Smart House

Engineering Adaptive Mobile Applications

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Problem of daily routines

- Apartments become bigger…
- User's time becomes more valuable
- We want to make domestic activities easier…
- And give the user information about his domestic environment…
- Accessible at any place!

Who is interested?

- Any homeowner wants to make some action automatic.
- Why is it so dark? Where is the switch?!
- What is the current temperature here? I want A/C on!
- What is the current humidity? I want dry air!

- Nowadays we need to do all this manually.
- Smart House will do your job!

- Target user group: Owner of a big house/flat

Target personas. Student

- Age: 22 - 23
- Activity: Master-student
- Family: Single
- Place of living: Dresden (private apartment)
- Income: 0
- Hobbies: IT, Electronics
- Internet activity: Daily
- Working experience: Software Development
- Daily tasks: Studying, room cleaning, cooking, washing
- Expectations: Easy to use daily tasks automation tools

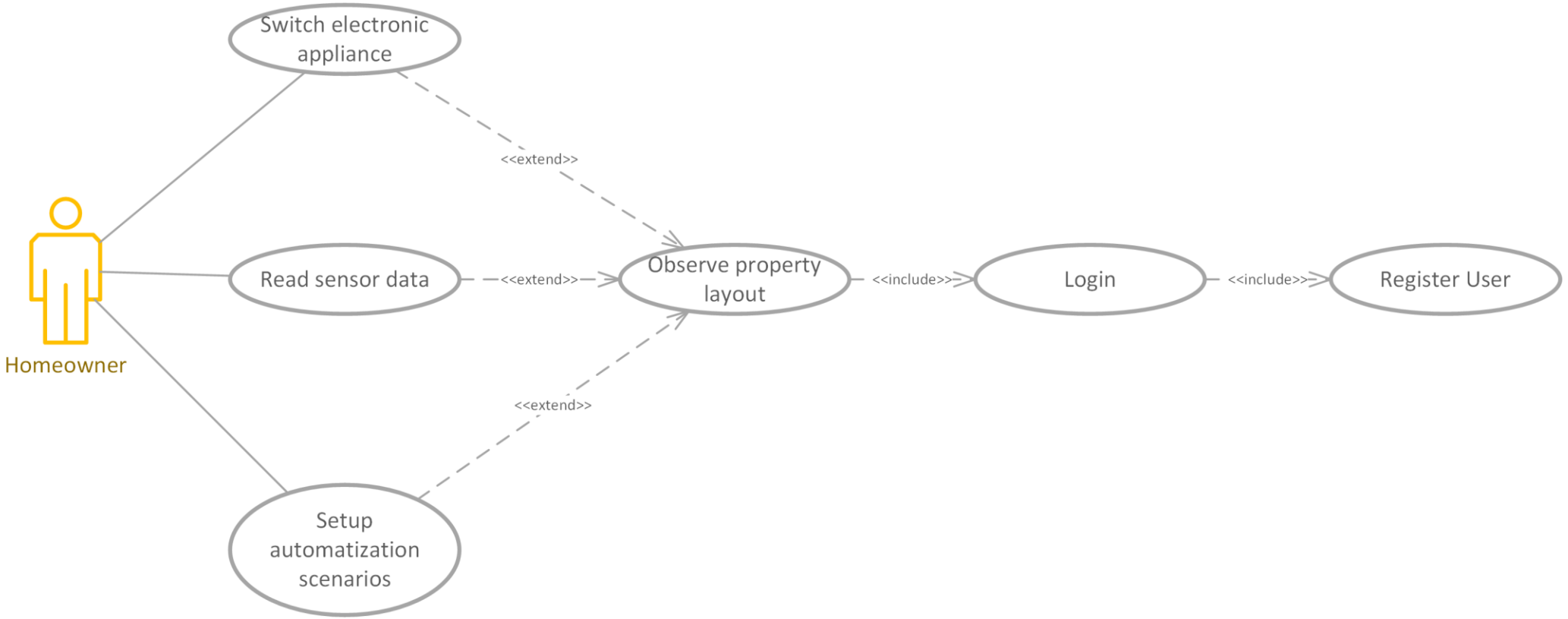
Target personas. Homeowner

- Age: 45
- Activity: Senior Software Developer
- Family: Married
- Place of living: Dresden (private house)
- Income: 60000 EUR per year
- Hobbies: IT, Electronics
- Internet activity: Daily
- Working experience: Software Design
- Daily tasks: Work, house keeping
- Expectations: Make daily tasks faster

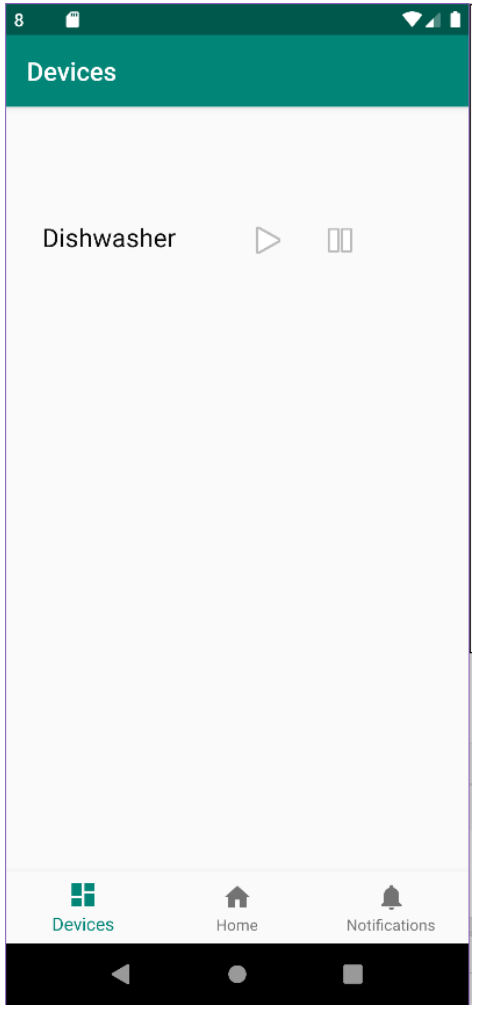
Key functions

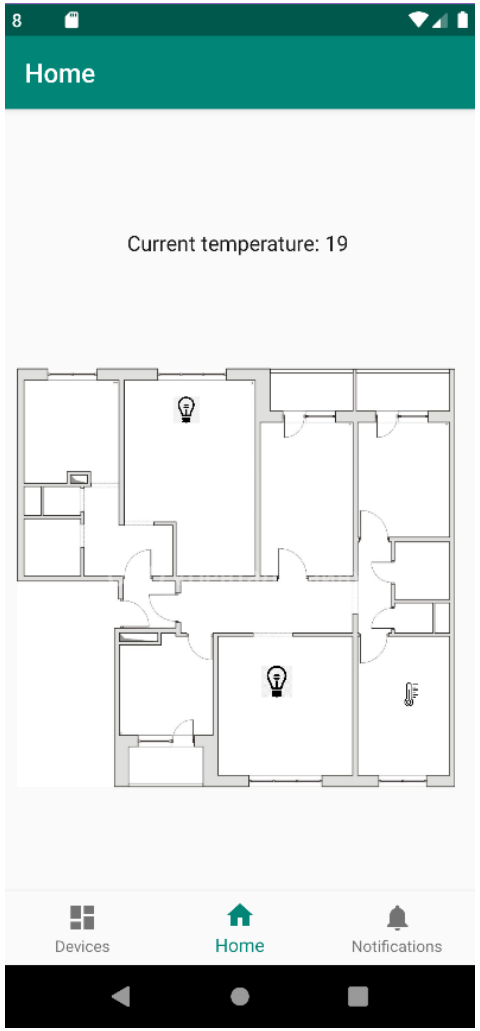
- Light control
- Reading Appliance state
- Remote control of appliance
- Automation scenarios
- Authorization. Separation of roles
- Reading sensor data

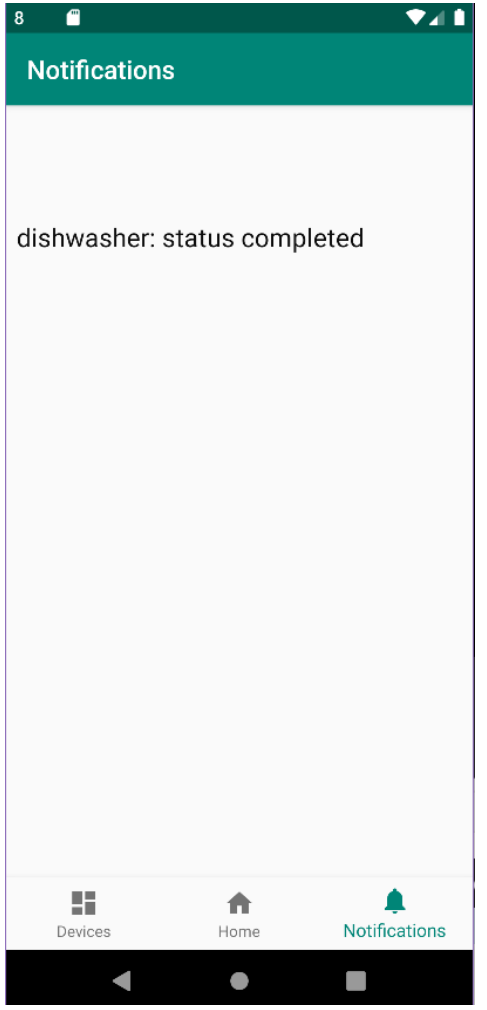
Use Cases


Switch electronic appliance
<<extend>>
Homeowner
Read sensor data
<<extend>>
Observe property layout
<<include>>
Login
<<include>>
Register User
<<extend>>
Setup automatization scenarios

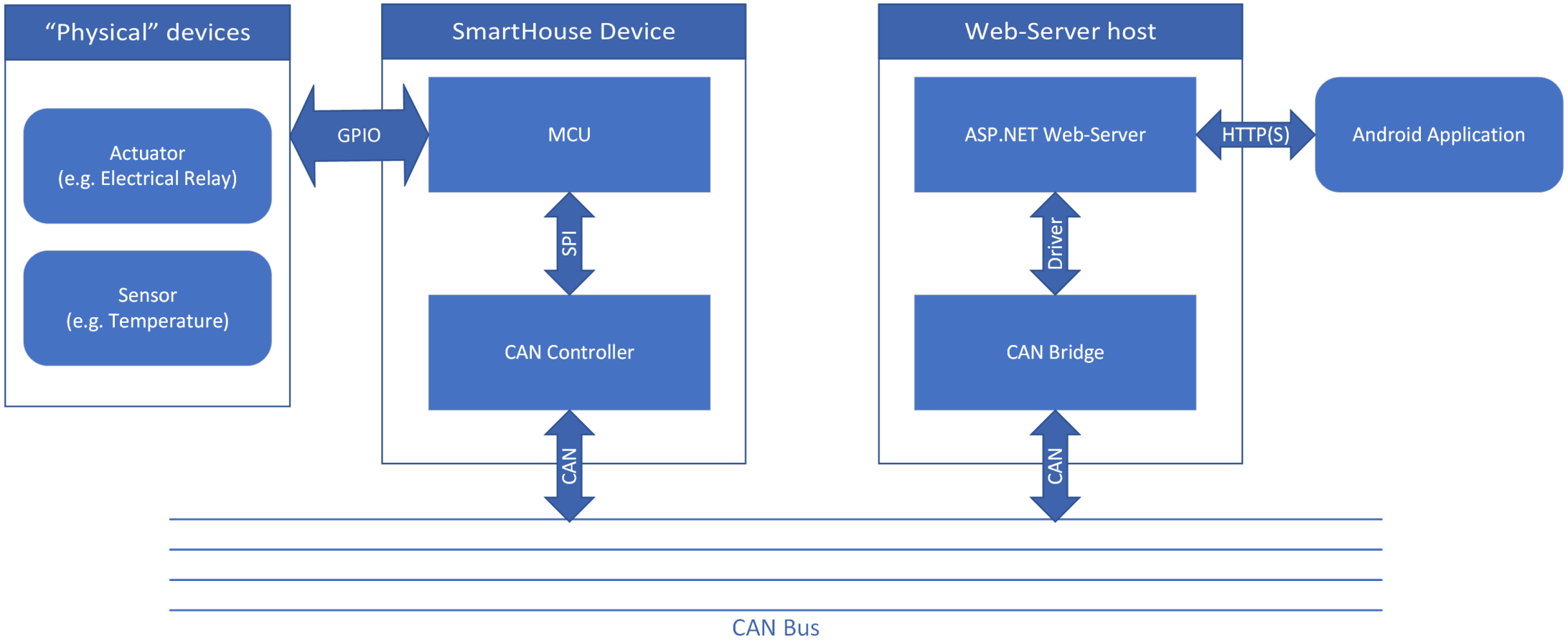
UI Mockup


Devices
Dishwasher
Devices
Home
Notifications

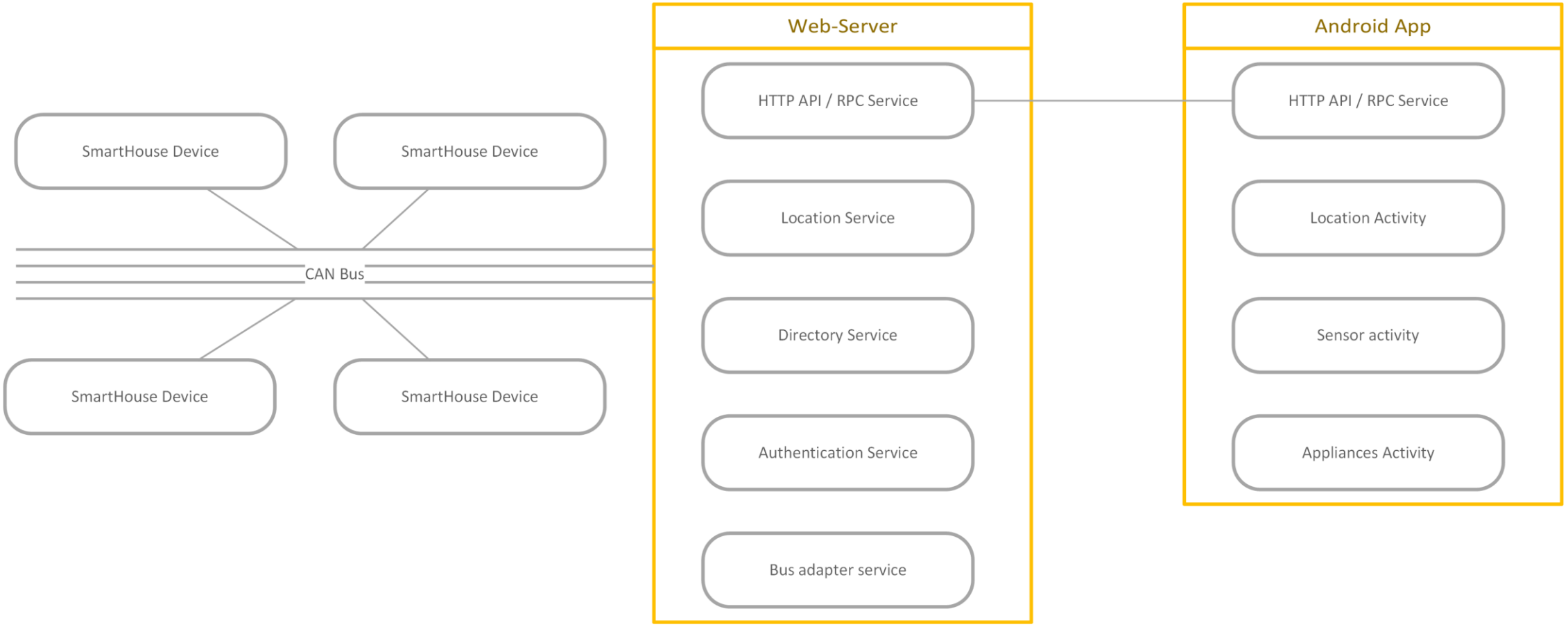

Home
Current temperature: 19
Devices
Home
Notifications


Notifications
dishwasher: status completed
Devices
Home
Notifications

Hardware Structure diagram



Software Component Structure diagram



Connectivity challenge

- What if the user is not at home, but still wants to control the Smart House?
- We need to handle transition between LAN and WAN.
- We need to ensure security while user is in WAN.
- No one unauthorized should control the house!

Offline Challenge

- Client application can store the apartment layout locally.
- Client application can cache last state of switches or sensors.
- Client application can enable deferred actions.

Energy challenge

- Mobile app must do as little work as possible.
- All heavy jobs are the server's responsibility.

Usability Challenge

- Show current room on startup based on location
- Show different functions depending on user's role (adult, kid, guest)
- Hide privileged functions depending on user's privilege level

Context Awareness and Adaptation

- Do stuff automatically depending on user location (turn lights on/off, read appropriate temperature sensor, etc.)
- But GPS does not work inside buildings or it's accuracy is too bad.
- We can use Wi-Fi positioning to determine current room.
- E.g. location is a function of Wi-Fi AP SSID (every room has its own AP)