Examining Visual-Spatial Paths for Mobile Authentication

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Computer Human Interaction: Mobility Privacy Security

Motivation

- Strong passwords for existing authentication methods are difficult for users to remember/ recall
- Many smartphone users have low entropy passwords that have low adversary protection
- 42% of smartphone users use no form of authentication

Main Objectives

- **Memorability:** How easily retainable is our secret
- **Security:** The security level of our authentication system
- **Adversary Protection:** How easily can someone steal the password

Memory Palace

- The user visualizes a spatial path within a virtual space (palace) to recall information

- Humans are better at remembering visual-spatial information than they are at remembering abstract information

Memory Palace Mobile Authentication App

- The user creates a password stored in the form of a path through a virtual world consisting of rooms
- Wall decorations and items in these rooms serve as visual guides
- The user then can authenticate his/her device by drawing the exact path that corresponds to their password

Methodology

We decided to run two user studies to validate our idea:

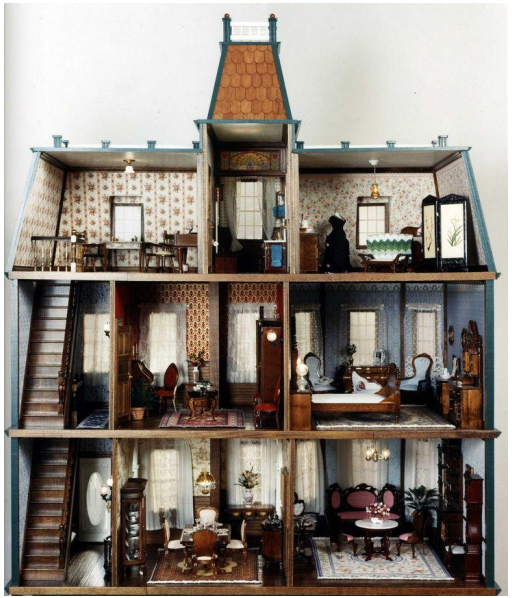
1) Run an initial user study to determine the best representation of the Memory Palace

2) Run a subsequent user study to test the Memory Palace against Android PatternLock, an existing password system

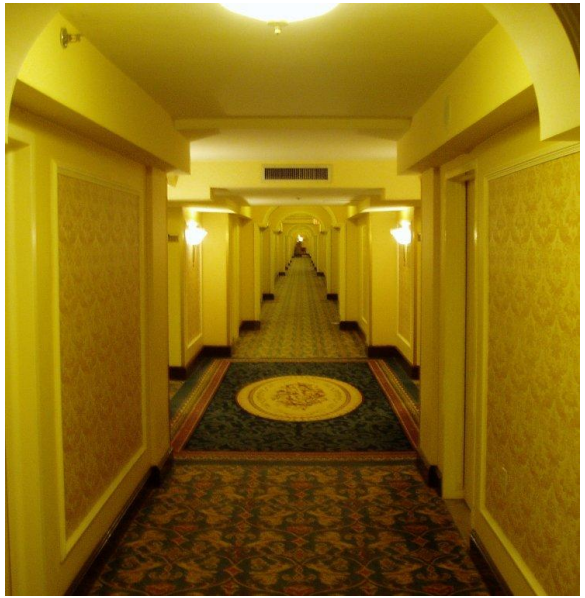
Possible Representations

2D

3D

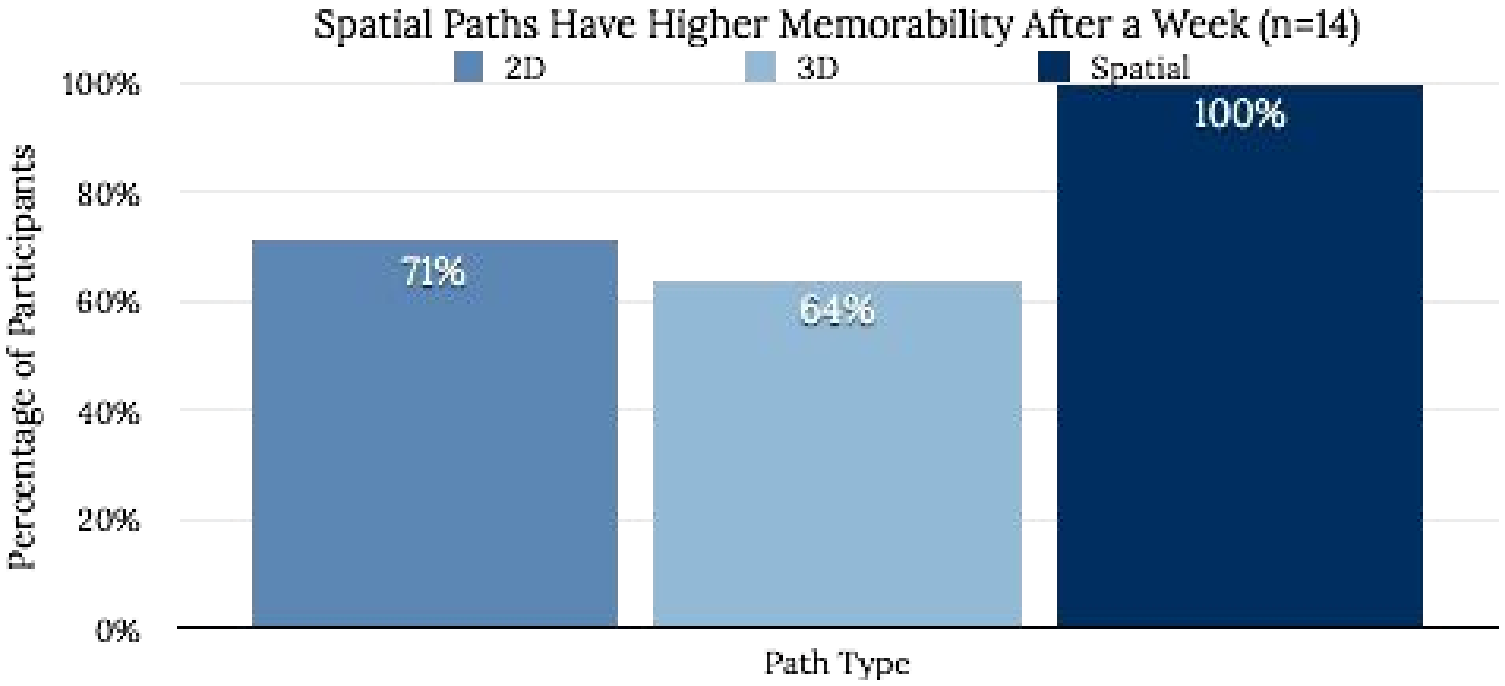


Spatial



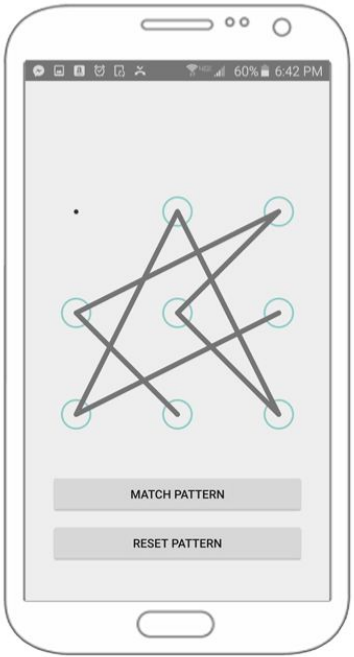
Results/ Analysis

Study 1:

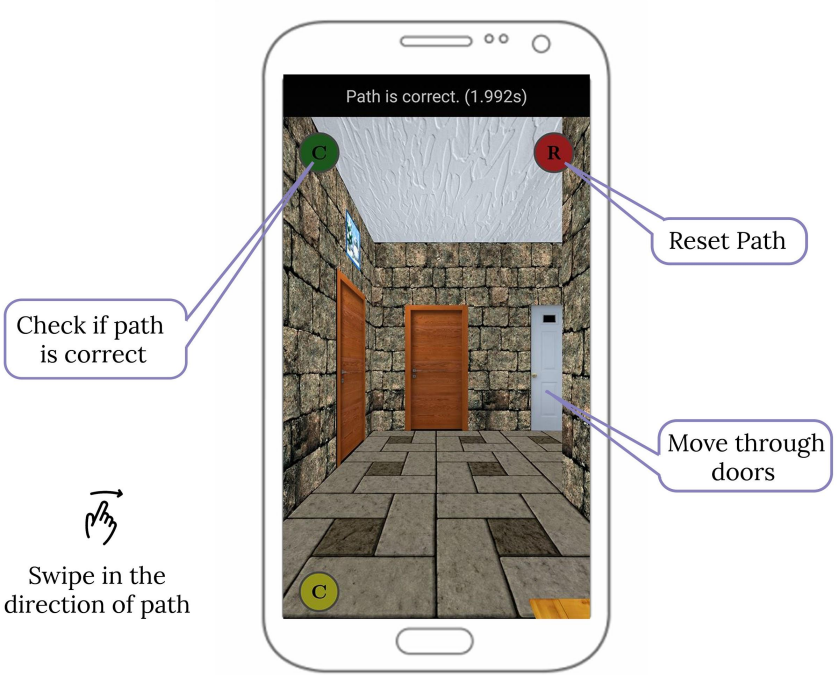


Screenshots

Pattern Lock

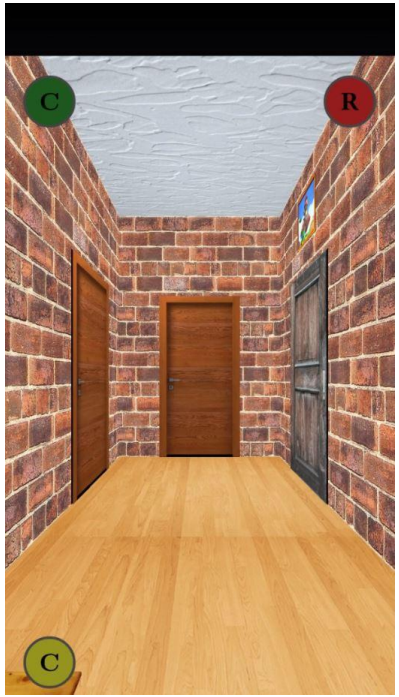


Memory Palace

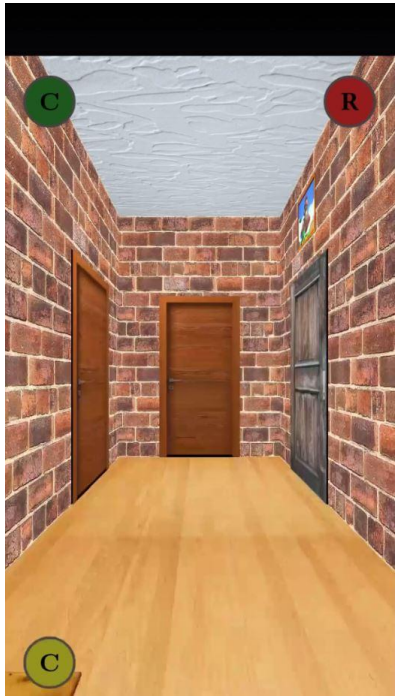


Input Modes

Slow Mode

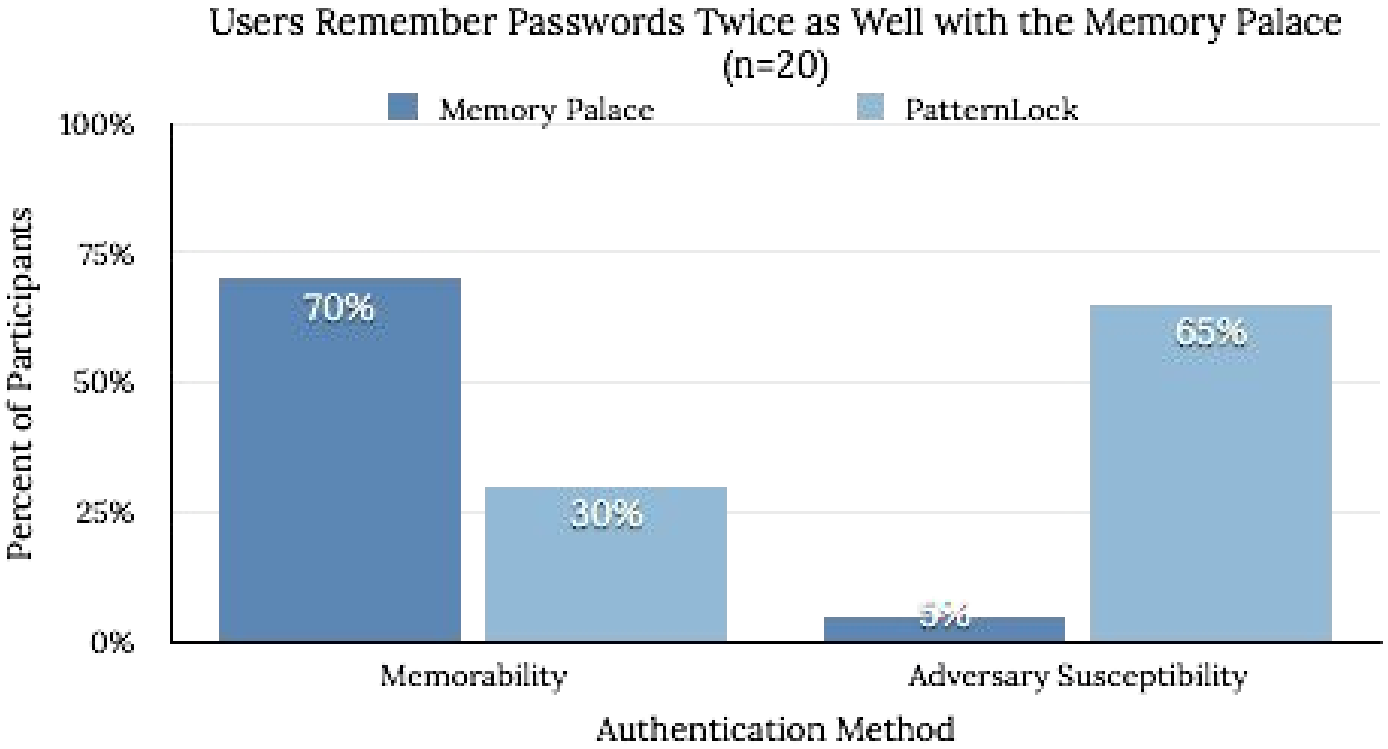


Fast Mode



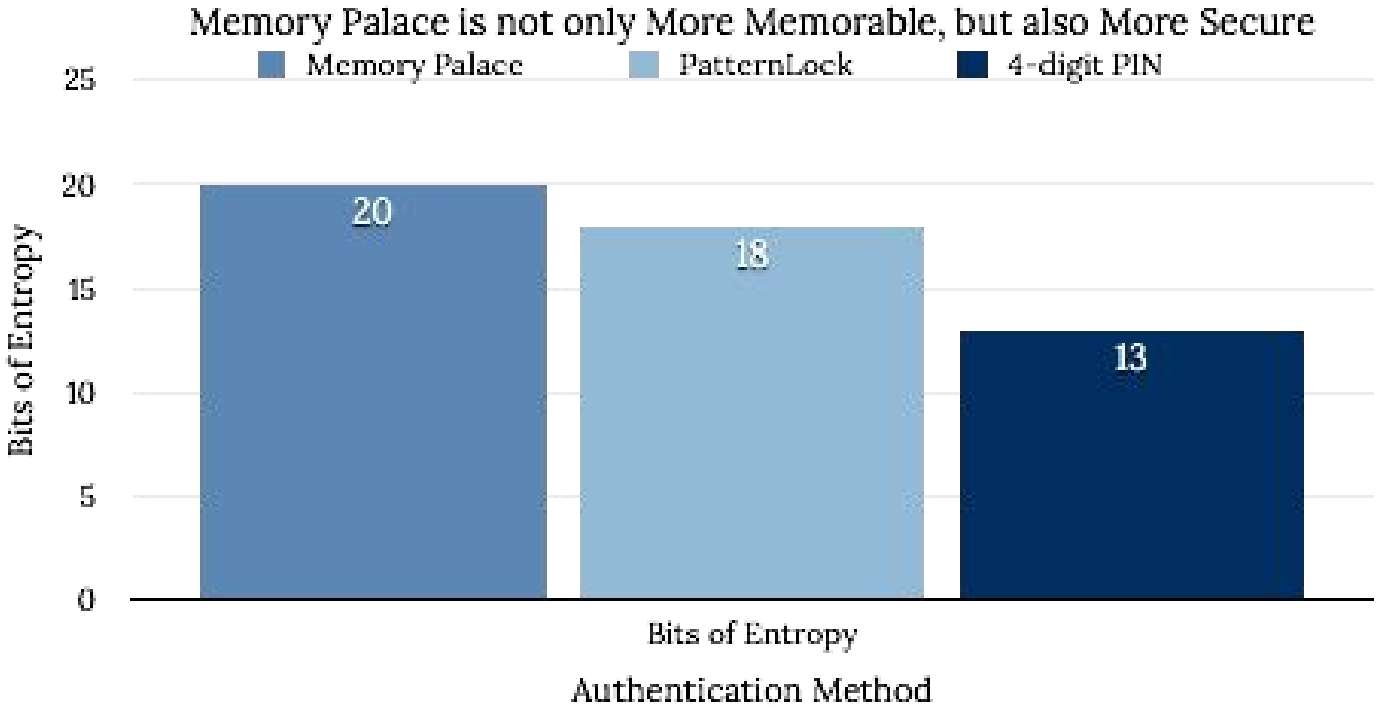
Results/ Analysis

Study 2:



Results/ Analysis

Study 2 (cont.) :



Applications

While The Memory Palace is shown to be a strong security solution, it also provides many other applications as well.

- **Multi-Tiered Authentication**
- **Guest Passwords**

Questions

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