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Advanced computer networking (IN2097)

Project proposal

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October 29, 2013

Introduction to

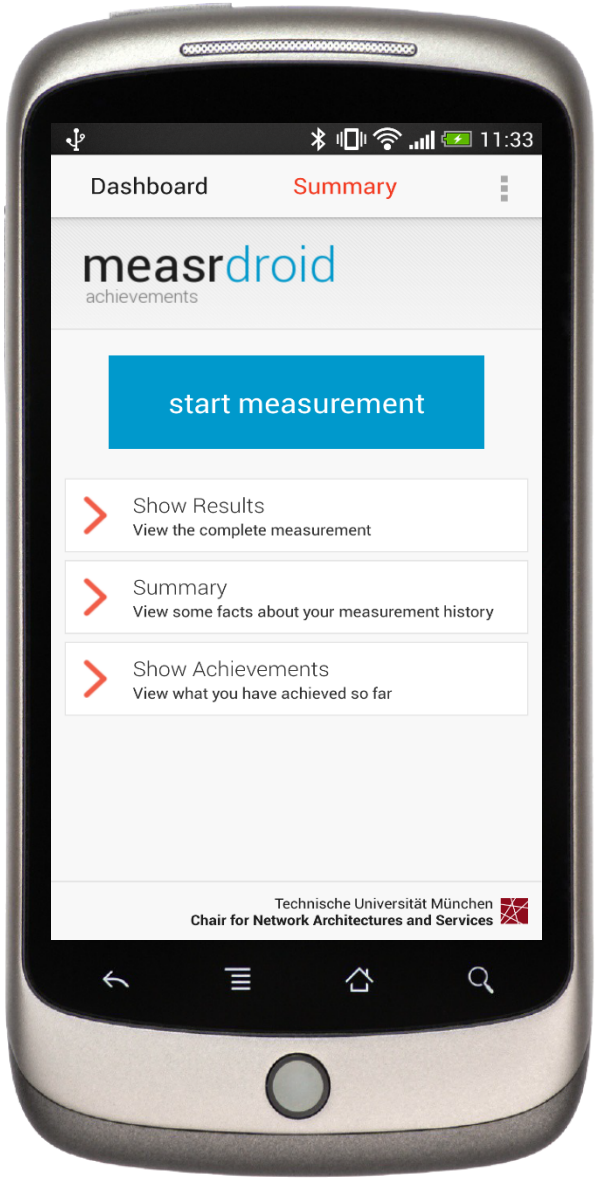
MeasrDroid

We built MeasrDroid

- **MeasrDroid**
  - Free measurement client with focus on **networks**
  - Utilization of integrated sensors and API functions
  - Incorporation of native C code where beneficial
  - Designed for interdisciplinary research
- **Progress so far:**
  - >10 students (BA/MA/HiWi) worked in the project
  - 32,000 LOC in 35 packages
  - Periodic measurements of **335** distinct data points: *hardware-environment-location-network-telephony*

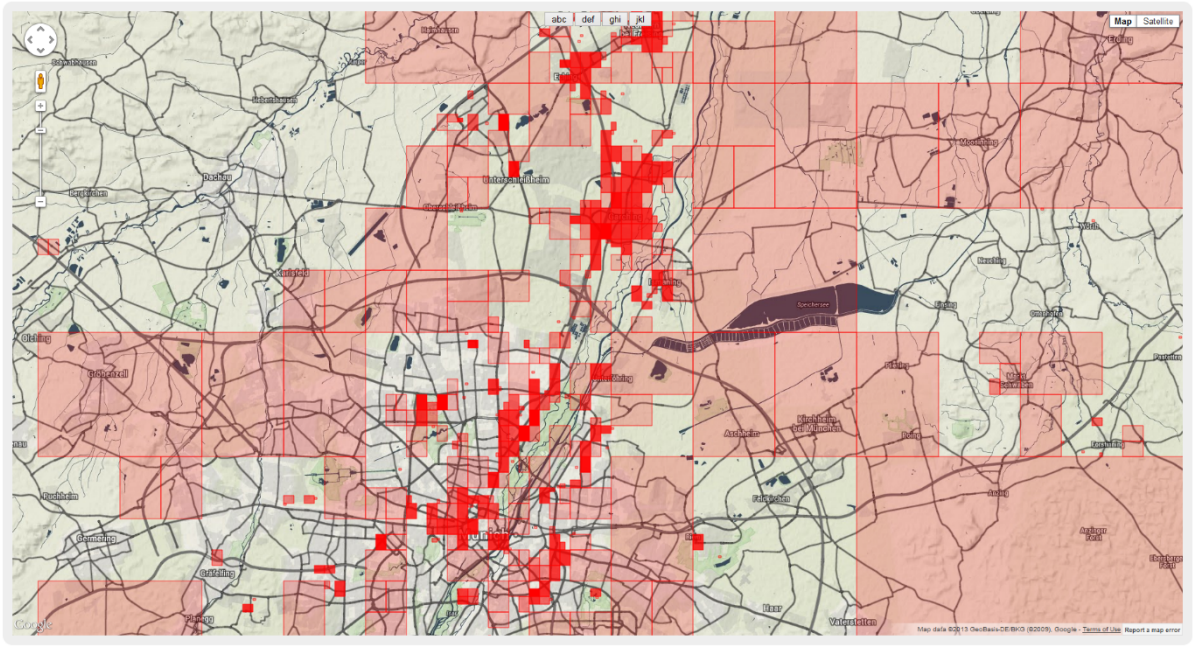
Current State of Development

- **Simple GUI**
  - Focus on research *(“donate data”)*
  - Achievement system to keep users using the App
- **Modular design:**
  - Measurement core API can be used as a library
  - Designed for multiple GUIs
- **Backend**
  - 10 services up and running
  - Large set of Python classes available to ease the development of new services
- **Resource Consumption**
  - Battery: only ~1-2%
  - Network: between 25 MB and 300 MB per month (configurable)
- **Security & Privacy**
  - Full encryption of measurements on-device
  - Cryptographic signatures on all downloaded configuration files
  - Privacy statement, *no hidden features*
- **BETA Test**
  - 4 months of beta test data available
  - 50 participating clients, 150,000 data sets (~6 GB)

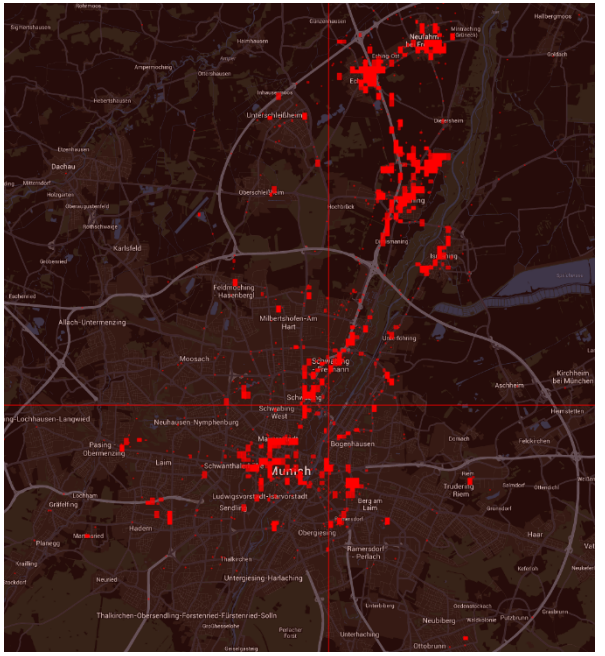


Analysis Frameworks so far (1)

- **Anonymized client visualization**
  - How to visualize location data?
  - How to visualize movement data?
  - *…while preserving privacy of our users?*



fully anonymized



not anonymized

Analysis Frameworks so far (2)

- **Can we reverse-engingeer Google's Wifi localization technique?**
  - Try to triangulate Wifi access points (APs)
  - Map signal strengths to radii and intersect circles
  - Compare results to publicly available ground truth (open wifi spots), evaluate *Telekom WLAN-to-go*

triangulation of a single AP

all APs localized within our building

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PROJECT PROPOSAL

Overview

- **Use MeasrDroid**
  - To initiate measurements to your virtual server
  - To analyze delay characteristics over time
- **Listen for measurements**
  - To initiate counter-measurements from your VM
  - To analyze asymmetries in network topologies
- **Learn more about**
  - The Internet's dynamic topology
  - Environmental influences in mobile networks
  - Asymmetric routing

YOUR TASKS

- **(1) Project Plan** [1 point]
  - Find team partner
  - Develop a schedule and milestones
  - Anticipate challenges and problems
- **(2) Measurements** [3 points]
  - Monitor delay and traceroute measurements
  - Plot and display measurements over time (live)
  - Initiate counter-measurements
- **(3) Evaluation** [4 points]
  - Find correlations between delay variability and environmental conditions (included in MeasrDroid data)
  - Define a metric for path (a)symmetry, analyze bidirectional measurement data and interpret your findings
- **(4) Final Assessment** [2 points]
  - Write a detailed report about steps (1) – (3)
  - Reflect on the project (what was good/bad?)

Technical Issues

- **Hardware requirements**
  - One Android (> 2.1) device per team
  - >50 MB of traffic volume per month
  - Access to one virtual server per team

- **Download and configure MeasrDroid**
  - Go to http://mccn.droid.net.in.tum.de/ and download client
  - Start MeasrDroid and accept privacy agreement
  - You may configure measurements to your needs, but you should not deactivate active network measurements
  - Enter your team name (**important!**)

- **Obtain your MeasrDroid data**
  - Your measurement data will be continuously transferred to your virtual server
  - Details can be found on the project sheet (soon)

Project Settings

- **Practical work**
  - Programming language is **`Python`**
  - Auto-generate diagrams with **`Python/matplotlib`**
  - Live-view of diagrams with **`Apache/CGI/Python`**

- **Important deadlines**

  [Nov 5, 2013] Project starts.

  [Nov 12, 2013] Hand in your project plan.

  [Dec 3, 2013] Have your live-view running.

  [Dec 17, 2013] Auto-run measurements.

  [Feb 4, 2014] Hand in your final evaluation.

Thanks.

INTERESTED?