IDP: Software development to implement building physics in the field of Smart Homes

In recent years, there have been great developments in the field of smart homes, but one aspect of building automation that has not been taken into account yet, is the direct interaction between people and living space, i.e. building physics.

The comfort of buildings and living spaces depends on many complex interrelationships. One aspect that particularly affects the health of the user is the formation of mould in the living space. Mould are very harmful to health and can make a living space uninhabitable. The mold formation is mainly dependent on the correct interaction of air humidity and air temperature. These connections were already examined in detail and a software was provided to simulate the mold growth.

For the application in the SmartHome however still several aspects are still necessary for a successful application. A SmartHome must be able to evaluate the mould relevant connections and to find and implement the best solution for occurring problem situations. Thus, it is possible to support and secure the health and comfort of the users. However, this is aggravated by the fact that not every user in a building has the same habits, so it is crucial that the system can adapt to the user.

![Diagram of intelligent interface](image)

*Fig. 1: The intelligent Interface*

The task of this project is to implement an already developed methodology in Matlab that recognizes building physics relationships and integrates them into an automation system. The focus of this software should be on mould and thermal comfort. The IDP takes place at the Chair of Building Physics with a workplace and regular supervision.
Knowledge of:
- matlab
- SQL
- pearl
- OWL (Web Ontology Language)

are desirable but not necessary.

Possible task packages:

Design of a database layout
A data segment layout created in MySQL must be created and contain a list of modules, sensors and actuators, but also the categorization and a special semantic system which is based on the Semantic Web technology.

Development of an OWL-based categorization of Smart Home devices
A Matlab routine must be created which automatically assigns actuators and sensors of a Smarthome to the respective software modules of the Smarthome. Thus, a determination of relevant software modules is possible depending on new sensor values or actuated actuators.

Validation of routines
The Matlab routines will be tested using two selected examples. The examples will treat mold and thermal comfort as topics because comprehensive algorithms have already been implemented here. The implementation will be done in Matlab.

Framework:

A fully automated two-room apartment is available for the validation and evaluation of the routines created in real-time operation.

Contact:

Please send application to
M.Sc. Alexander Peikos
alexander.peikos@tum.de