

# A Framework for a Task-Oriented User Interaction with Smart Environments Using Mobile Devices

## Abstract

Smart environments consist of sensors, actuators, computer-controllable devices, and pervasive services. A traditional paradigm for users to interact with a smart environment (*i.e.*, consuming services and controlling devices) is to use software applications (called controller applications). This interaction paradigm is called the application-centric paradigm which has been a dominant paradigm in desktop computing for many years. There are limitations of this paradigm:

- Users need to install the right controller applications on their computers (*e.g.*, smartphones).
- The user interfaces are not directed towards users' tasks, they are instead organised around functions of controlled devices. Such the function-based user interfaces require users to understand devices' functions and to coordinate them appropriately to accomplish a task.
- It cannot directly answer questions such as what tasks are possible in a particular smart environment; and how to achieve a task using available devices and services in a particular smart environment.
- It does not allow a user to move an ongoing task from one computer to another computer.
- It does not allow distributed users to collaborate on the same task.

To address the limitations aforementioned, in this thesis, we investigated the task-centric interaction paradigm in smart environments. With the task-centric paradigm, users interact with smart environments in terms of tasks, instead of applications and functions of devices. We designed and implemented a framework supporting development and deployment of the task-centric paradigm in smart environment. We implemented a prototype and evaluated it against the application-centric paradigm. In addition to addressing the limitations of the application-centric paradigm, our implementation of task-centric paradigm also provides a task specification language and context-aware task suggestion.

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