Searching in a Web-based Infrastructure for Smart Things



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RESEARCH GROUP FOR **Distributed Systems**

Enabling Smart Environments in the Internet of Things

Goal: Interconnection of services offered by smart things in everyday environments



Web of Things: Web technologies for application-layer interoperability of smart things

Thing + Internet connection³ + embedded Web server + resource-oriented modeling + REST¹

A Web-based Infrastructure for Smart Things

- Support discovery, selection, and usage of services offered by smart things
- Desired Properties: Scalability, Load-balancing, Self-management, User-friendliness
- Example applications: User interfaces, body sensor networks, robotic devices,...



Management Nodes

Infrastructure Properties

Hierarchical structure based on logical place identifiers to exploit the locality of thing interactions!





Searching for Smart Things

- Multiple query types for different scopes
- **Request-for-Query** to enable searching outside the scope of the current authoritative node

Self-management:

- Self-stabilization algorithms arrange nodes according to the \checkmark topology induced by logical place identifiers
- Ability to recover from temporary node failures, eventually \checkmark re-establishing the original structural configuration



Resource-oriented view on querying and query routing





Conclusions

Application of REST patterns in the design of an Internet of Things infrastructure

- Register services as resources (resource-oriented architecture)
- ✓ Annotate these resources to enable their automated discovery⁶
- Benefits: Scalability, interoperable APIs,... \checkmark

Next steps

- → Find smart things' locations w.r.t. management nodes: Integrate with relative indoor localization system!
- Enable targeted searching for machine clients: Integrate semantics in device and service descriptions!

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