Authentication in a Smart Environment ("3D Pass")

Bachelor / Master Thesis

Users' home environments are increasingly equipped with „smart" devices, which are increasingly capable of accessing, collecting and processing sensitive personal data. This opens a need for authentication on these devices. However, conventional authentication mechanisms are oftentimes not suitable for smart devices. As an example, entering secure (i.e. lengthy) passwords on a remote control for a smart TV may not be feasible. Related work suggested to transfer passwords to a 3D space (i.e., placing objects in virtual environments). We envision this to be transferred to actual, real environments (i.e., users' smart homes). Possible „passwords" may include, but are not limited to, interaction with a secret chain of devices (e.g. light switch, remote control for TV, fridge) or interaction with a particular devices while considering context (e.g., choosing a certain TV channel at a certain time). This may be included in users' usual interaction and routines to ensure usability and memorability. The theoretical password space is huge (i.e., high amount of devices, hence high amount of combinations) - however, so called „sweet spots" may evolve.

This thesis aims at developing a new, scalable authentication mechanism for smart environments based on a) novel possibilities for input and b) novel authentication factors (e.g. behavioural biometrics).

Tasks:

- Review of related work
- Analysis & Concept:
    - find suitable devices (not necessarily „smart")
    - find suitable interactions

- Develop and evaluate a concrete authentication mechanism for a smart home environment
- Analysis, reflection, and discussion of the outcomes

Requirements:

- Micro controller programming (sensors, raspberry pi)
- Interest in designing and conducting user studies
- Independent scientific work and creative problem solving

Related Work:

Alsulaiman, F. A., & El Saddik, A. (2008). Three-dimensional password for more secure authentication. *IEEE Transactions on Instrumentation and measurement*, 57(9), 1929-1938.
https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=4483709

Kolhe, V., Gunjal, V., Kalasakar, S., & Rathod, P. (2013). Secure authentication with 3D password. *International Journal of Engineering Science and Innovative Technology (IJESIT)*, 2(2), 99-105.
https://pdfs.semanticscholar.org/23fe/bc76196180821fa094488b612d8fbd07d5f6.pdf

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