

Project A4

Resource efficient and distributed platforms for integrative data analysis

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Problem

Scalability

- Congestion in dense scenarios
- Small-scale versus large-scale environments (resource constraints)



Heterogeneity

- Diverse communication requirements for different platforms and entities
- Conflict: radio vs. energy resources



Large-Scale Deployments

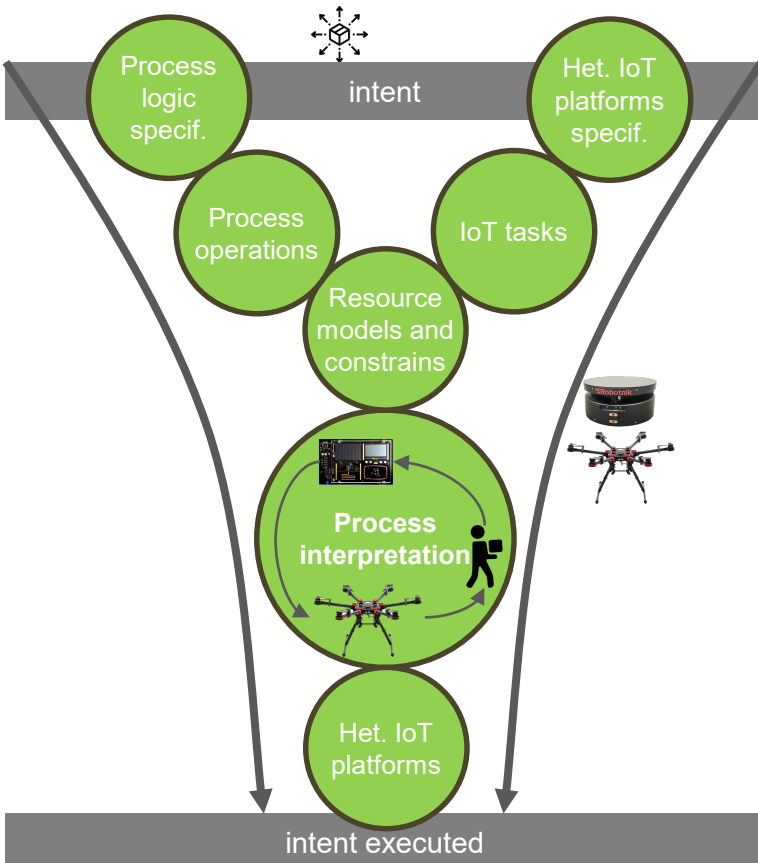
- Interoperability, shared spectrum, interference mobility



Methodology for Phase 3

Conception

Process Interpretation for Heterogeneous IoT Platforms

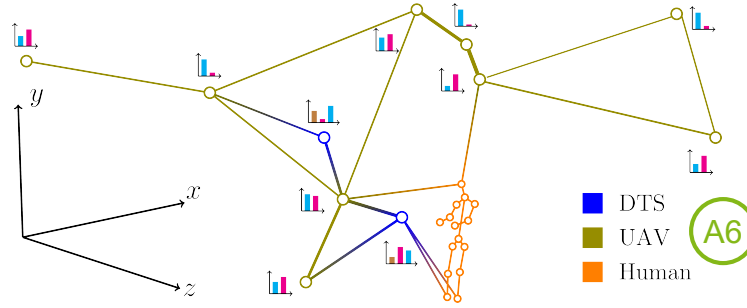


Process Interpretation

- Partitioning and resource-aware assignment of executing entities (A6)
- Graph representation for process collaboration and control

Models

IoT Environment Modelling



Mobility Models

- Optimal route-planning and collision avoidance (semi-/autonomous)

Communication Traffic Models

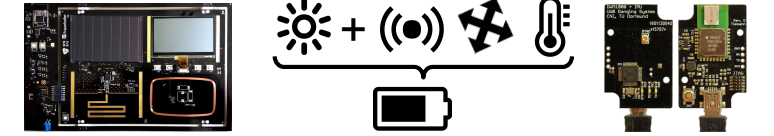
- Mixed traffic scenarios in public networks leverage machine learning for reality-based data-driven network models (B4, A1)

5G mmWave Radio Models

- Channel in dense and harsh environments
- Power consumption for 5G technologies

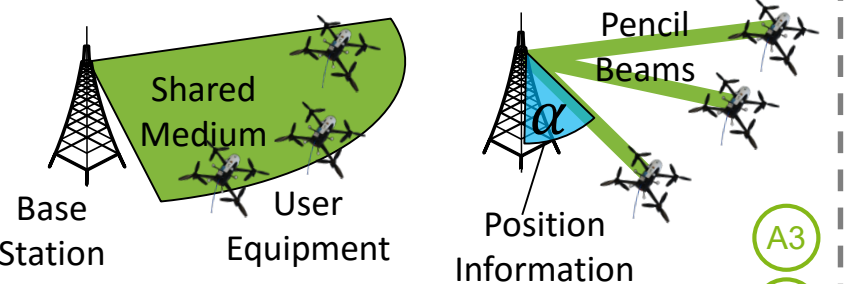
Methods

Heterogeneous Energy Harvesting



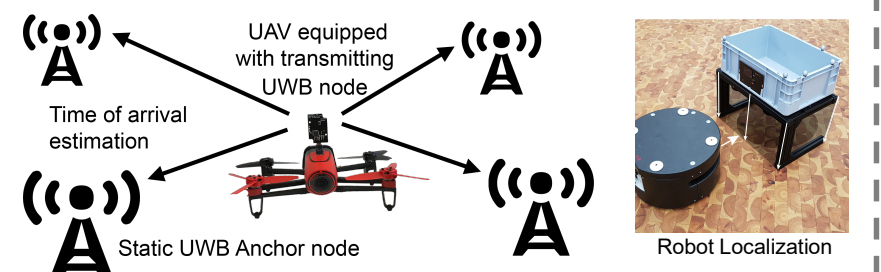
- Multi energy management systems

Scalable M2M Communication



- Anticipatory networking (A3)
- Joint mmWave comm. & positioning (B2)
- High spatial capacity (freq. reuse) (B4)

Multimodal Indoor Localization



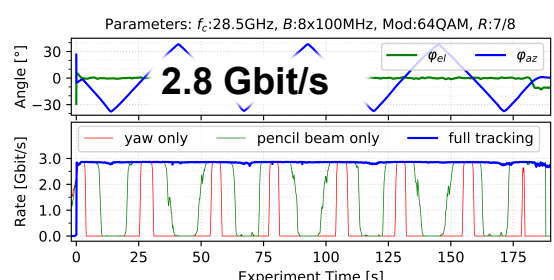
- Leverage machine learning for reliable location estimation (channel response) (A1)

Evaluation of Resource-aware Heterogeneous Platforms



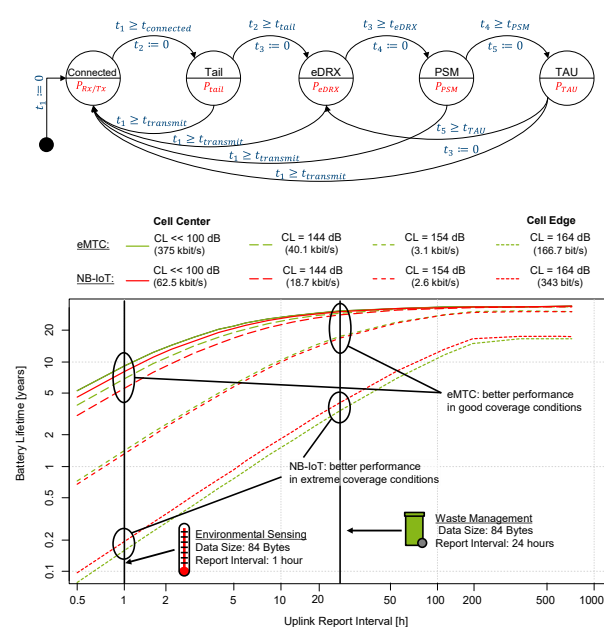
Preparatory Work

5G mmWave Communication



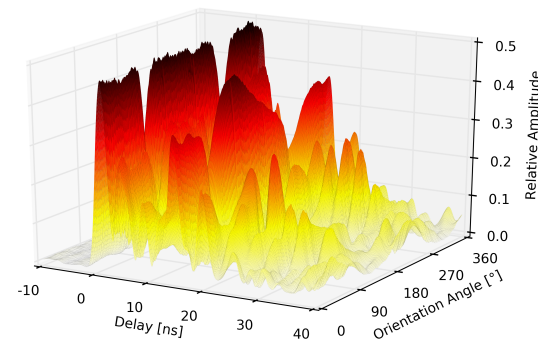
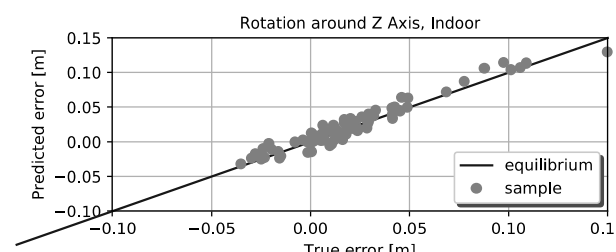
[Heimann, Tiemann, Böcker, Wietfeld, WSA 2018]

Cellular IoT Resource Consumption



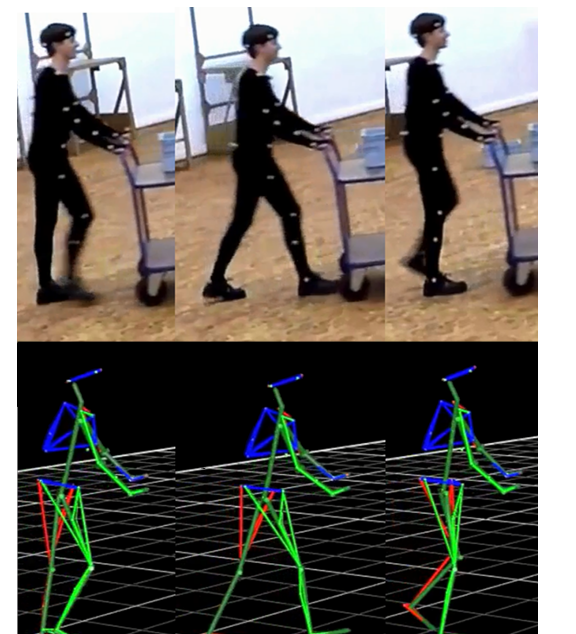
[Jörke, Fakenberg, Wietfeld, GLOBECOM 2018]

Impulse-Response Based UWB Positioning



[Tiemann, Piltmann, Wietfeld, VTC-Spring, 2017]

Human Mobility Modelling



[Dominik Kolßmann, Masters Thesis]