

Knock Gesture

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Overview

1. Thumbprint
2. Our Approach
3. Demo

Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Motivation:

- Authentication for local groups
- Relaxed security
- Access easily added and revoked
- Different users have different rights

→ shared passwords not a solution



Image Source:

<http://momcentral.com/wp-content/uploads/2013/10/ClickN-KIDS-Family-Tablet-Review-e1432923123935.jpg>

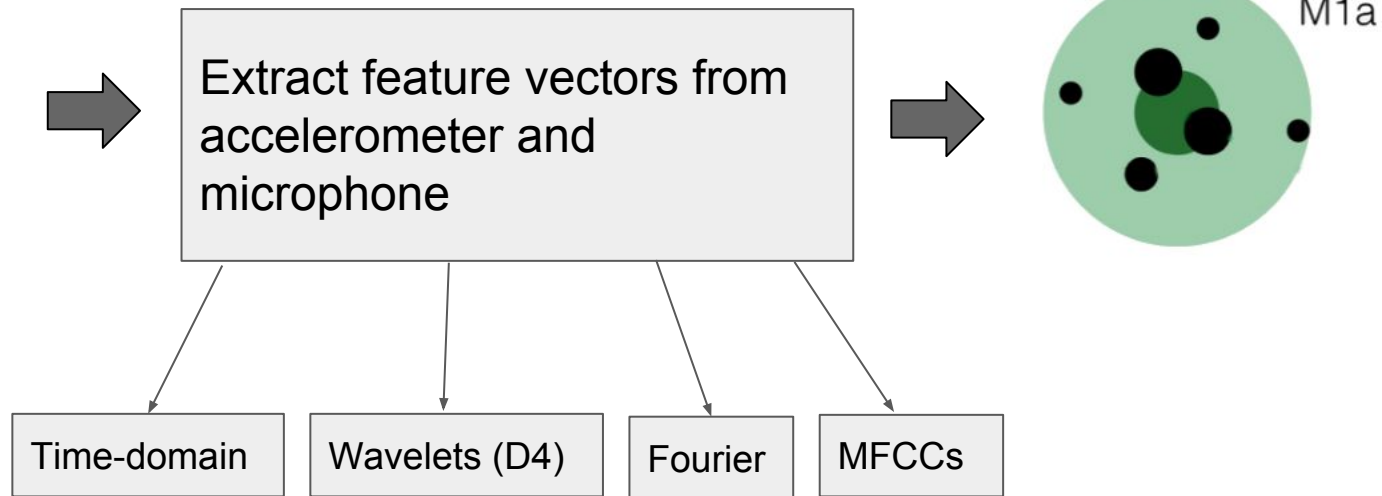
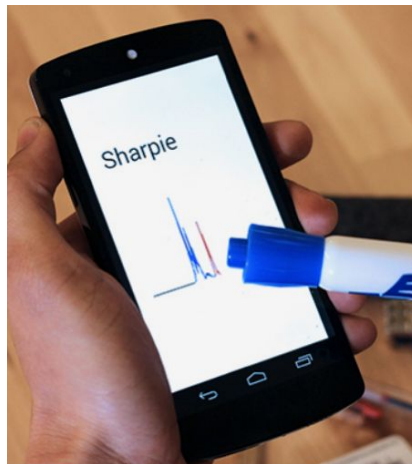
Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Basic idea:

- Inspired by secret knocks
- Shared secret knock
- Users recognized by their expression

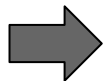
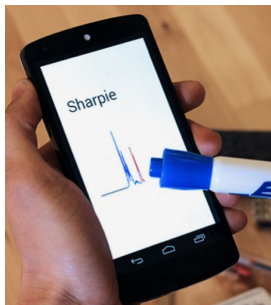
Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Training Data

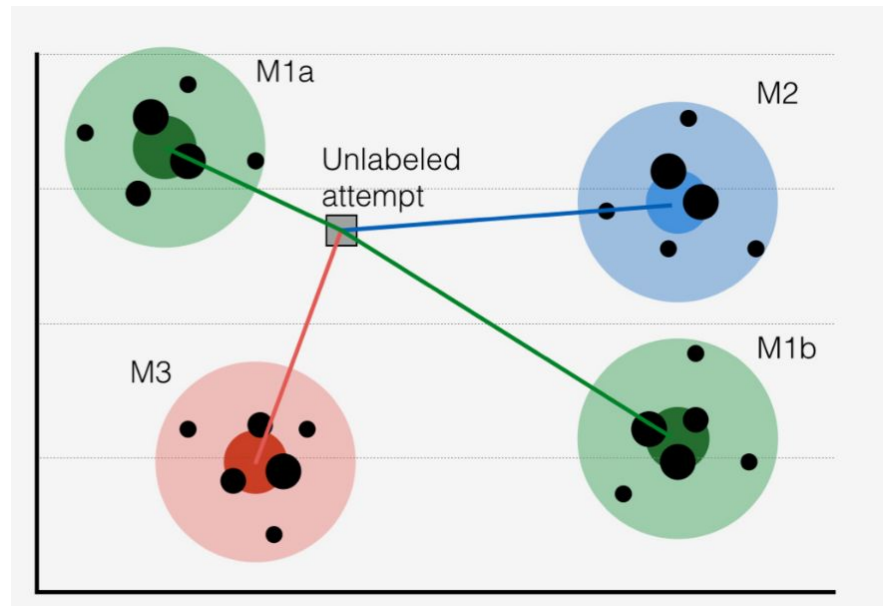
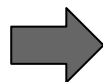


Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Authenticate



Extract feature vectors

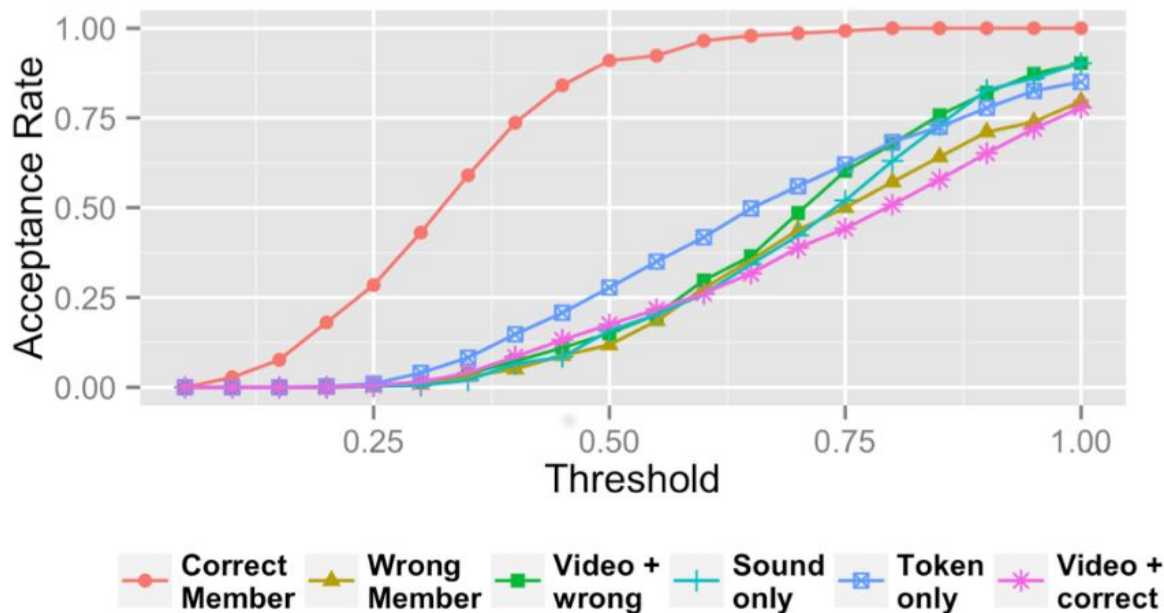


Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Set Threshold to 0.45 - 0.5

Hit: 85 - 91%
(*correct user*)

False Alarm: 13 - 19%
(*adversaries*)



Thumprint (Sauvik Das, Gierad Laput, Chris Harrison, Jason I. Hong)

Results:

- Users can be distinguished from one another
- Users enter thumprints consistently over time
- Protected against casual adversaries

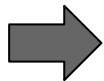
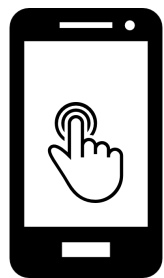
Criticism

- Insecure
- Knocking on display with coins, pencils, etc
- Both hands needed for interaction

Our Approach

- Gesture control instead of login
- No individualisation
- Tapping on the back instead screen
 - No sound
- One handed
- Proof of concept

Implementation



Score: 35

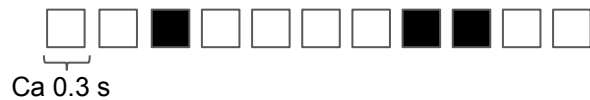


Score: 8



Score: 45

Double Knocks



⋮

Similarity Function

Input: Gesture, Input

$\text{xor} = \text{Gesture} \oplus \text{Input}$

$k = 2 * \text{hammingweight}(\text{xor})$

$p = \text{distance}(\text{Input})$

$p += \text{offset}(\text{Gesture}, \text{Input})$

$h = \text{hammingweight}(\text{Gesture})$

return $k * p + h$



Problems

- Knock smartphone out of hand
- Energy consumption
- Actually not as much variety of easily distinguishable patterns as one might think



Demo