

SECURITY (COMP0141): WHAT YOU ARE



AUTHENTICATION

Authentication is:

What you know

text passwords

graphical passwords

personal details

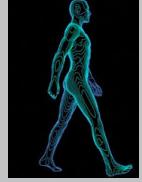
What you have

RFID card

cryptographic tokens

What you are

BIOMETRICS



Dear Anna
I have written an article about you in a
local newspaper ('Our Own Space'), and I would
ask you to do a *Facebook* review if we
can't get it published.
We actually didn't tell anyone about it, but perhaps you could
let me know that?

Lifeguards In your thread, did we say
it was a "charge of 40p" or is it around 40p
per day? I am looking for my leadership model
to say "Dropped in since Jan 2016, the price of
living is *now* important!" (snide)!!

When, in the course of human events, it becomes necessary for one people to dissolve the political bands which have connected them with another, and to assume among the powers of the earth, the separate and equal station to which the laws of nature and of nature's God entitle them, a decent respect to the opinions of mankind requires that they should declare the causes which impel them to the separation.

We hold these truths to be self-evident: that all men are created equal, that they are endowed by their Creator with certain unalienable rights, that among these are life, liberty and the pursuit of happiness.

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BIOMETRICS

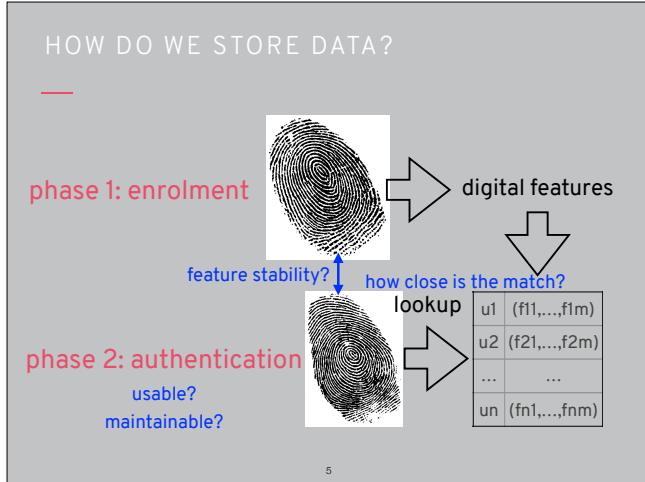
A biometric is a property of an individual that can be measured and from which **distinguishing** and **repeatable** features can be extracted to automatically recognise individuals

Biometric sample: raw data obtained from a capture device

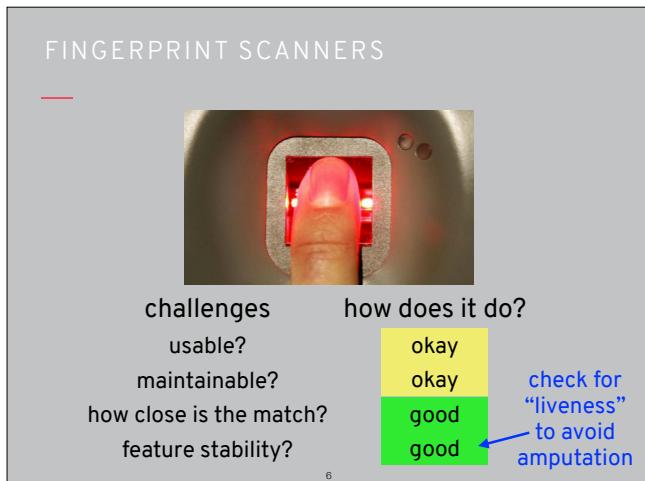
Biometric template: stored biometric features

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There are many things that are (supposedly) unique to you: iris scan, fingerprints, vocal patterns, gait, handwriting, and stylometry



When enrolling you in a system, start by storing data as a set of features (the template). When you go to sign in to the system, it looks to see if your sample matches the template in the database. This seems simple but again there are a lot of challenges



HAND SCANNERS



challenges	how does it do?
usable?	good
maintainable?	good
how close is the match?	okay
feature stability?	good

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hard to train

RETINA SCANNERS



challenges	how does it do?
usable?	okay
maintainable?	good
how close is the match?	good
feature stability?	okay

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think
contact
lenses

TECHNICAL CONSIDERATIONS

Advantages:

- Nothing to remember
- Passive
- Can't share
- Unique (assuming perfect accuracy)

Disadvantages:

- Revocation is difficult (impossible?)
- Invasive
- Private but not secret (easy to steal off glass, door handle, ...)
- If false acceptance rate is 1 in a million, chance of false match is above 50% with only 1609 samples (birthday paradox)

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USER ACCEPTANCE

Threat to **privacy** in terms of stored templates

- Who is using the data, and for what purposes?
- Implicit identification (facial recognition)

Doubts about **reliability**

- Sophisticated attackers can bypass system
- Successful attacks erode confidence

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YOU ARE A HUMAN!

—
CAPTCHA (Completely Automated Public Turing test to tell Computer and Humans Apart)



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CAPTCHAs are a general form of authentication to prove just that you're a human. These pose obvious problems to certain user groups (e.g., blind people) and have gotten more complex (and cumbersome) as attackers have gotten better at automating them

MULTI-FACTOR AUTHENTICATION

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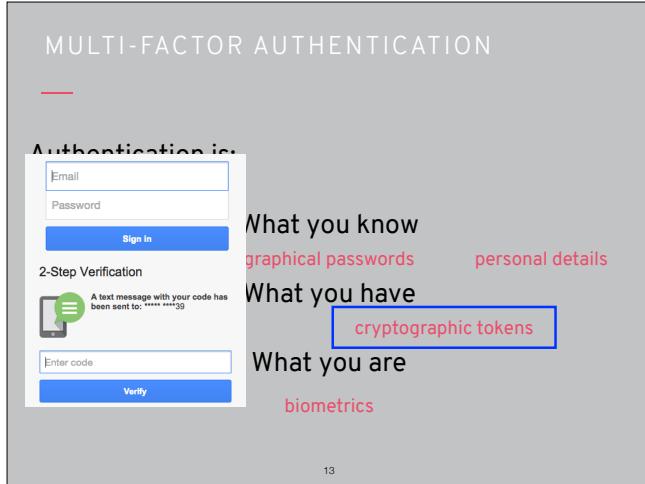
cryptographic tokens

What you are

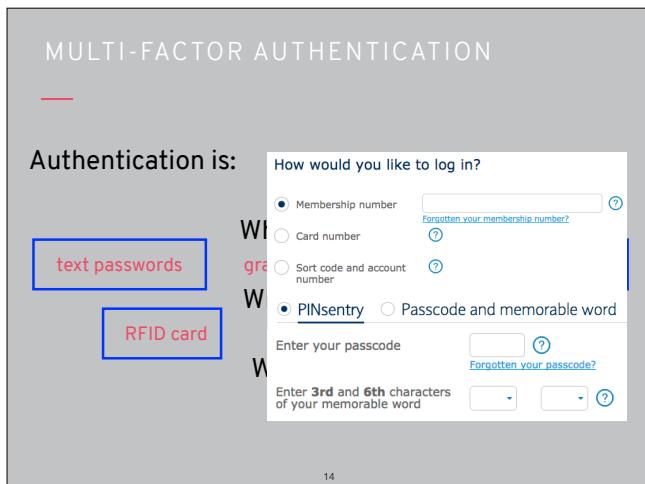
biometrics

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Finally, we can consider combining some of these things together



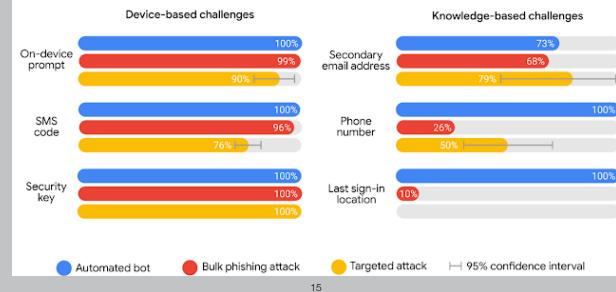
If you have your password and your phone, this might be used for logging into email (commonly what we mean by 2FA)



There are other examples too, like using your card number and a device to log into your bank account, or your card number and a passcode

MULTIPLE FACTORS DO HELP!

Account takeover prevention rates, by challenge type



Taken from <https://security.googleblog.com/2019/05/new-research-how-effective-is-basic.html>