GI-Dagstuhl Seminar

IoT Hackathon: From Research to Practice

Alexander Afanasyev, Oliver Hahm, Thomas Schmidt, Matthias Wählisch



Dagstuhl Specifics

Archiving

- Signing the guest book (coffee place)
- Group picture in front of the chapel

Trust

- Yes, there are no keys for the doors
- Billing, write on you consumption list, pay after leaving

Non-Google hangout

- Wine cellar and garden
- Billiard and music room



Digital Logistics

WLAN: "eduroam" or "otto" (register at wlan.dagstuhl.de)

 Documentation and coding https://github.com/dagstuhl-hackathon17



 Please, upload your slides if you give a presentation https://github.com/dagstuhl-hackathon17/orga/tree/master/slides

Agenda Monday

09:00 - 09:10 Welcome

09:10 - 10:00 One Minute Madness Introduction

10:00 - 12:15 Compilation of Coding Groups

12:15 - 13:30 Lunch

13:30 - 14:30 Lightning Talk given by Pekka

14:30 - 18:00 Coding (take some cake at 15:30)

18:00 - 19:15 Dinner

19:15 - ... Coding & Cheese (Wine Cellar)



Agenda Tuesday++

09:00 - 10:00 Brief status update of each coding group

10:00 - 12:15 Coding

12:15 - 13:30 Lunch

13:30 - 14:30 Lightning Talk (contact Thomas)

14:30 - 18:00 Coding (take some cake at 15:30)

18:00 - 19:15 Dinner

19:15 - ... Coding & Cheese



Special Social Events (Wed or Thu)

Hiking.

Landgasthof Paulus.



Even More Special Social Event

The Dagstuhl Hackathon Orchester.

Who is playing?

Even More Special Social Event

The Dagstuhl Hackathon Orchester.

Who is playing?

What about you?!

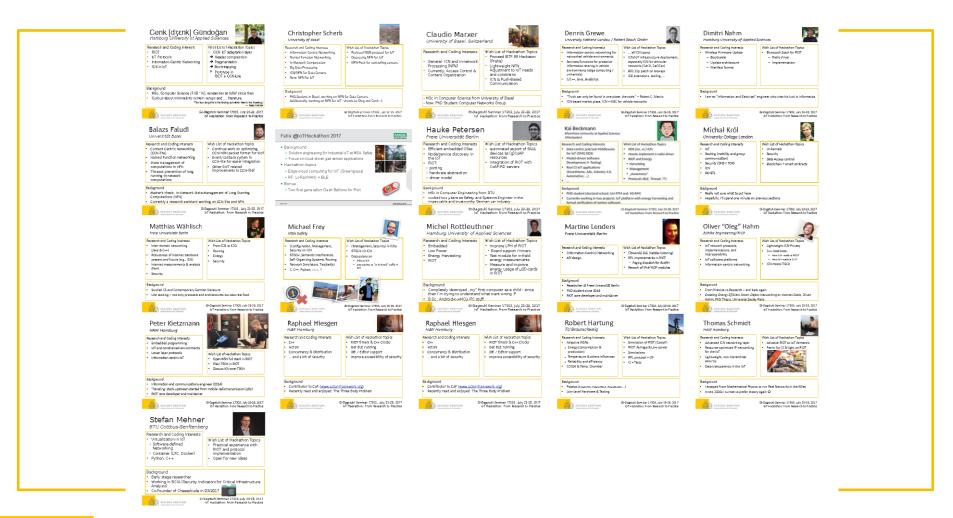
(Contact Peter.)



After IoT/ICN Hackathon is before two months later: IoT and ICN cnt. in Berlin ...



One Minute Madness Intro





Pekka Nikander

Aalto University



Research and Coding Interests

- DLT & WoT
 - Distributed ledgers
 - Web of Things
- Industrial (wired) IoT
 - PoE and PoDL
 - Esp. 10SPE and 802.3bu
 - Security & cost optimisation

Wish List of Hackathon Topics

- RiOT registration to Resource Directory (RD) with RFC6690
- Various Node RED modules, such as RD, weather, electricity price
- Discussions about open security infra, e.g. DLT or other PoW
- ICN, WoT with unikernels, ...

- Life long old school Unix wizard (though I know only Rob, not Ken nor Dennis)
- Over two decades of security protocols design and analysis



Hauke Petersen

Freie Universität Berlin



Research and Coding Interests

- Efficient embedded OSes
- Node/service discovery in the IoT
- RIOT:
 - porting
 - hardware abstraction
 - driver model

Wish List of Hackathon Topics

- automated export of SAUL devices as (g)CoAP resources
- integration of RIOT with CoAP-RD servers

- MSc in Computer Engineering from DTU
- worked two years as Safety and Systems Engineer in the impeccable and trustworthy German car industry



Cenk [dzenk] Gündoğan

Hamburg University of Applied Sciences



Research and Coding Interests

- RIOT
- IoT Protocols
- Information-Centric Networking
- ICN in IoT

Wish List of Hackathon Topics

- CCN IoT adaptation layer
- → Header compression
- → Fragmentation
- → Bootstrapping
- Prototype in RIOT + CCN-Lite

Background

- MSc. Computer Science (FUB '16), researcher at HAW since then
- Curious about minimalistic system setups and ... literature.

"The true delight is in the finding out rather than in the knowing."

— Isaac Asimov



Christopher Scherb

University of Basel



Research and Coding Interests

- Information Centric Networking
- Named Function Networking
- In-Network Computation
- Big Data Processing
- ICN/NFN for Data Centers
- New: NFN for IoT

Wish List of Hackathon Topics

- Reduced NDN protocol for IoT
- Discussing NFN for IoT
- NFN-Push for controlling sensors

Background

PhD Student in Basel, working on NFN for Data Centers.
 Additionally, working on NFN for IoT - thanks to Oleg and Cenk;-)



Dennis Grewe

University Koblenz-Landau / Robert Bosch GmbH



Research and Coding Interests

- Information-centric networking for networked vehicle environments
- Services/functions for proactive information sharing in vehicle environments (edge computing / unikernels)
- C/C++, Java, JavaScript

Wish List of Hackathon Topics

- ... all ICN topics
- ICN/IoT infrastructure deployment, especially ICN for vehicular networks (Car2I, Car2Car)
- 802.11p patch on Jetways
- IDE extensions, tooling, ...

- "Truth can only be found in one place: the code." Robert C. Martin
- ICN-based market place, ICN + MEC for vehicle networks



Claudio Marxer

University of Basel, Switzerland



Research and Coding Interests:

- General: ICN and in-network Processing (NFN)
- Currently: Access Control & Content Organization

Wish List of Hackathon Topics:

- Proceed IETF 99 Hackaton (Praha)
- Lightweight NFN: Adjustment to IoT needs and constrains
- ICN & Push-Based Communication

- MSc in Computer Science from University of Basel
- Now: PhD Student Computer Networks Group



Balazs Faludi

Universität Basel



Research and Coding Interests

- Content Centric Networking (CCNlite)
- Named Function Networking
- State management of computations in NFN
- Timeout prevention of long running in-network computations

Wish List of Hackathon Topics

- Continue work on optimizing CCN/NDN packet format for RIoT
- Event/callback system in CCN-lite for easier integration
- Other RIoT related improvements to CCN-lite?

Background

- Master's thesis: In-Network State Management of Long Running Computations (NFN)
- Currently a research assistant working on CCN-lite and NFN



GI-Dagstuhl Seminar 17303, July 23-28, 2017 IoT Hackathon: From Research to Practice

Kai Beckmann

RheinMain University of Applied Sciences (Wiesbaden)



Research and Coding Interests

- Data-centric pub/sub Middleware for IoT (OMG DDS)
- Model-driven Software Development (+ Testing)
- Real (!) IoT applications (SmartHome, AAL, Industry 4.0, Automotive, ...)
- ...

Wish List of Hackathon Topics

- DDS {on, vs.} ICN
- Howto implement a radio driver
- RIOT and Energy
 - Harvesting
 - Management
 - "Awareness"
- Protocols (BLE, Thread, ??)

- PHD student (doctoral school: Uni FFM and HS-RM)
- Currently working in two projects: IoT platform with energy harvesting and formal verification of system software



Michel Rottleuthner

Hamburg University of Applied Sciences



Research and Coding Interests

- Embedded
- Low Power
- Energy Harvesting
- RIOT

Wish List of Hackathon Topics

- Improve LPM of RIOT
 - Board support / timers
- Test module for in-field energy measurements
- Measure and improve energy usage of μSD-cards in RIOT

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- Completely destroyed "my" first computer as a child since then I'm trying to understand what went wrong:P
- B.Sc.: Android<->MCU IPC stuff



Robert Hartung

TU Braunschweig

Research and Coding Interests

- Adaptive WSNs
 - Energy (consumption & production)
 - Temperature & others influences
 - Reliability and efficiency
- COOJA & Temp. Chamber

Wish List of Hackathon Topics

- Simulation of RIOT (Cooja?)
- RIOT: Atmega & Low-power
- Simulations
- RPL protocol + OF
- CI + Tests

- Potatos (PotatoNet, PotatoMesh, PotatoScope, ...)
- Low-Level Hardware & Testing



Felix @loTHackathon 2017



- Background
 - Solution engineering for Industrial IoT at MSA Safety
 - Focus on cloud-driven gas sensor applications
- Hackathon topics
 - Edge-cloud computing for IoT (Greengrass)
 - RF: LoRa(WAN) + BLE
- Bonus
 - Two first generation Dash Buttons for Riot





MSAsafety.com

Dimitri Nahm

Hamburg University of Applied Sciences



Research and Coding Interests

- Wireless Firmware Update
 - Bootloader
 - Update architecture
 - Manifest format

Wish List of Hackathon Topics

- Bluetooth Stack for RIOT
 - Radio driver
 - Implementation

Background

I am an "Information and Electrical" engineer who tries his luck in informatics



Martine Lenders

Freie Universität Berlin



Research and Coding Interests

- (Information Centric) Networking
- API design

Wish List of Hackathon Topics

- (Towards) BLE (netdev tutoring)
- RPL improvements in RIOT
 - Paging dispatch for 6LoRH
- Rework of IPv6/NDP modules

- Researcher at Freie Universität Berlin
- PhD student since 2016
- RIOT core developer and maintainer



Michał Król

University College London

Research and Coding Interests

- IoT
- Routing (mobility and group communication)
- Security (DNS + TOR)
- ICN
- FANETs

Wish List of Hackathon Topics

- Unikernels
- Security
- Data Access control
- Blockchain + smart contracts

- Really not sure what to put here
- Hopefully, I'll spend one minute on previous sections



Stefan Mehner

BTU Cottbus-Senftenberg

Research and Coding Interests

- Virtualization in IoT
 - Software-defined Networking
 - Container (LXC, Docker)
- Python, C++



Wish List of Hackathon Topics

- Practical experience with RIOT and protocol implementation
- Open for new ideas

- Early stage researcher
- Working in SICIA (Security Indicators for Critical Infrastructure Analysis)
- Co-Founder of Cheeezbude in 03/2017



Raphael Hiesgen

HAW Hamburg



Research and Coding Interests

- C++
- Actors
- Concurrency & Distribution
- ... and a bit of Security

Wish List of Hackathon Topics

- RIOT timers & C++ Clocks
- Get BLE running
- IDE / Editor support
- Improve accessibility of security

- Contributor to CAF (<u>www.actor-framework.org</u>)
- Recently read and enjoyed: The Three Body Problem



Peter Kietzmann

HAW Hamburg

Research and Coding Interests

- Embedded programming
- IoT and constrained environments
- Lower layer protocols
- Information centric IoT



Wish List of Hackathon Topics

- OpenWSN full stack in RIOT
- Plain TSCH in RIOT
- Discuss ICN over TSCH

Background

- Information and communications engineer (2014)
- 'Traveling' stack-upstream started from mobile radio transmission (phy)
- RIOT core developer and maintainer



GI-Dagstuhl Seminar 17303, July 23-28, 2017 IoT Hackathon: From Research to Practice

Michael Frey

MSA Safety

Research and Coding Interests

- {Configuration, Management, Security} in ICN
- 6TiSCH, Semantic Interference,
 Self-Organizing Systems, Routing
- Network Simulators, Testbed(s)

SCHLOSS DAGSTUHL

Leihniz-Zentrum für Informatik

C, C++, Python, Java, R



- {Management, Security} in ICNs
- 6TiSCH <3 ICN
- Discussions on
 - DDS vs ICN
 - approaches to "prioritized" traffic in ICN



GI-Dagstuhl Seminar 17303, July 23-28, 2017 IoT Hackathon: From Research to Practice

Thomas Schmidt

HAW Hamburg

Research and Coding Interests

- Advanced ICN networking layer
- Resource-optimized IP networking for the IoT
- Lightweight, non-hierarchical security
- Data transparency in the IoT

Wish List of Hackathon Topics

- Advance RIOT to IoT demands
- Panini for CCN-light on RIOT



- I escaped from Mathematical Physics to run Real Networks in the 90ies
- In the 2000s I turned to prefer theory again ☺



Oliver "Oleg" Hahm

Zühlke Engineering/RIOT

Research and Coding Interests

- Network protocols, implementations, and interoperability in constrained nodes networks
- IoT software platforms
- Information-centric networking

Wish List of Hackathon Topics

- Naming schemes in IoT-ICN
- C++-readiness:
 - How C++-ready is RIOT?
 - How IoT-ready is C++?
- ICN meets TiSCH

- From Practice to Research and back again
- Enabling Energy Efficient Smart Object Networking at Internet Scale
 Oliver Hahm, PhD Thesis, Université Saclay-Paris



Matthias Wählisch

Freie Universität Berlin



Research and Coding Interests

- Inter-domain networking (Java & C++)
- Robustness of Internet backbone present and future (e.g., ICN)
- Internet measurements & analysis (Perl)
- Security

Wish List of Hackathon Topics

- From E2E to E2D
- Routing
- Energy
- Security

- Studied CS and Contemporary German literature
- Like cooking not only protocols and architectures but also real food



CRIOT Summit September 25 - 26, 2017 Meet in Berlin!

http://summit.riot-os.org/2017/



September 26 - 28, 2017

http://conferences.sigcomm.org/acm-icn/2017/