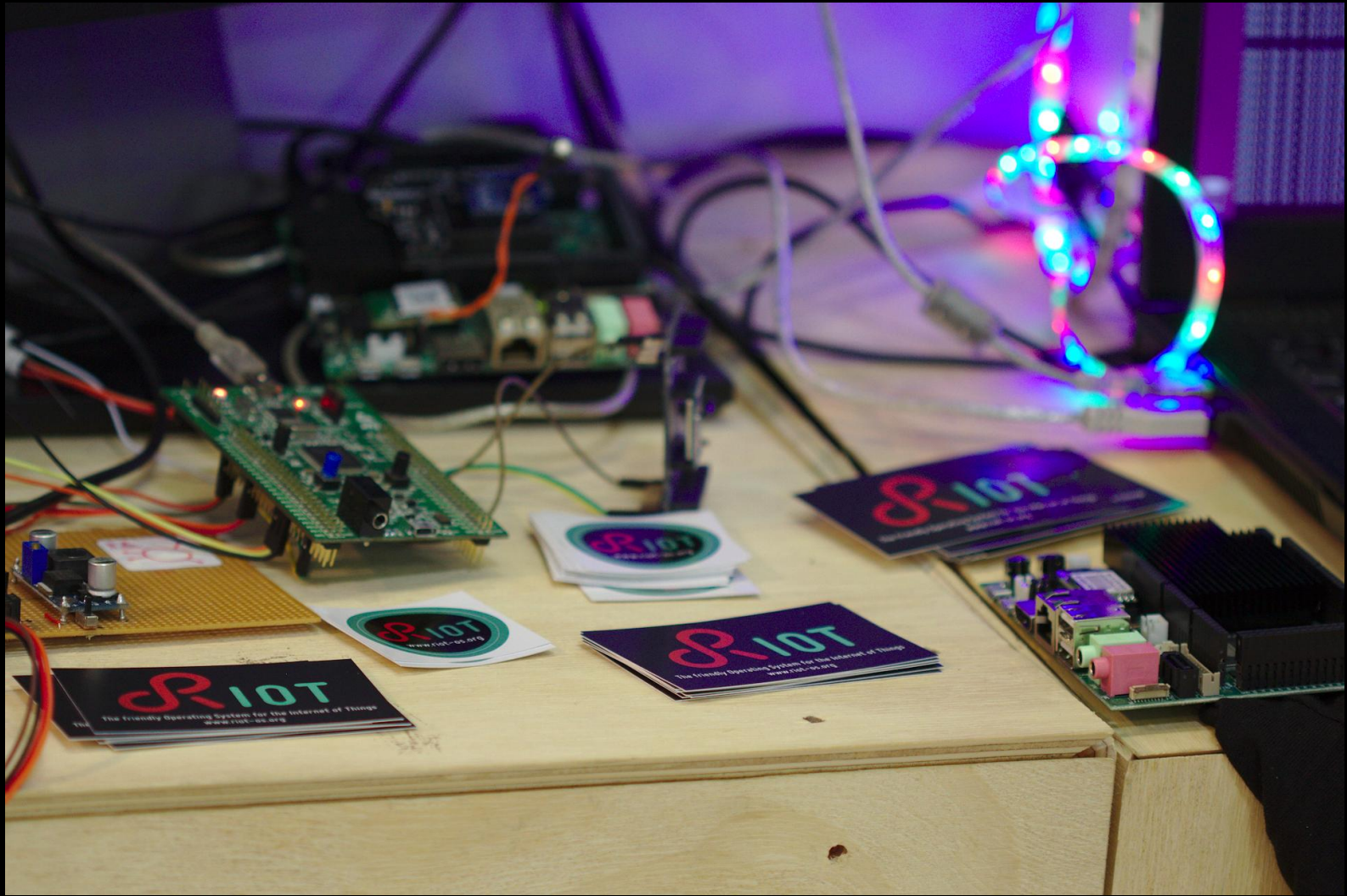
SmartWindow Bachelor PO WiSe 15/16

Haptic Game Feedback



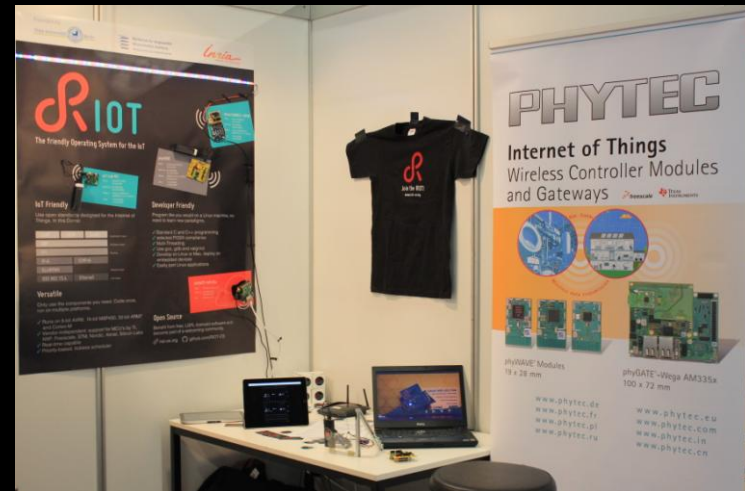
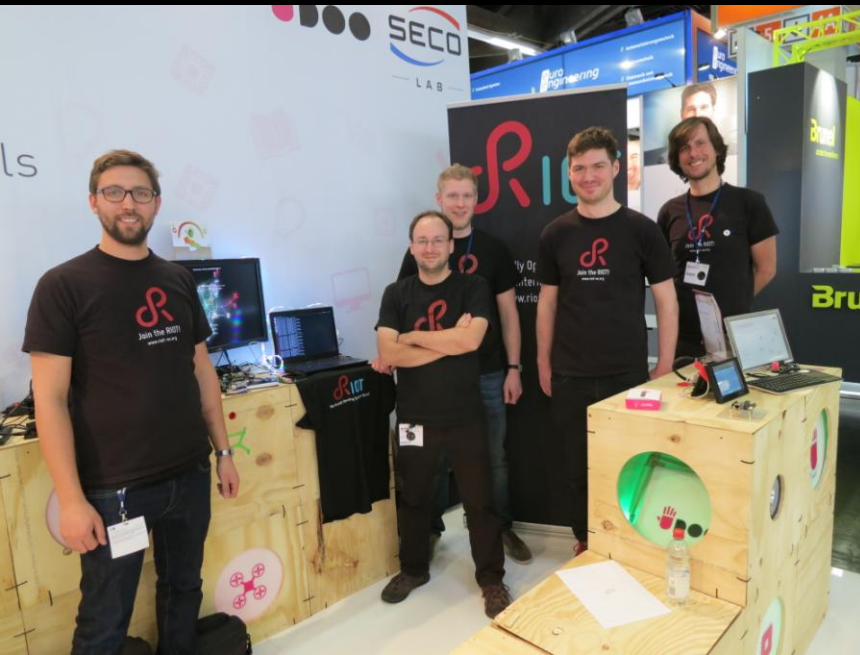
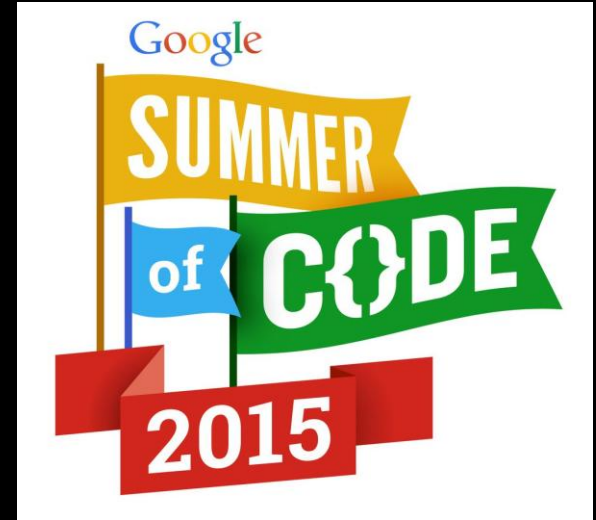
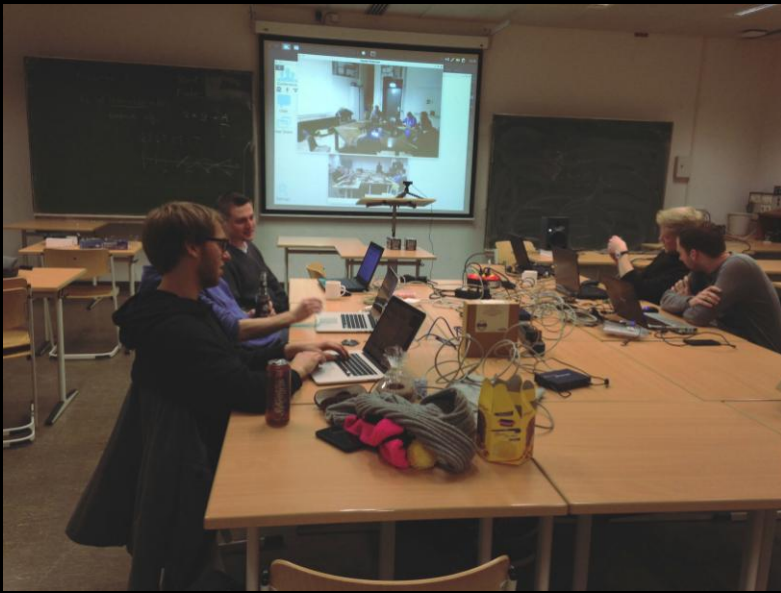
AudioGames Bachelor PO SoSe 16

Maker



R I O T Summit

July 15 - 16, 2016



Thanks for your interest!

News: https://twitter.com/RIOT_OS

For developer questions: devel@riot-os.org

Support & discussions on IRC: [#riot-os](https://irc.freenode.org)

