

Design of a Framework for Controlling Smart Environments

Stefan Nosović

Technical University Munich

What is a Smart Environment?

- Smart environment is a *highly integrated computing and sensory environment* that *effectively reasons about the physical and user context* of the space to *transparently act* on human desires. [1]
- Fixtures = addressable sensors + addressable actuators

1. D. Lupiana, Z. Omaray, F. Mtenzi and Ciaran O'Driscoll: Smart Spaces in Ubiquitous Computing. 4th International Conference on Information Technology, (2009)

Goals of the Smart Environment

- The goals of creating smart environments are to:
 - Increase comfort of the inhabitants
 - Optimize energy consumption
 - Enhance the abilities of the inhabitants
- These goals can be addressed by enabling the environment to adapt to the inhabitant's needs and preferences
- Adaptivity can be achieved only if different devices are able to collaborate

Problem

- No one communication standard in the industry
- Manufacturers use proprietary communication protocols
- No communication between devices that are using different protocols is possible



Proposed Solution

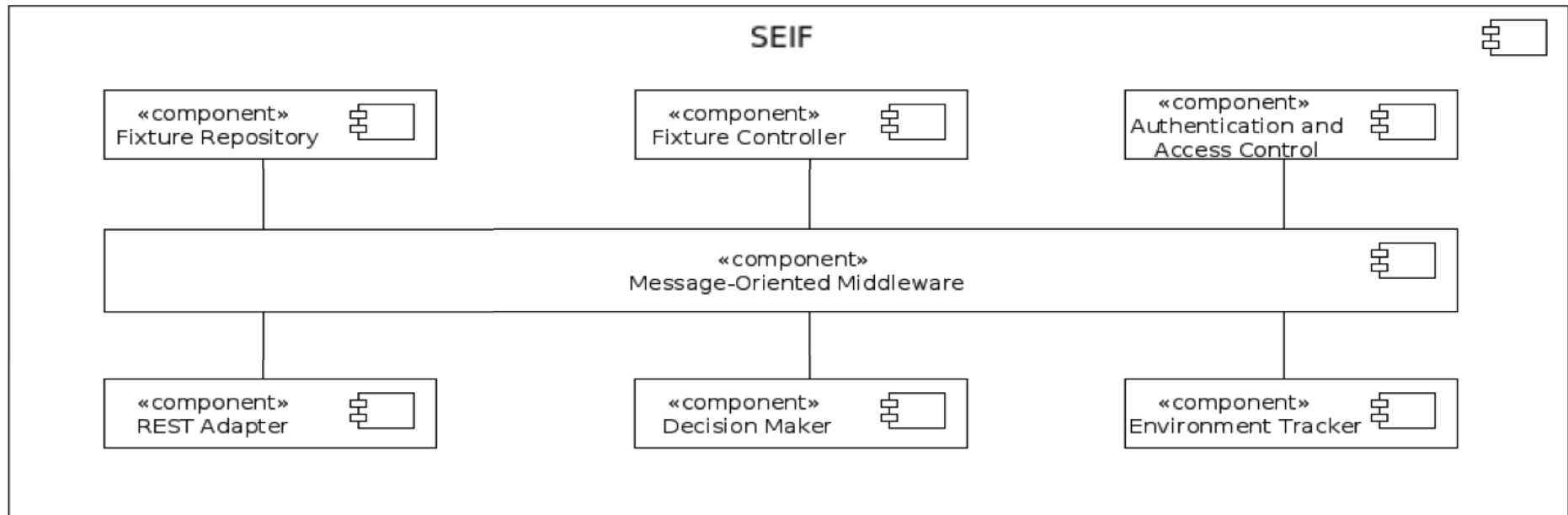


Design Goals

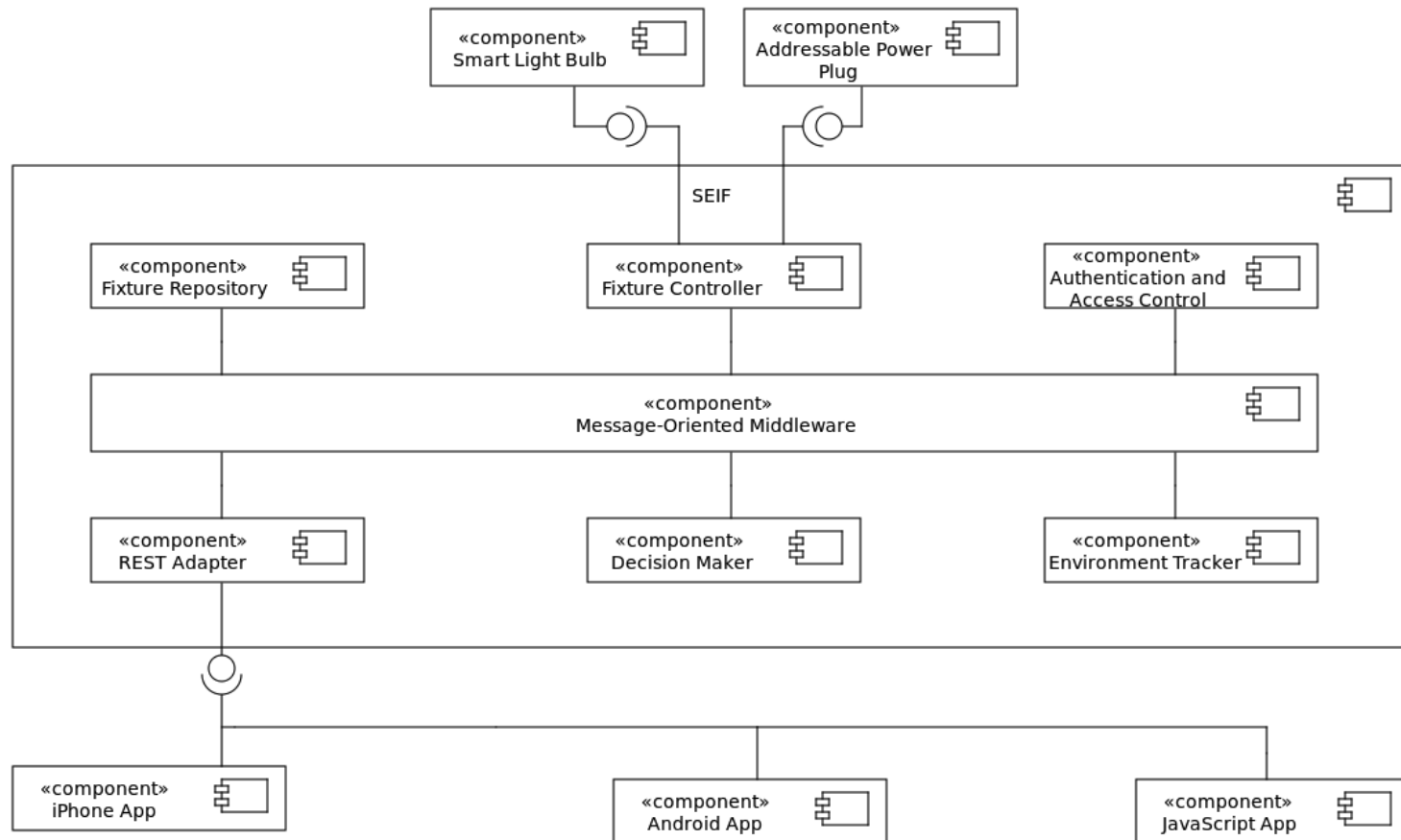
- Independent development of framework components
- Extensibility with respect to new framework components
- Extensibility with respect to number of devices communicating with the framework



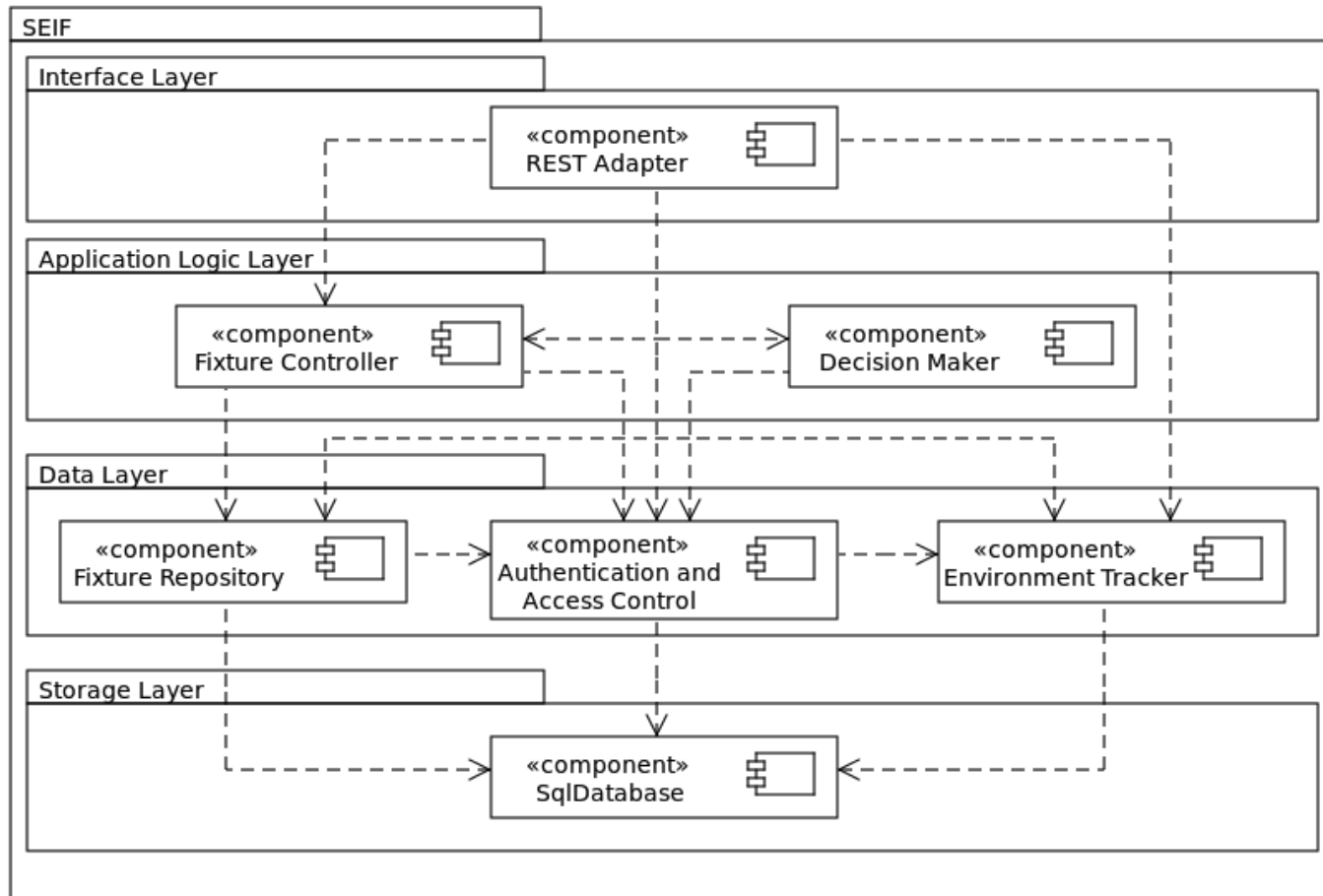
Smart Environment Integration Framework Design



Smart Environment Integration Framework Design



System Design – Layered Architecture



Our Smart Conference Room



Our Smart Office Lab



EnOcean Switch

EnOcean In-wall Switch

EnOcean Window Sensor

EnOcean Gateway

EnOcean In-wall Switch

EnOcean Switch

Arduino Microcontroller

iPhone containing our App

iBeacon

Smart Environment Integration Framework Server

8/28/2014

System Design Discussion

- Advantages:
 - Easily distributed across multiple servers
 - Design by contract - components can be developed independently
 - Reusability of components
- Accepted consequences:
 - Single point of failure
 - Response time may vary depending on the capacities of the local network

Future Work



<http://www.genesys-project.eu/wp-content/uploads/2014/06/Energy-Savings.jpg>

Thank You for Your Attention

Related Work

