

CASA

CYBER SECURITY IN THE AGE
OF LARGE-SCALE ADVERSARIES



DIGISOUL

Tangible 2FA

An In-the-Wild Investigation of User-Defined Tangibles for Two-Factor Authentication

Mark Turner, Martin Schmitz, Morgan Masichi Bierey, Mohamed Khamis, [Karola Marky](#)

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Two-Factor Authentication



1st Factor
(knowledge)

2nd Factor
(ownership)



Ownership Factor



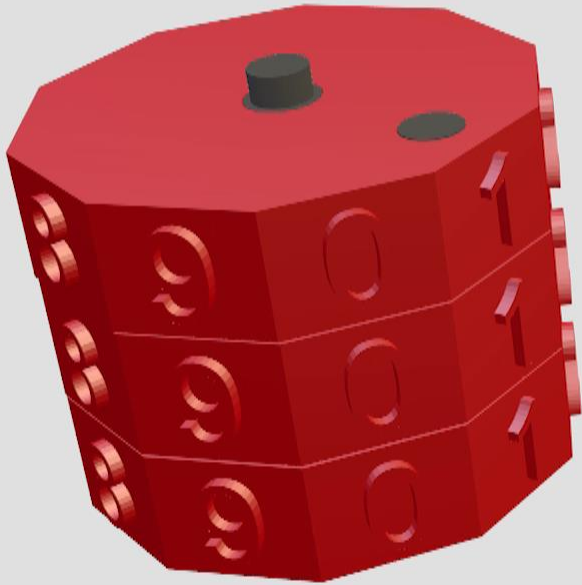
I can't *customize* it

I can't *use* it in my daily life



Marky, K., Schmitz, M., Zimmermann, V., Herbers, M., Kunze, K., & Mühlhäuser, M.
3D-Auth: Two-factor authentication with personalized 3D-printed items.
In *Proceedings of the 2020 CHI conference on human factors in computing systems*

3D-Auth Concept



Embedded-Secret

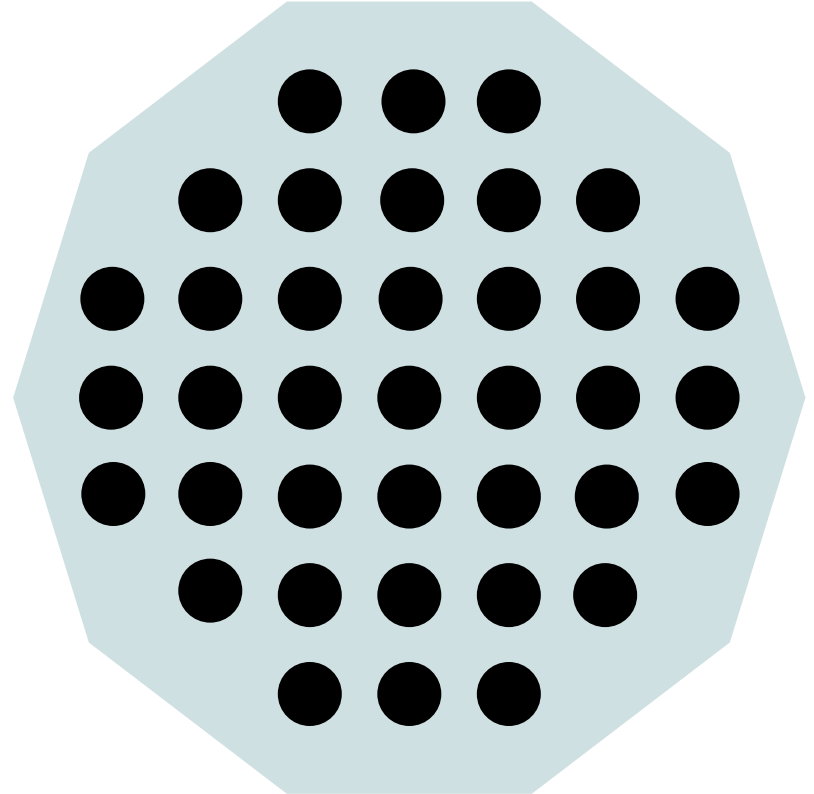


Interaction



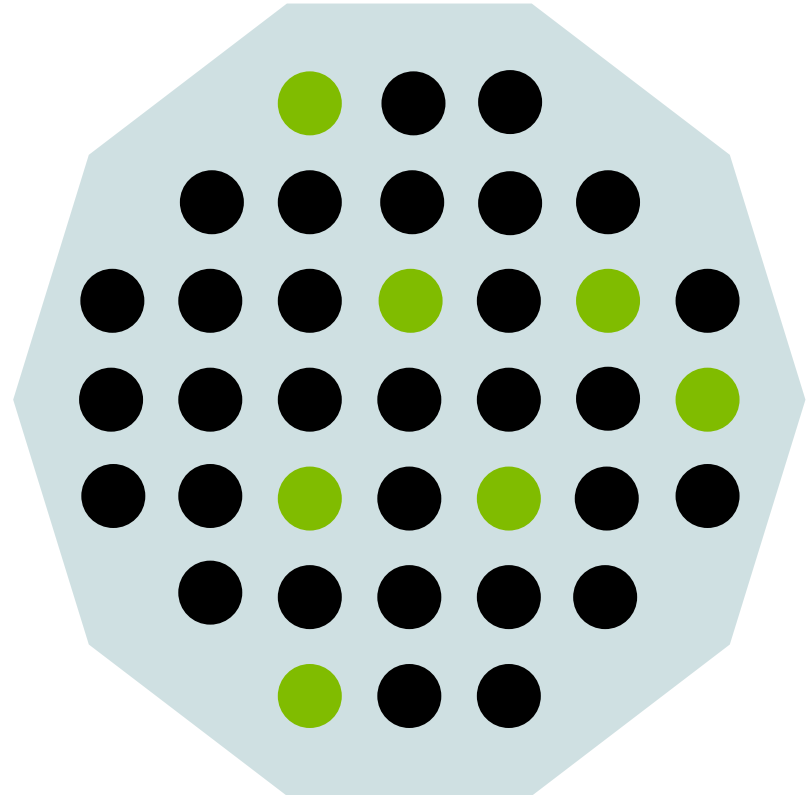
Authentication
Pattern

Authentication Pattern



Authentication Pattern

Embedded-Secret



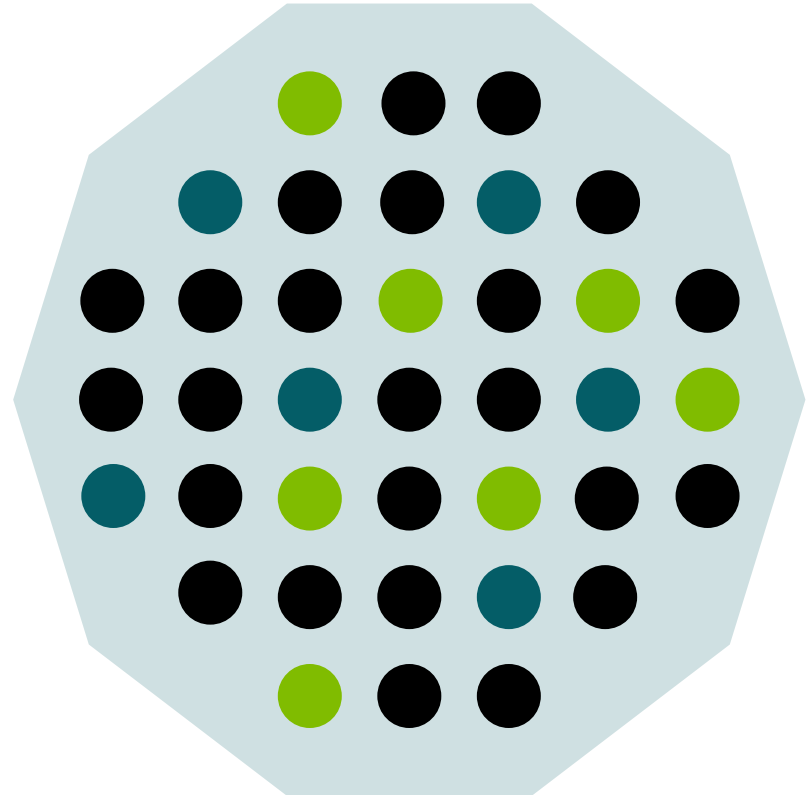
Authentication Pattern

Embedded-Secret

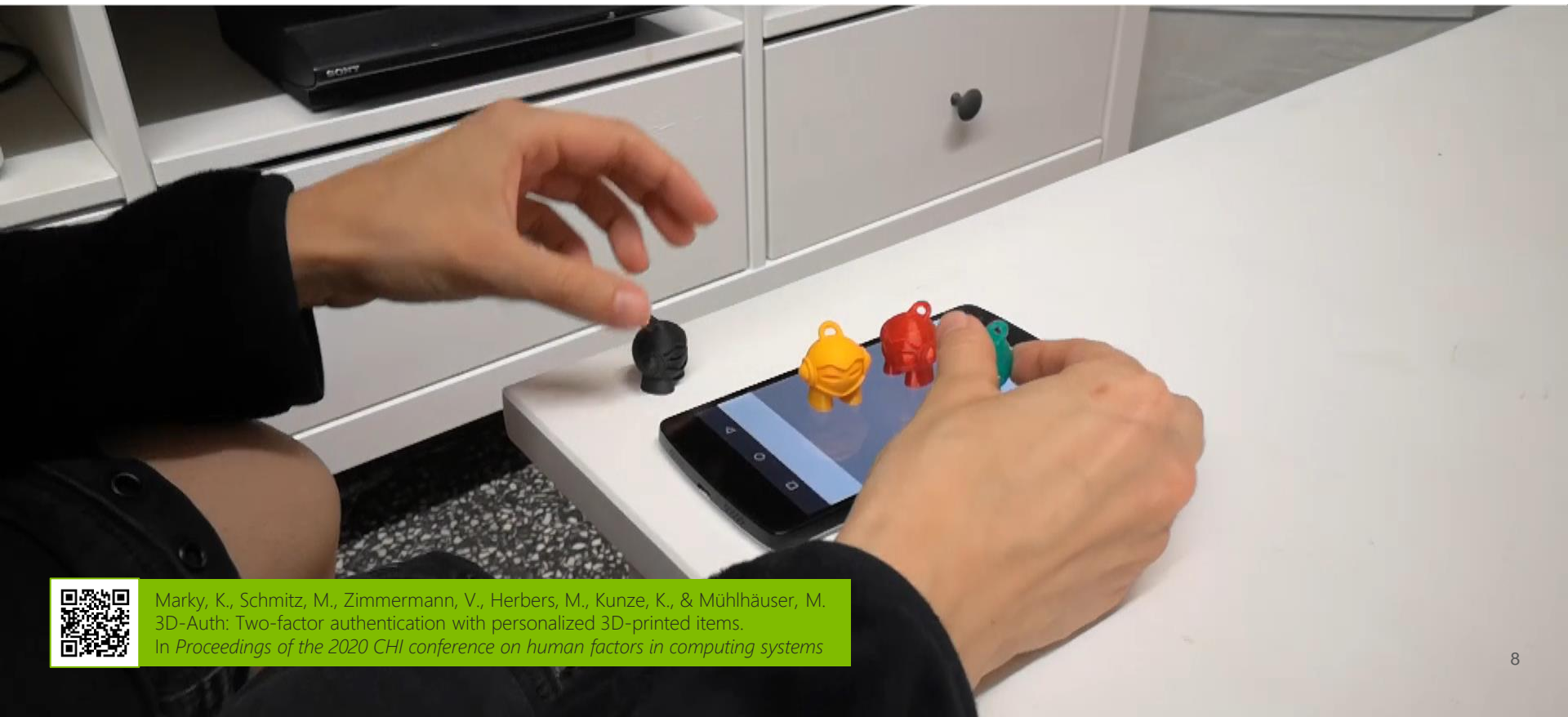
Interaction



Authentication
Pattern



Sophisticated Items



Marky, K., Schmitz, M., Zimmermann, V., Herbers, M., Kunze, K., & Mühlhäuser, M.
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User-Defined Tangibles



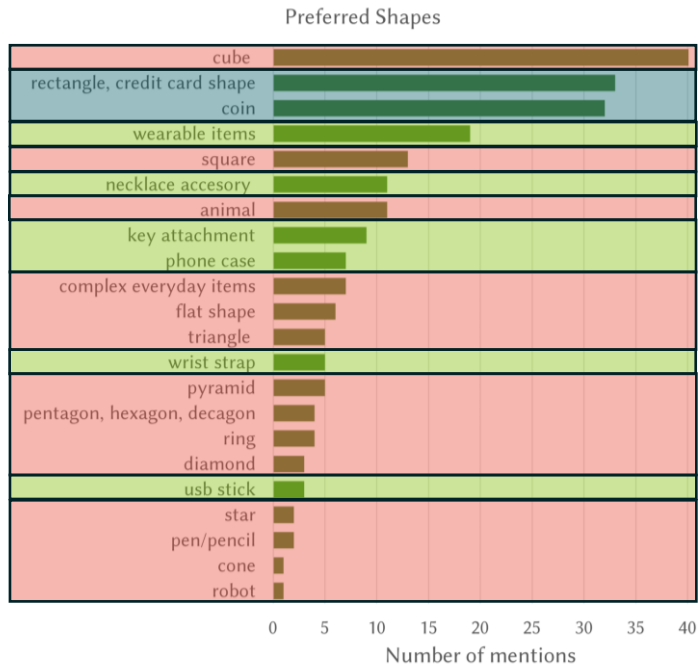
RQ1: What kinds of 2FA tangibles do users wish to use?

Online Survey (N=226)



- Shapes
- Dimensions
- Colours
- Interactions
- Context

Results (Excerpt): Shapes



Standalone Item

Connectable

Wallet Fit

Prototypes

Connectable



Standalone Item



Wallet Fit





Usage in Daily Life



RQ2: How do tangibles for 2FA perform in the users' daily lives?

In-the-Wild Study (N=15)

Welcome Interview
(Consent & Setup)

Usage
(1 week)

Reflection Interview
(Online)

- Triggered Authentications
- Post-Interaction Questionnaire

Result Overview

Security Perceptions

(Security) Metaphors were considered and welcomed

Positive Aspects

Security benefits are valued

Experienced Problems & Issues

Result Overview

Security Perceptions

Positive Aspects

Experienced Problems & Issues

Interaction was perceived as fun

Authentication interactions were memorable

Result Overview

Security Perceptions

Positive Aspects

Experienced Problems & Issues

Forgetting the tangible

Material-related aspects

Thanks for your attention!

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2FA Tangibles might be a viable alternative for 2FA

Security, interaction & customization benefits are valued

More investigation on form factors, materials and security needed



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Check out
our paper



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Check out our DigiSoul Talks



Mark Turner, Martin Schmitz, Morgan M. Bierey, Mohamed Khamis, Karola Marky
Tangible 2FA: An In-the-Wild Investigation of User-Defined Tangibles for Two-Factor Authentication



Rebecca Panskus, Max Ninow, Sascha Fahl, Karola Marky
Privacy Mental Models of Electronic Health Records: A German Case Study



Karola Marky, Shaun Macdonald, Yasmeen Abdrabou, Mohamed Khamis
In the Quest to Protect Users from Side-Channel Attacks – A User-Centred Design Space to Mitigate Thermal Attacks on Public Payment Terminals

Digital Sovereignty Lab

