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Requirements of User Interface (UI) for home network system

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Home network is an evolving research subject in networking area recent years. Currently, there are many smart home solutions in the market. Their purposes are both help users to remotely control and monitor their home. Moreover, their graphical user interface (GUI) is of paramount importance to a successful solution: whereas a badly designed GUI will complicate and hinder the use of a perfectly capable underlying system and negatively impact the user experience, a well designed GUI can help the user control and operate devices effectively. However, it's a difficult task to evaluate the effective and usability of the GUI because there is no research about the requirements of the home network Graphical User Interface (GUI) yet.

On the other hand, at the moment, we are in the era of mobile devices such as: smart phones, tablets, etc. which are network devices that can easily connect to a home network and become central controllers for home devices. Therefore, in this research, we firstly propose the requirements of the GUI for the home network system after examining existed home automation solutions and physical user interfaces of home devices, which are:

- Centralized visualization of home devices

- Show device location
- Show device type
- Show device current status
- Device remote controlling
 - Show “appropriate” UI components for practical command functions of the devices
 - Show “appropriate” UI components for practical setting continuous values functions of the devices
 - Show “appropriate” UI components for practical setting discrete values functions of the devices
- Device scripting/programming
 - Create a script
 - Edit an existed script
 - Execute a script

Secondly, an application called HomeControl is implemented followed the required UI functions. The application is developed for iOS platform and uses UPnP architecture to connect with devices in an experimental house.

In the next stage, realistic use cases are designed for using HomeControl application on an iPad to control the home devices. For the experiments, six people are asked to participate in the practical use cases and answer a questionnaire. At the end, logged activities of user and events of home devices combine with the questionnaire results review that:

- The requirement of the centralized visualization of home devices has a greater effect on user than the remote controlling function.

In summary, in this research, we propose the requirements of GUI for home network at the same time clarify the effect of the necessary UI functions on the usability of the prototype GUI. The achieved insight of the evaluated characteristics of these requirements will help home network researchers have an overview of a friendly and functional GUI which allows residents to interact efficiently with their home system.