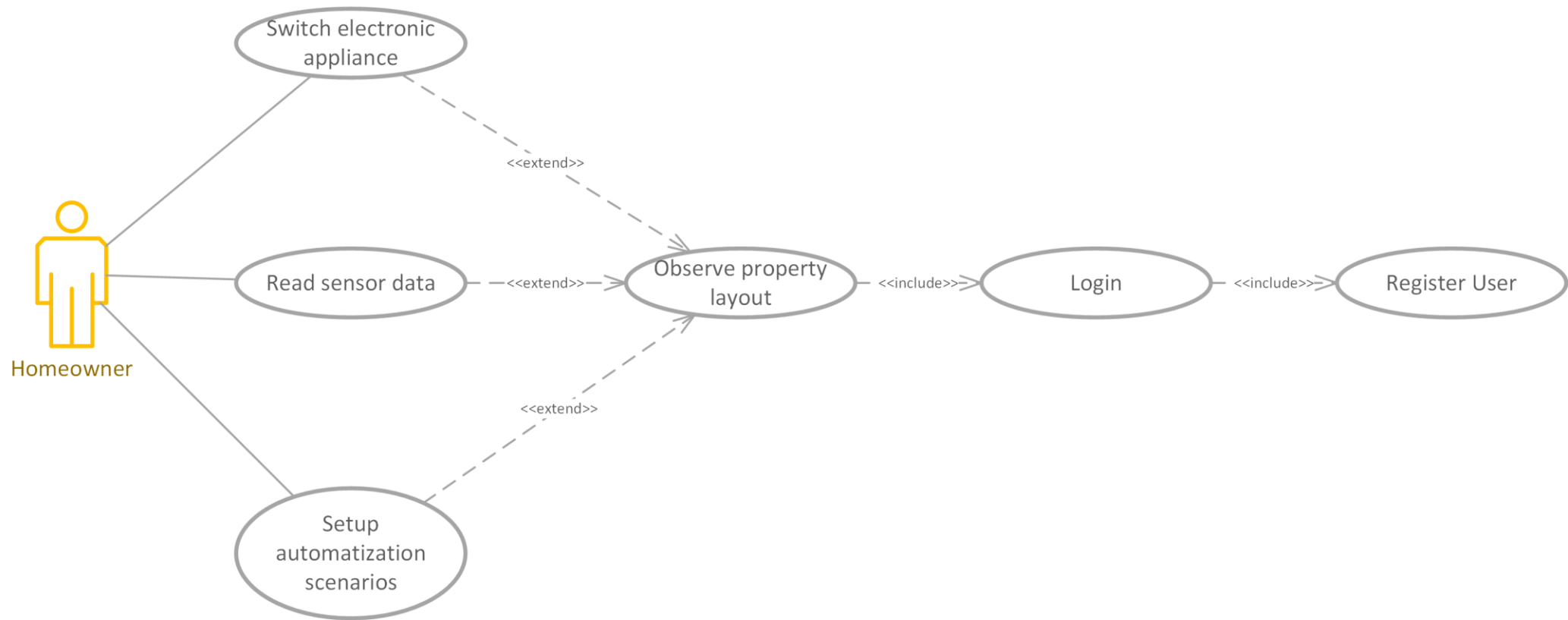# Adaptation Concepts

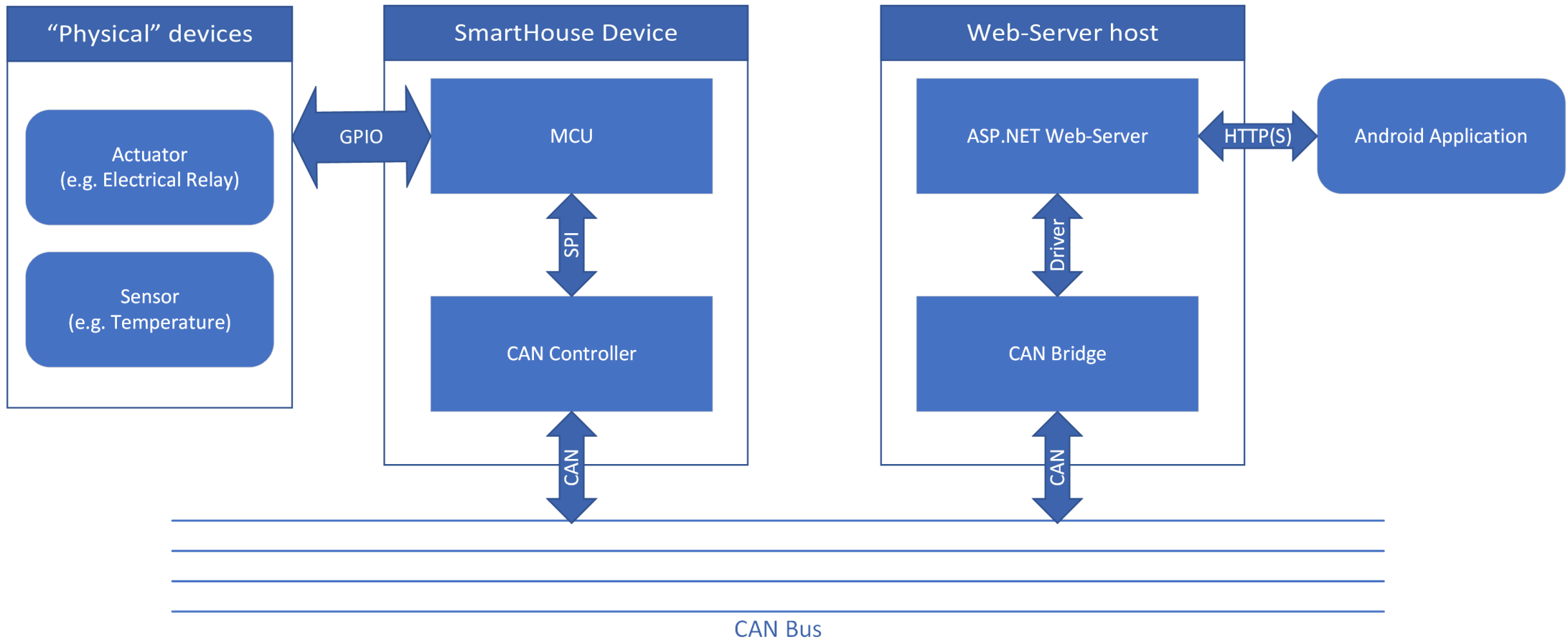Anastasia Lykhtar, Dmitriy Monakhov

Key functions

- Light control

- Reading Appliance state

- Remote control of appliance

- Automation scenarios

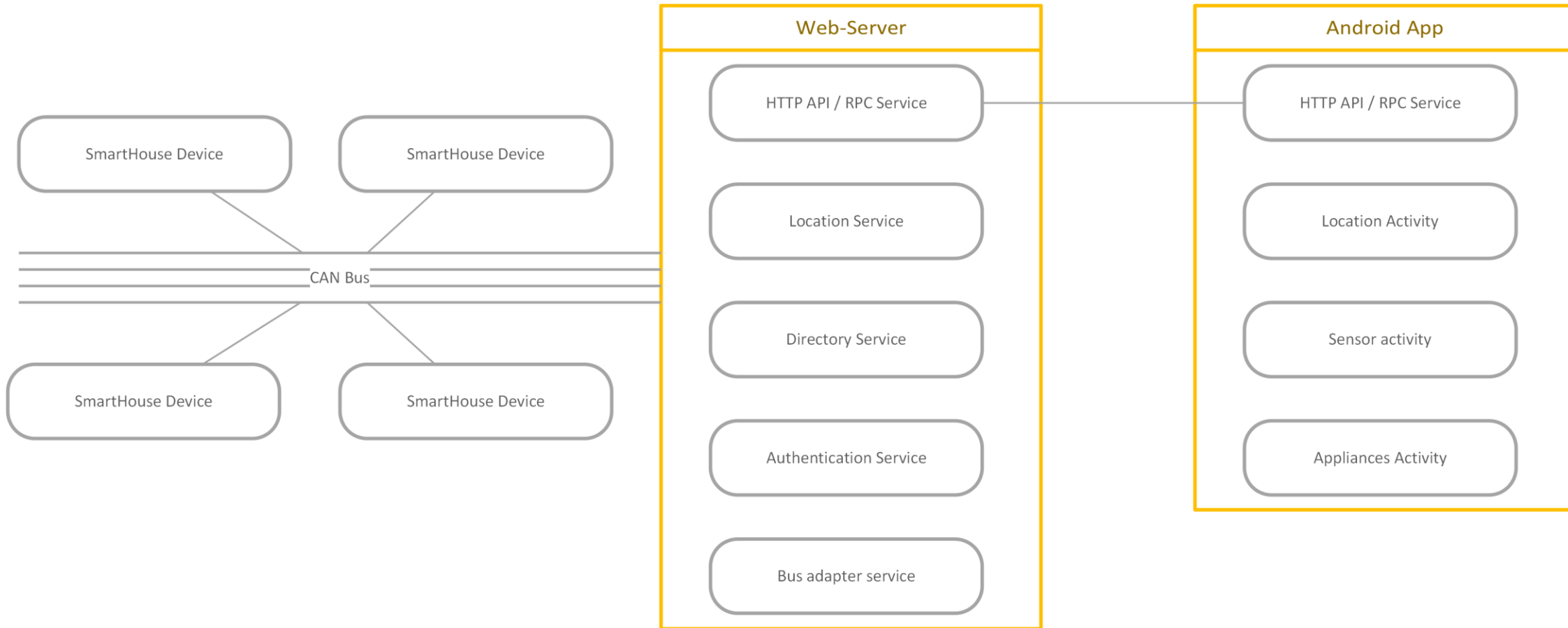- Authorization. Separation of roles

- Reading sensor data

Use Cases

Hardware Structure diagram

Software Component Structure diagram

Web-Server

- HTTP API / RPC Service
- Location Service
- Directory Service
- Authentication Service
- Bus adapter service

Android App

- HTTP API / RPC Service
- Location Activity
- Sensor activity
- Appliances Activity

SmartHouse Device

SmartHouse Device

SmartHouse Device

SmartHouse Device

CAN Bus

Adaptation – Wi-Fi location tracking

- Get network state

- Check if Wi-Fi SSID is in location tracking Data Base

- Measure signal strength and determine the current room

- Adaptation: select active room and update screen info depending on location

Adaptation – energy saving

- Get battery state

- If battery has low charge, then disable server polling for SmartHouse states

- User can still update SmartHouse states manually and push updates manually

Problem – user leaves the apartment

- We can detect that user is not at home via checking Wi-Fi state

- If it is the case, we should switch to WAN connection mode or to offline mode

- If we are using WAN mode, the app cannot use adaptation mechanism of location monitoring, but still provided the main features of SmartHouse

- If we are using offline mode, the app can only show last known states of SmartHouse equipment and queue user commands for future pushing to the server

- When user enters the apartment again, we switch to LAN mode

Problem – battery low

- By default, the mobile app periodically polls the server for updates

- This requires a permanent connection, which uses lots of battery energy

- If the battery is low, we should switch polling off and make the user update state information manually

- We also can use Push-notifications, but this technology depends on Google services and thus is unavailable on some devices

UX Storyline: User leaves the apartment

Storyboard   Persona: Student   Scenario: user leaves the apartment
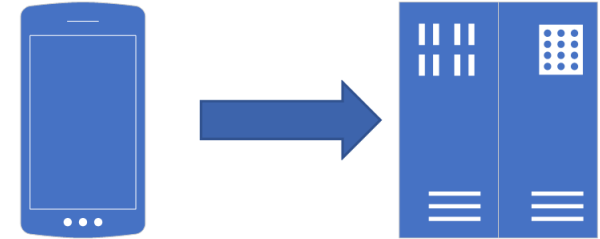
UX Storyline: Battery low
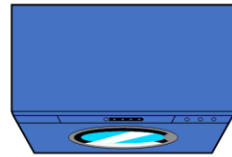
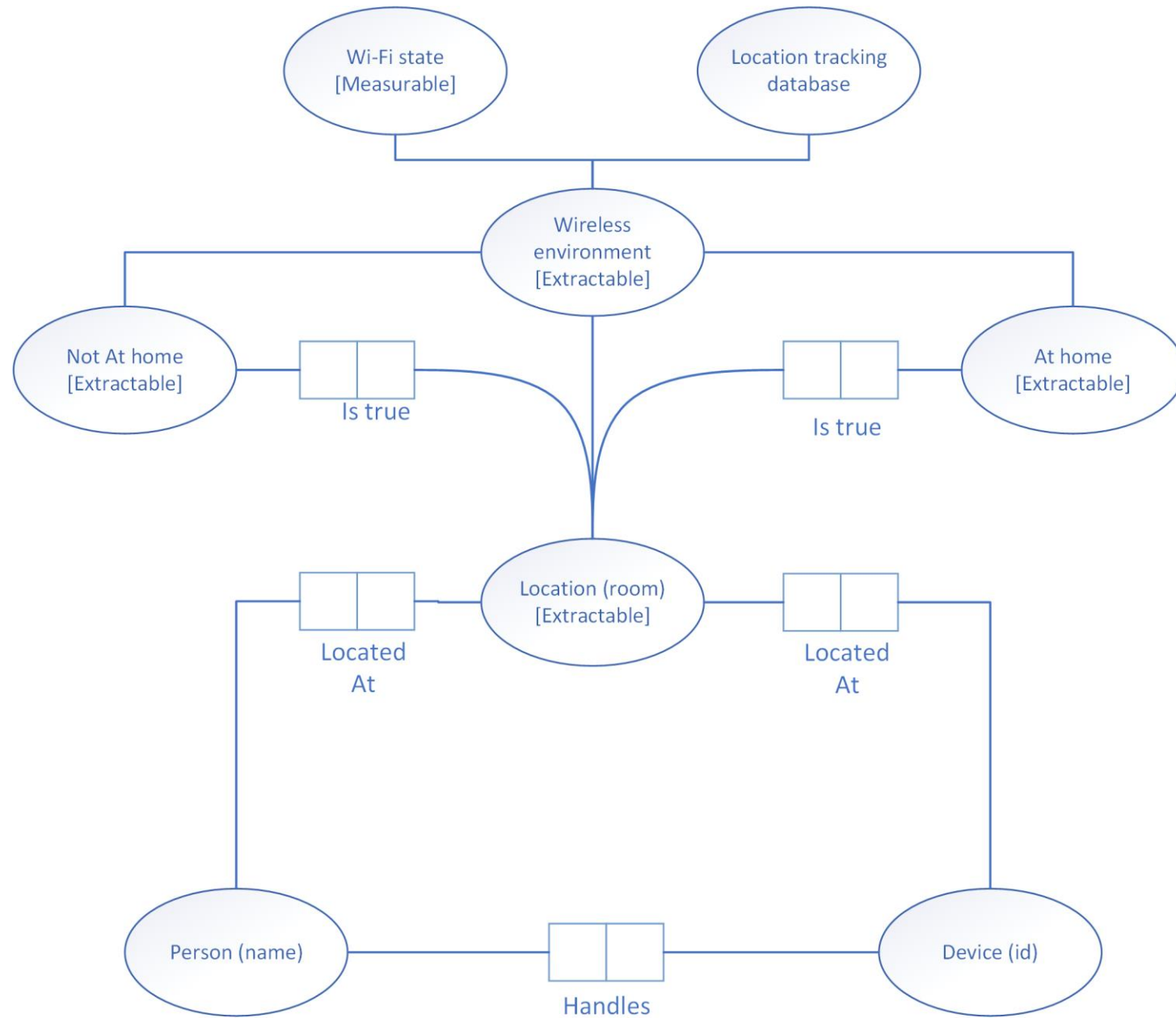| User actively uses the smartphone for the whole day	Problematic situation: Now the battery is low	SmartHouse changes interaction scheme to push-only

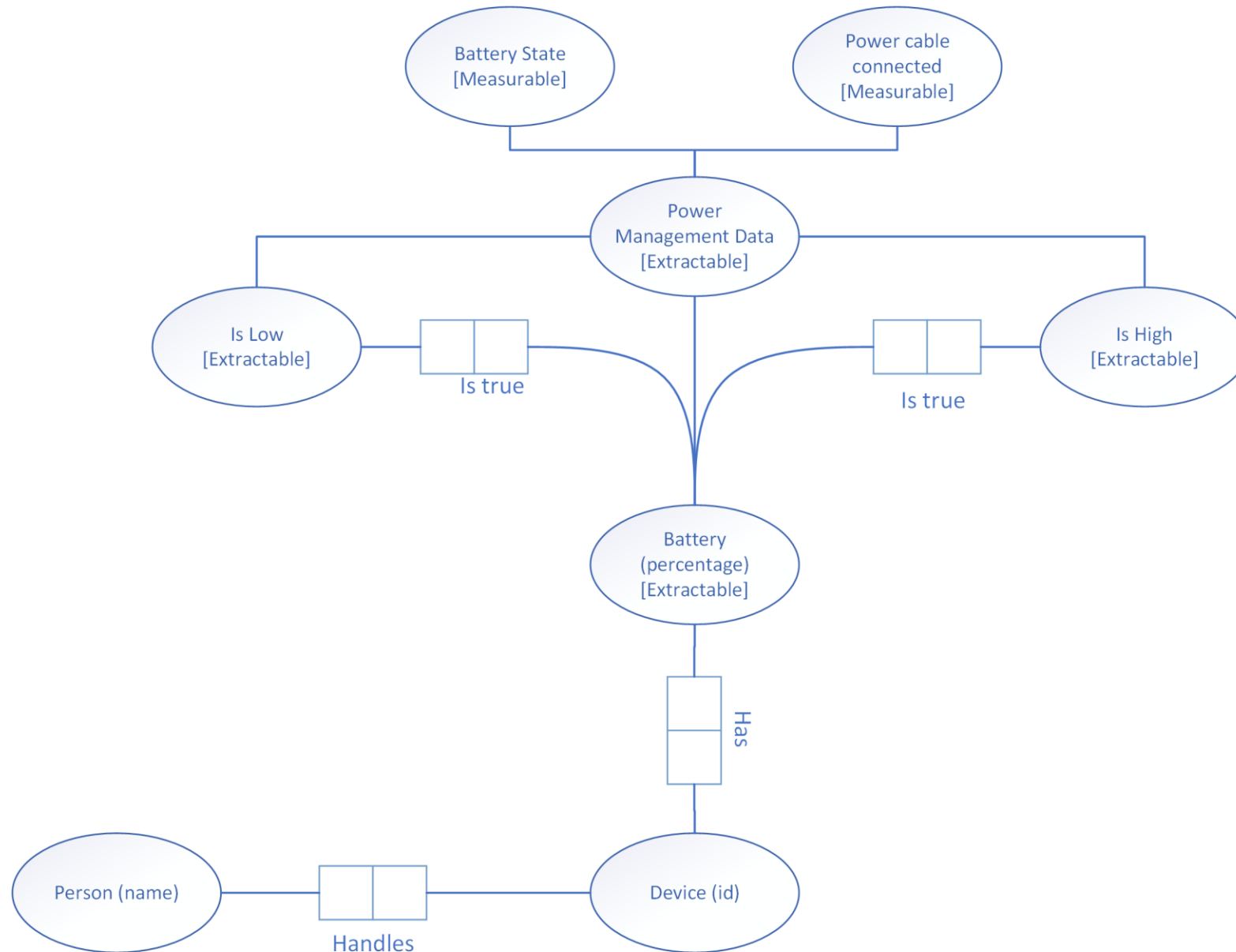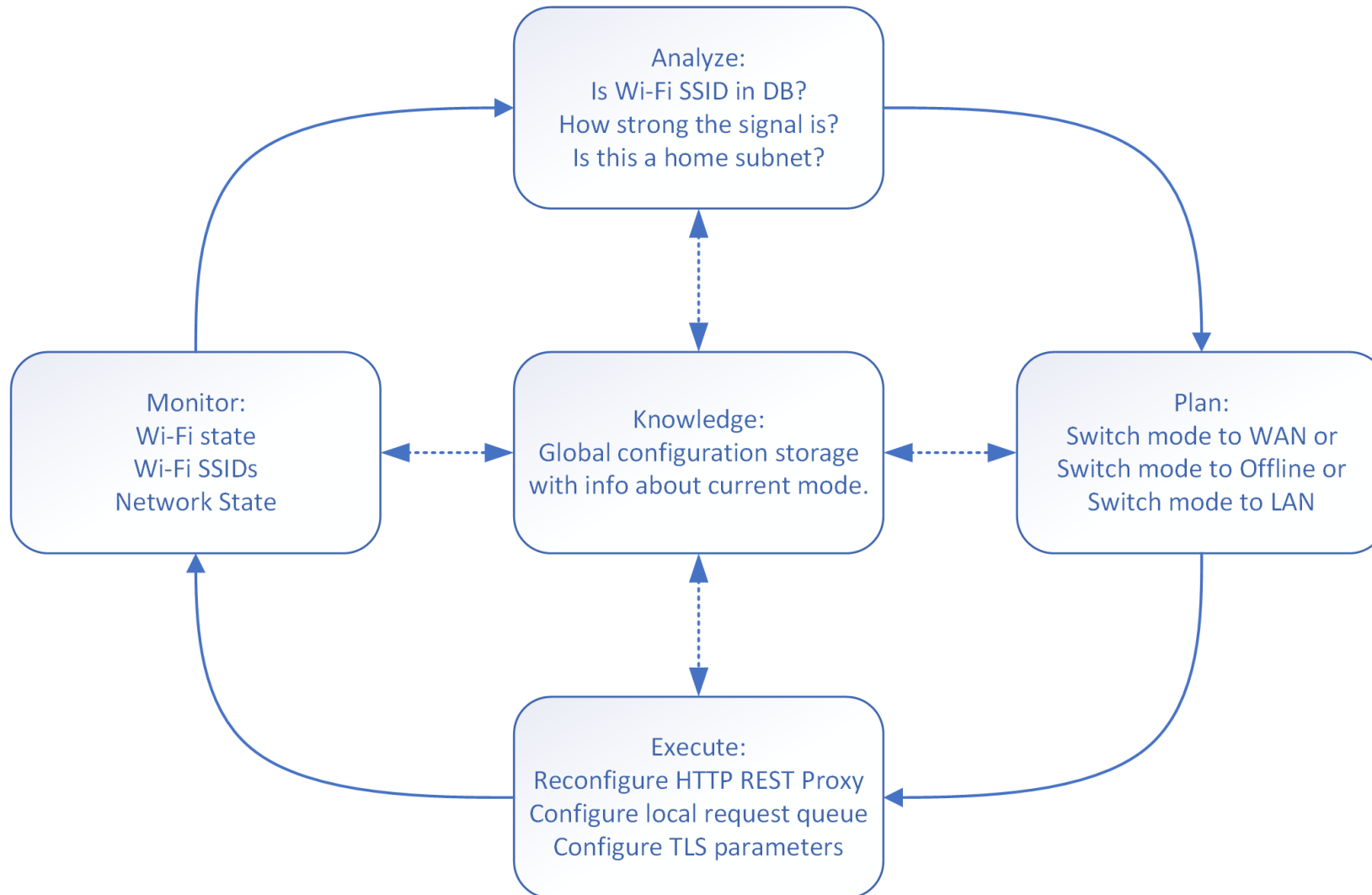| Battery life is extended	User plugs the phone in and SmartHouse is pull-push again	

Context Model: Wi-Fi position tracking

Context Model: Energy saving

MAPE-K for Connectivity and Offline Challenge

MAPE-K for Energy Challenge