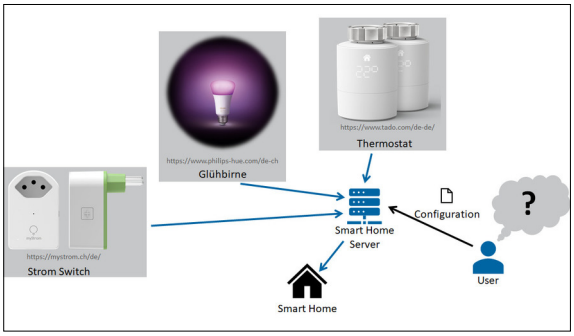
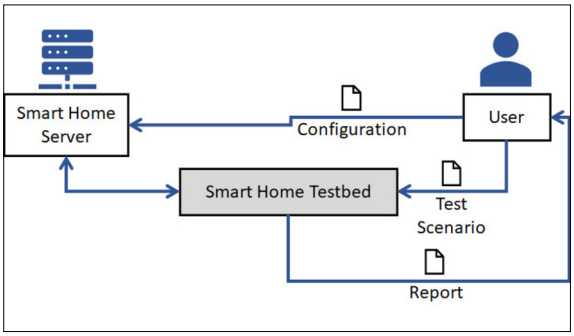
Patrick Elsener

Graduate Candidate	Patrick Elsener
Examiner	Prof. Reto Bonderer
Co-Examiner	Urs Reidt, Hamilton Medical AG, Bonaduz, GR
Subject Area	Software and Systems

Smart Home Testbed



A user being doubtful while configuring a smart home server that integrates different smart home devices into one system
Own presentment



Interaction of a testbed for smart home servers with the user and the smart home server
Own presentment

Initial Situation: Nowadays, there is an ever-growing number of smart home devices on the market. Each of these products is controlled and configured in its own vendor-specific way. Smart home servers provide the possibility to integrate these different devices into one system. A user has to come up with a smart home server configuration to define how the whole system should function. Unfortunately, it is unknown in advance if the smart home server configuration leads to the desired result. It can only be found out by trial and error. Testing such a configuration manually can take a long time, especially if there is a dependency on seasonal variations.

Approach / Technology: To help to test a smart home server configuration, this thesis develops the concept of a testbed for smart home servers. It turns out that a concept that fulfills all the needs of such a testbed is relatively simple.
This thesis implements a testbed that follows the developed concept. The testbed can model room temperatures and room heating, power consumption, production, and storage, hot water usage and heating. With the testbed, it is possible to define a test scenario, including the possibility to specify a forecast given to the smart home server at a specific point in time of the simulation. The communication between the testbed and the smart home server is realized via the MQTT protocol. As MQTT is commonly supported, the testbed is compatible with a wide range of smart home servers.

Result: Lastly, this thesis shows that the concept and its implementation works by providing two examples covering the implemented features of the testbed. The first example shows how a test scenario for controlling the thermostats of an apartment could look like. The second example shows a test scenario where a fictional user tries to use the weather forecast to optimize the use of the domestically produced power to heat the required hot water.