

Privacy Considerations for a Pervasive Eye Tracking World

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Technology and Privacy

Technology growth precedes policy



1973



1991



2000s

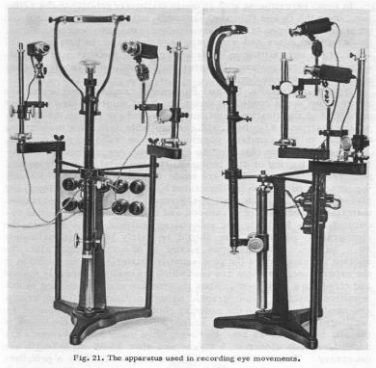
Glympse®

tinder™

today

Let's talk about privacy!

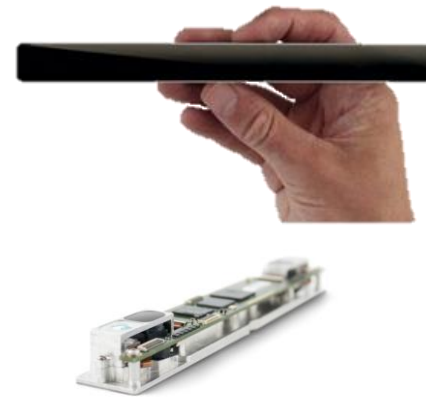
Gaze tracking



1967



2000s



2014

Let's talk about privacy!

Gaze and Privacy Overview

What data is collected?

Who collects it?

Collection at scale.

Gaze data is unique!

Voice recognizer

defeat by changing your voice.

Cameras and face recognition

wear sunglasses, hats, makeup.

Keystroke metrics

type differently.

Eye tracking

???



Volitional control is difficult –
and mentally, physically fatiguing.



Adam Harvey, NYU ITU
“CV Dazzle”

Beyond (x, y)

Individual identity

(various)

Reading native language?

Rayner, 1998

Task

Yarbus, 1967

Borji & Itti, 2014

Mind wandering

Hess & Polt, 1960.

Uzzaman & Joordens, 2011.

Smallwood *et al.*, 2011

Expertise

Y. Liu *et al.*, 2009.

Age

Munoz *et al.*, 1998.

Emotional valence

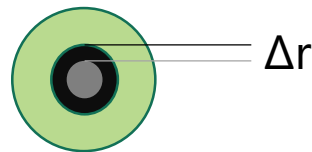
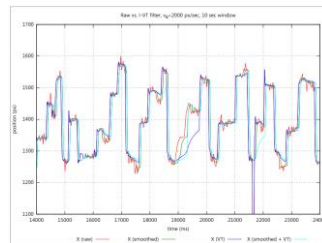
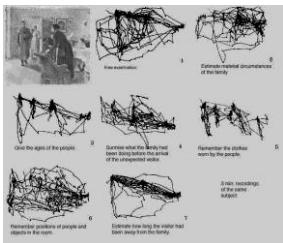
Partala *et al.*, 2000.

Body mass index

Graham *et al.*, 2011

Menstrual cycle

Laeng & Falkenberg, 2007.



Who collects

Intentional collection

Researchers -> benefits the research[ers]

Physicians -> benefits end user

Companies -> benefits company

Incidental collection

Marketers, banks, vehicle manufacturers, etc.

Coming soon: computing device mfrs, Web sites, auto manufacturers

Is opt-out
even possible?

Scale

From **one recording** to
many recordings
of many people

Analogue:



Eye tracker public installations

Eye-Follower, Paris, 1986 –
National Gallery, London, 2001
~ 10,000 recordings

Research corpora

EyeCloud (Vrzakova *et al.*)
EMVIC

Privacy

Westin (1967):

An individual's right “to **control, edit, manage, and delete information about them[selves]** and **decide when, how, and to what extent** information is **communicated to others.**”

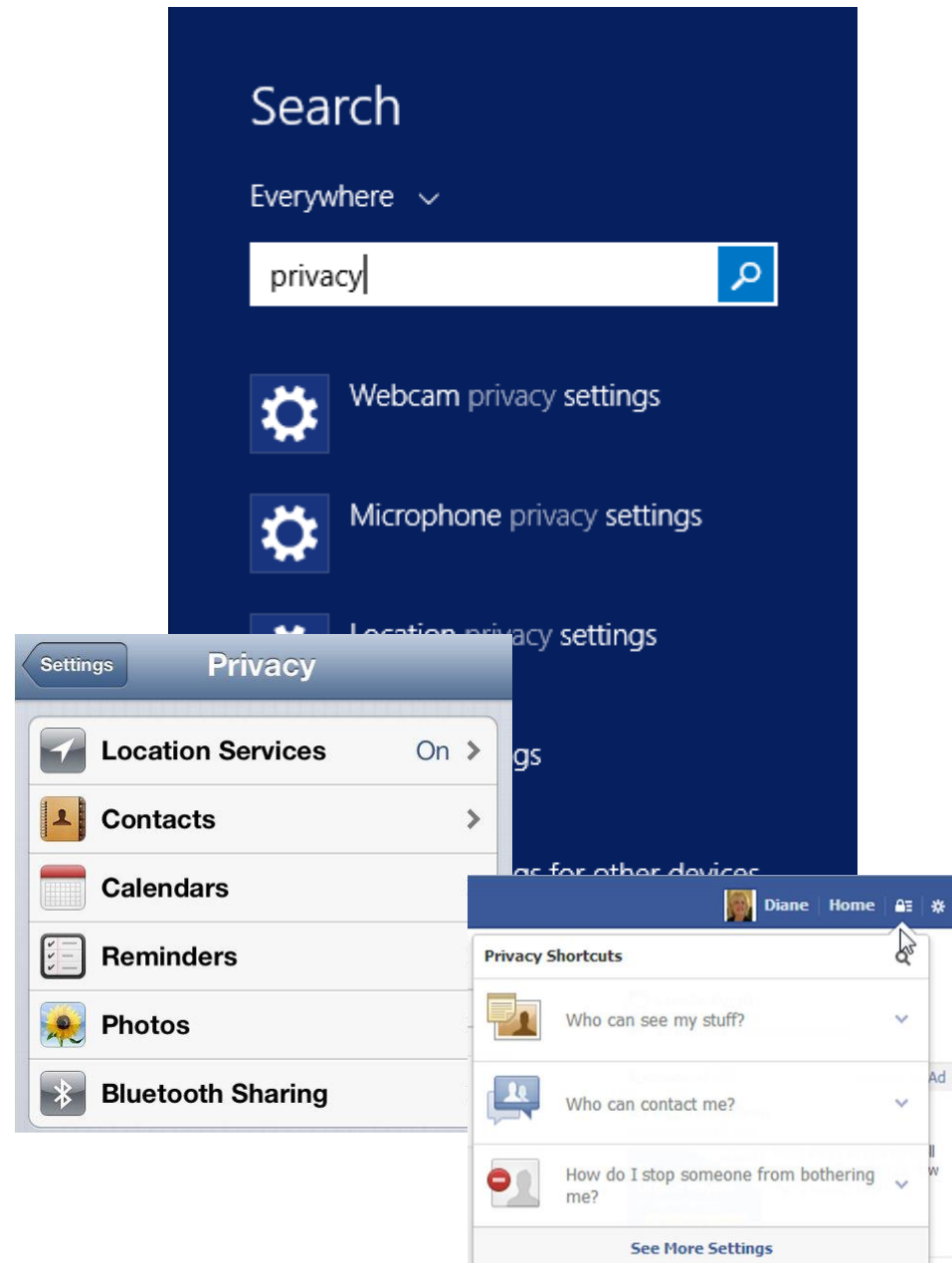
We care about “**information self-determination.**”

What to do?

Duty to inform

Create affordances for self-introspection

Provide interfaces for dissemination control



What to do?

Levels of abstraction, fuzzing

What granularity and noise tolerances are enough?

Rich literature in location community.

Policy and regulation

EU Data Protection Directive, etc.

Gaze-enhanced privacy

Authentication is a good thing

Use focus and attention to gate sensitive data

Summary

With great power comes great responsibility.

Stewards of gaze data should think deeply about collection and use of eye gaze data at scale.

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