

HCIN-722

HCI with Mobile Devices

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MobileHCI

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About this class

- What it's not
 - Mobile app development
 - Mobile design
 - Phone- and tablet-only
- What it is
 - Mobile interaction thinking
 - Big picture ideas
 - New devices
 - Lots of reading & writing!

About this class

- When: Tuesdays & Thursdays, 2:00–3:15 pm
- Where: GOL-1620
- Office hours
 - Thursdays, 3:30–5:00 pm
 - GOL-2615
- If you get confused or stressed or sad, please come see me or email me!

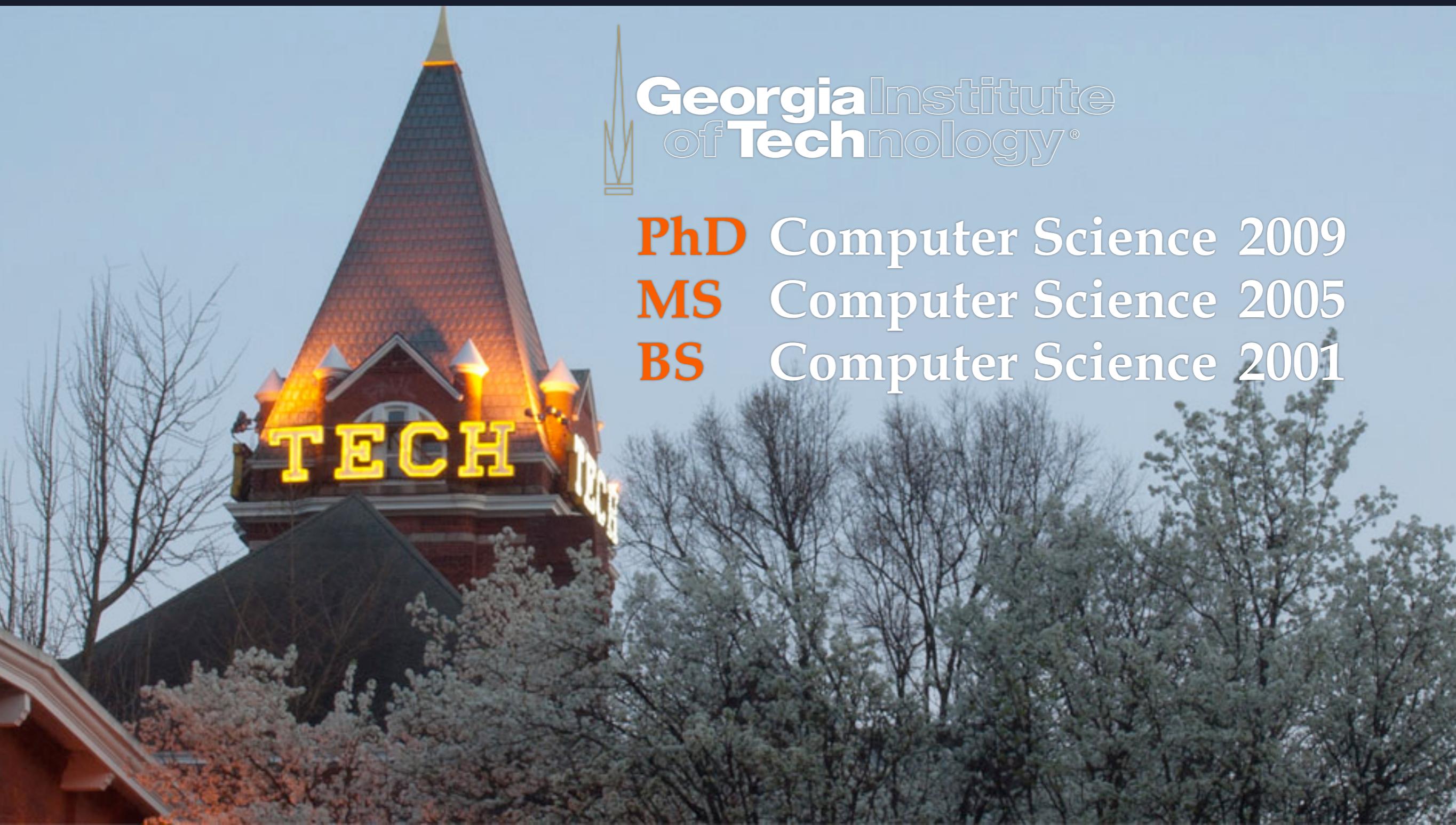
Today

- About me
- About you
- Class overview
- Lots of administrative stuff
- Then interesting content!

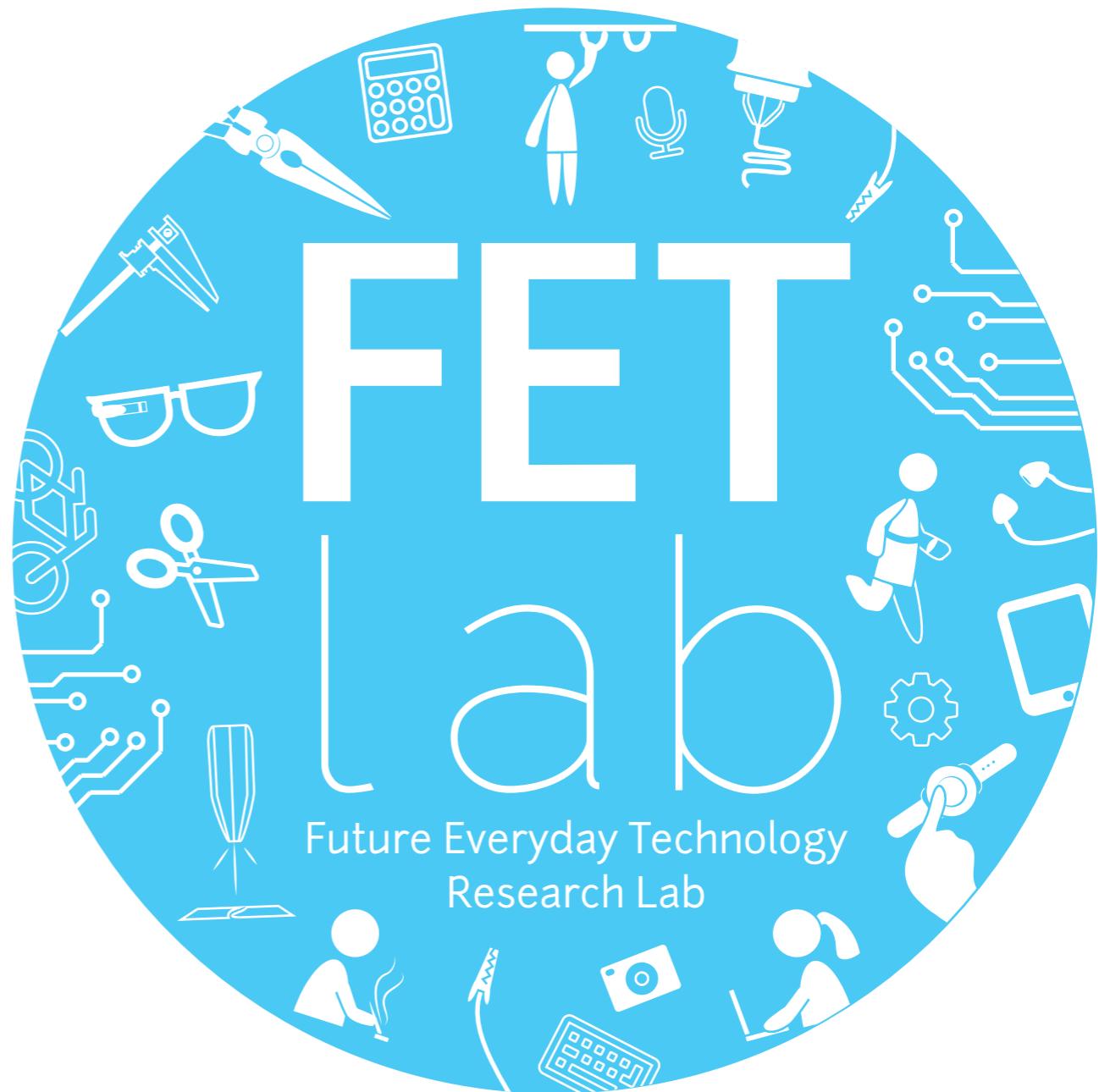
About me



PhD Computer Science 2009
MS Computer Science 2005
BS Computer Science 2001







2014-

My research

Microinteractions



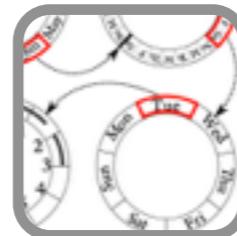
Facet (2013)



Nenya
magnetic
ring (2011)



MAGIC
gesture tool
(2009,
2010)



Round touch
watch
(2008)



Quickdraw
(2008)



Dual-
purpose
Speech
(2004)



Gesture
Pendant
(2001)

“Scratch” computing

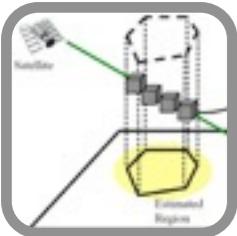


Bitwear
(2013)



Rhythmlink
(2011)

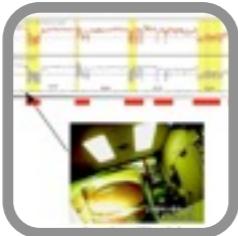
Sensing & modeling



GPS
shadows
(2008)



Soldier
activities
(2007)



GERD
camera
(2004)



Mobility
modeling
(2002,03)

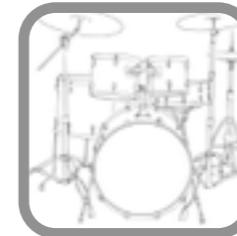
Creativity



SenSynth
(2012)



Dancing in
the Streets
(2005)

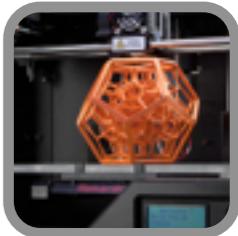


One Man
Band
(unpub'd)

Current research



Scratch
computing
& new UI



Personal
fabrication

About you

- Who are you?
 - name, program, year
 - applicable experience, skills
- Why are you here?
 - what do you want to learn?

Class overview



Best party

EVER

Objectives

- Understand where and how mobile HCI differs from HCI
- Get a foundation of contemporary and classic research
- Identify and understand current challenges in mobile HCI
- Think beyond "brick" devices (phones, tablets) to new interaction modalities
 - Stop staring at your phone
- Understand challenges in evaluating mobile interfaces

Class structure

- Updates, due dates via Slack
 - Turn in only PDF files!
- Each week: read 2–3 research papers (classic & new)
- Discussion
- In-class activities
- Individual homework assignments
- Group projects

Web page

- I hate MyCourses; we will use it for
 - communicating grades
 - nothing else
- Official class website: <http://fetlab.rit.edu/722>
 - Everything will be posted here or on Slack

Slack

- Slack is the official communication channel for the class
- I will post announcements here
- You can communicate with me and each other here
- Please use Slack instead of email

Grading

Class participation	10%
Reading summaries	9%
Individual assignments	21%
Class presentation	20%
Project	40%
Extra credit (maybe)	5%
<i>Total</i>	105%

Policies

- Late assignments
 - Turned in within 24 hours = 50% credit reduction
 - Each 24 hours after that = 10% credit reduction

Academic integrity

- Academic integrity violations: don't do it! **Instant fail!**
 - cheating
 - duplicate submissions
 - plagiarism

Plagiarism

Plagiarism is the representation of others' ideas as one's own without giving proper attribution to the original author or authors.
Plagiarism occurs when a student copies direct phrases from a text (e.g. books, journals, and internet) and does not provide quotation marks or paraphrases or summarizes those ideas without giving credit to the author or authors.

Plagiarism

I'm serious.

I have failed students for plagiarism.

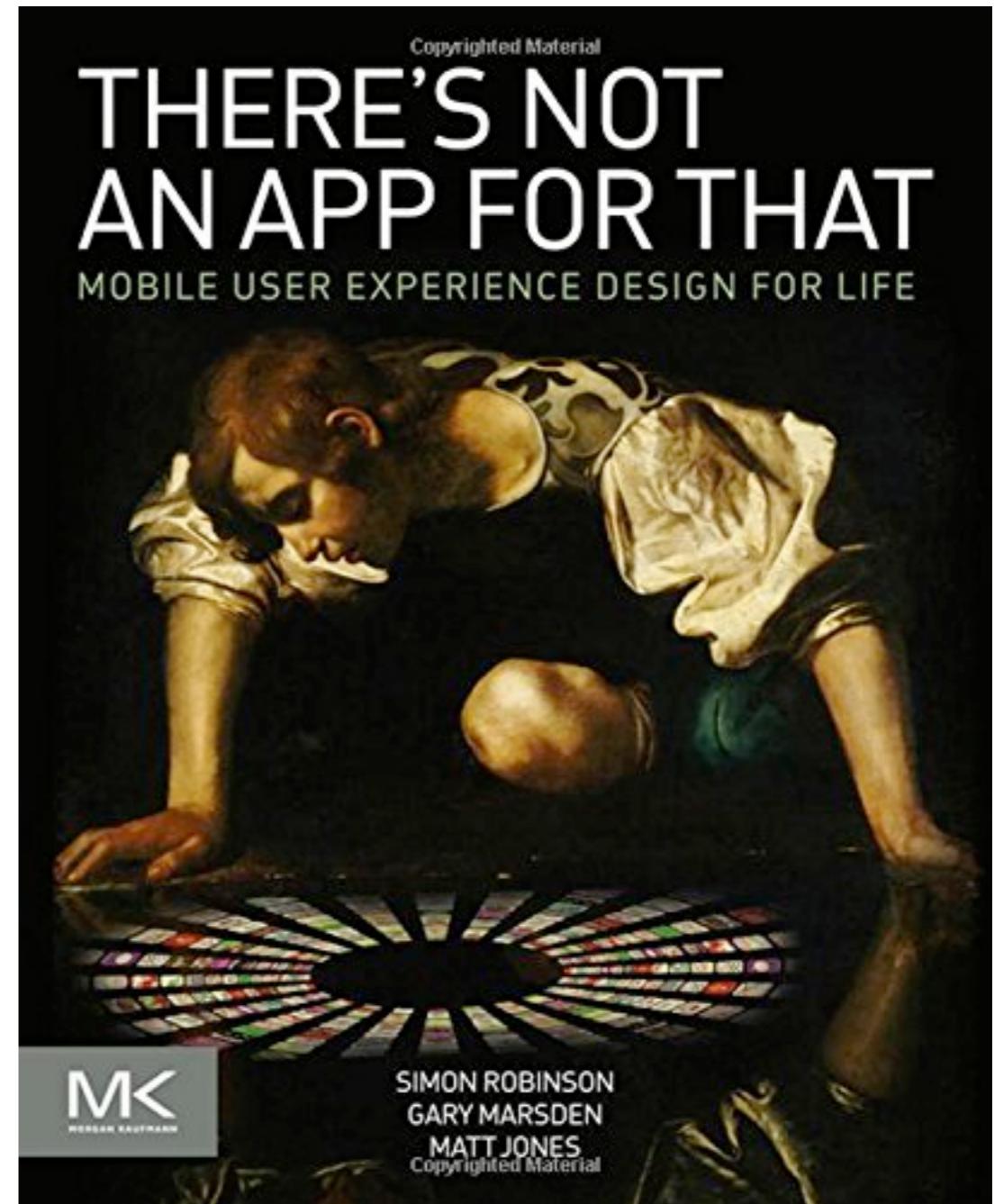
Book

There's Not an App for That:
Mobile User Experience Design
for Life

*Simon Robinson
Gary Marsden
Matt Jones*

Amazon link:
<http://tinyurl.com/hcin722-book>

Get it on Kindle or paperback



Class participation

- Worth 10% of your final grade
- What is it?
 - Asking questions
 - Responding to other students' questions
 - Participating in discussion
 - Participating in in-class activities
- I should know who you are by halfway through the semester!

Individual assignments

- To be announced
- There will be 3, each worth 7%
 - One observing people
 - One testing an app
 - One making improvements and testing them

Reading summaries

- There will be approximately 3 readings per week
- You will briefly summarize them via a Post on Slack
- They are due at 1:59 pm every Tuesday
- Include:
 1. What research problems were the authors investigating?
 2. How did the authors attempt to answer these questions? Did they succeed?
 3. What follow-on possibilities do you see?

Reading summary—format

Title of the first reading

1. Answer to question 1
 2. Answer to question 2
 3. Answer to question 3
-

Title of the second reading

1. Answer to question 1
2. Answer to question 2
3. Answer to question 3

Reading summaries—example

Gaze Enhanced Speech Recognition

1. The authors wanted to find out if they could improve the accuracy of speech recognition by incorporating gaze tracking. By understanding what the user has looked at, they theorize that they can restrict the speech recognizer's language model.
2. The authors ran a study to collect eye gaze data in conjunction with speech-based navigation of an interface, and then they used this information to adapt a speech recognition engine to use the eye gaze data. Their method worked well, achieving a 10% improvement in errors.
3. The authors only considered a static situation, reading a web page. It would be interesting to try to do the same task in a more realistic scenario, by having users interact with objects in the environment by looking at them.

Student presentations

- Each student will teach one (half) class!
- You'll either pick three papers and synthesize them and teach the class about what you learned...
- or you'll pick a technology project and give a tutorial.
- This is worth **20%** of your final grade.

Some sources for readings

- MobileHCI: <http://dl.acm.org/event.cfm?id=RE395>
- CHI: <http://dl.acm.org/event.cfm?id=RE151>
- UIST: <http://dl.acm.org/event.cfm?id=RE172>
- ISWC (International Symposium on Wearable Computing)
 - <http://dl.acm.org/event.cfm?id=RE336> (Publication Archive tab)
 - Search for "ISWC" at <http://ieeexplore.ieee.org>
- ASSETS (Accessibility and Computing): <http://dl.acm.org/event.cfm?id=RE205>

Projects

(see detailed guidelines on the class web page)

Possible project ideas

- Do a new study
 - Phone use with gloves
 - Long-term use of fitness trackers
 - Behavior around phone notifications
- Replicate a study
 - Oulasvirta 4 second paper
 - Reading on the go
 - Quickdraw
 - Check future work from papers you read
- Build something
 - App for eyes-free music composition
 - Mobile RSVP
 - Accessible eyes-free mobile keyboard
 - Build a wearable keyboard
 - Peripheral notification
 - Rich watch-based input, output
 - Mobile programming environment
 - Address an issue from a prior study

Group projects

- Teams of 4–5
- Original research effort
- Large effort: get started **now!**
- Let me know about intra-group problems **sooner** rather than later.

Project timeline

Form teams	Feb 2
Project proposal due	Feb 9
Proposal feedback returned	Feb 12
Updated proposal due	Feb 16
Mid-project check-in 1	Mar 17
Mid-project check-in 2	Apr 19
Final deliverables due	May 17

Project proposal

- **Clearly written**, approximately 2 pages, including:
 - title
 - group members and roles
 - project idea
 - planned contributions
 - plan of attack with weekly milestones
 - initial literature review
 - resources you may need (HW/SW) and how you will get them
 - success criteria: how will I (and you) know if you succeed?
- I'll give you feedback; you'll return an updated proposal addressing the feedback.

Project proposal

- Don't be afraid! Come to my office hours.

Mid-project check-ins

- Two of them, due Mar 17 and Apr 19
- Clearly written draft paper with sections:
 - Introduction
 - including project idea, motivation, etc
 - Related Work section
 - Outline of body with approach

Final deliverables

- < 3m video
- Final paper
- During finals week: in-class 10–15 minute presentation, demo (if applicable)

Hardware

- If you want hardware:
 - discuss it with me!
 - I might have it already.
 - Order it yourself and keep it...
 - or I (maybe) can order it and use it in my lab.
 - most importantly: **have a plan!**
- I have 3D printers
- Visit the student makerspace: <http://hack.rit.edu>!

Hardware suggestions

- Arduino: easy(-ish) to use
- Light Blue Bean: Bluetooth Arduino
- Note: it's still not incredibly easy to connect stuff to your phone. But! Use your laptop!

Hardware I have now(-ish) that you can use

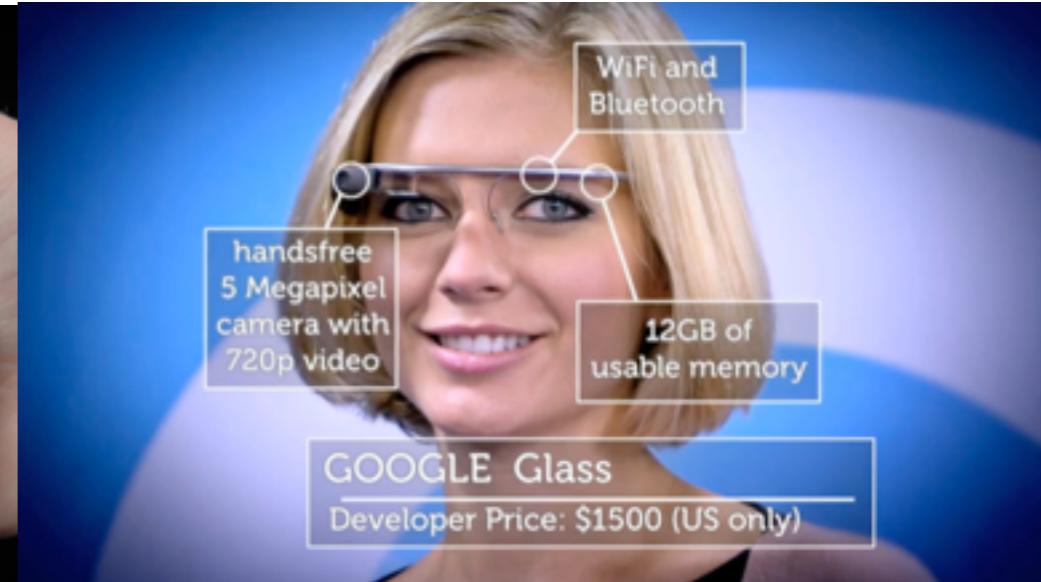
(this doesn't mean that it's a good idea)



Light Blue Bean
(Arduino Bluetooth)



Zeemote Bluetooth
game controller



Google Glass
(I have 5)



Galaxy Gear watch
with strap camera



LG R Watch



Pebble Watch

Homework

- By next class (Thursday Jan 28), put a **Post** on Slack in #introductions:
 - Introduce yourself
 - Name, year
 - Experience level in HCI, programming, research, hardware, etc...—anything that might be relevant for project work
 - At least one project idea
 - 1 bonus point for 4 or more ideas
- By class Thursday, Feb 18, do IRB certification
 - <https://www.citiprogram.org/>
 - Create login, associate with RIT
 - Do "Students conducting no more than minimal risk research" course
 - Send me the completion certificate when you're done via a Slack DM
 - **Start now!** This takes a long time (multiple days).

Break time

3 minutes: stand up, stretch!

Mobile HCI vs HCI

What is mobile HCI?

- Mobile interaction, usability
- Related to (smart) devices we carry or wear: phones, tablets, watches, rings, glasses, clothing, cameras, projectors, GPS, networking devices, health trackers, hearing aids, pacemakers...
- Portable & on-the-go

How is mobile HCI different?

- MHCI is a subset of HCI
- New challenges related to mobility when doing HCI:
 - design challenges
 - evaluation challenges

Challenges of mobile HCI

Diverse usage contexts

Context

*Context is any information that can be used to characterize the situation of an entity**

**entity: person, place, or physical or computational object*

Context



walking;
with dog;
outdoors;
overcast;
cool weather;
on phone

Context



stationary;
outdoors;
cold weather;
with others;
not in conversation

Context



Context



Context



Context



**Why do we care
about context?**

Challenges of mobile HCI

Diverse usage contexts → interaction with real world

Limited:

user attention

input capability

output capability

Situational impairments

situational impairments:
difficulties an individual may have
in performing an action *due to the
individual's context*

Situational impairments



windy;
traffic noise;
dog barking;
distracted by passers-by

Situational impairments



sound from crowd;
restrictive clothing

Situational impairments



Situational impairments

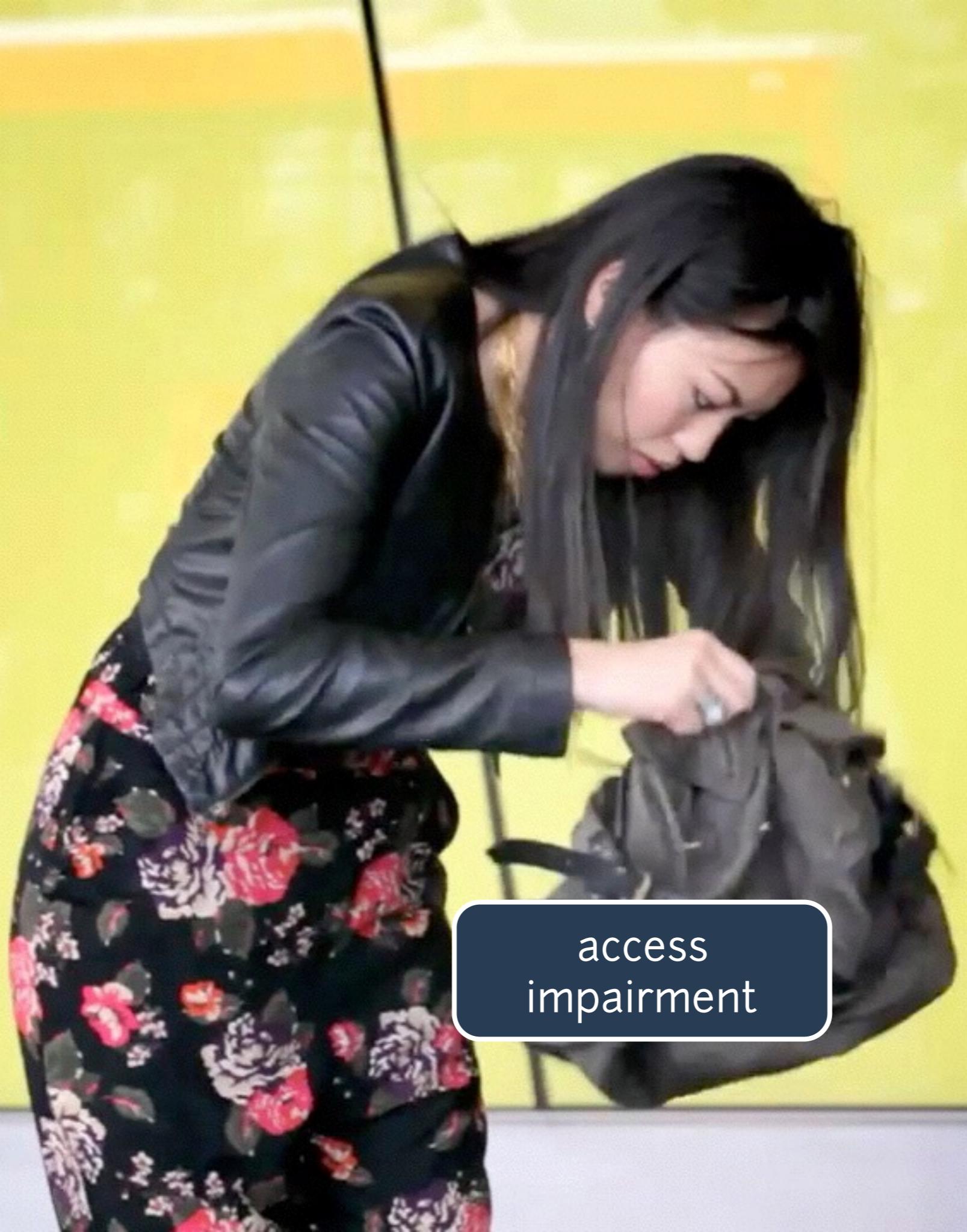


Situational impairments



Situational impairments

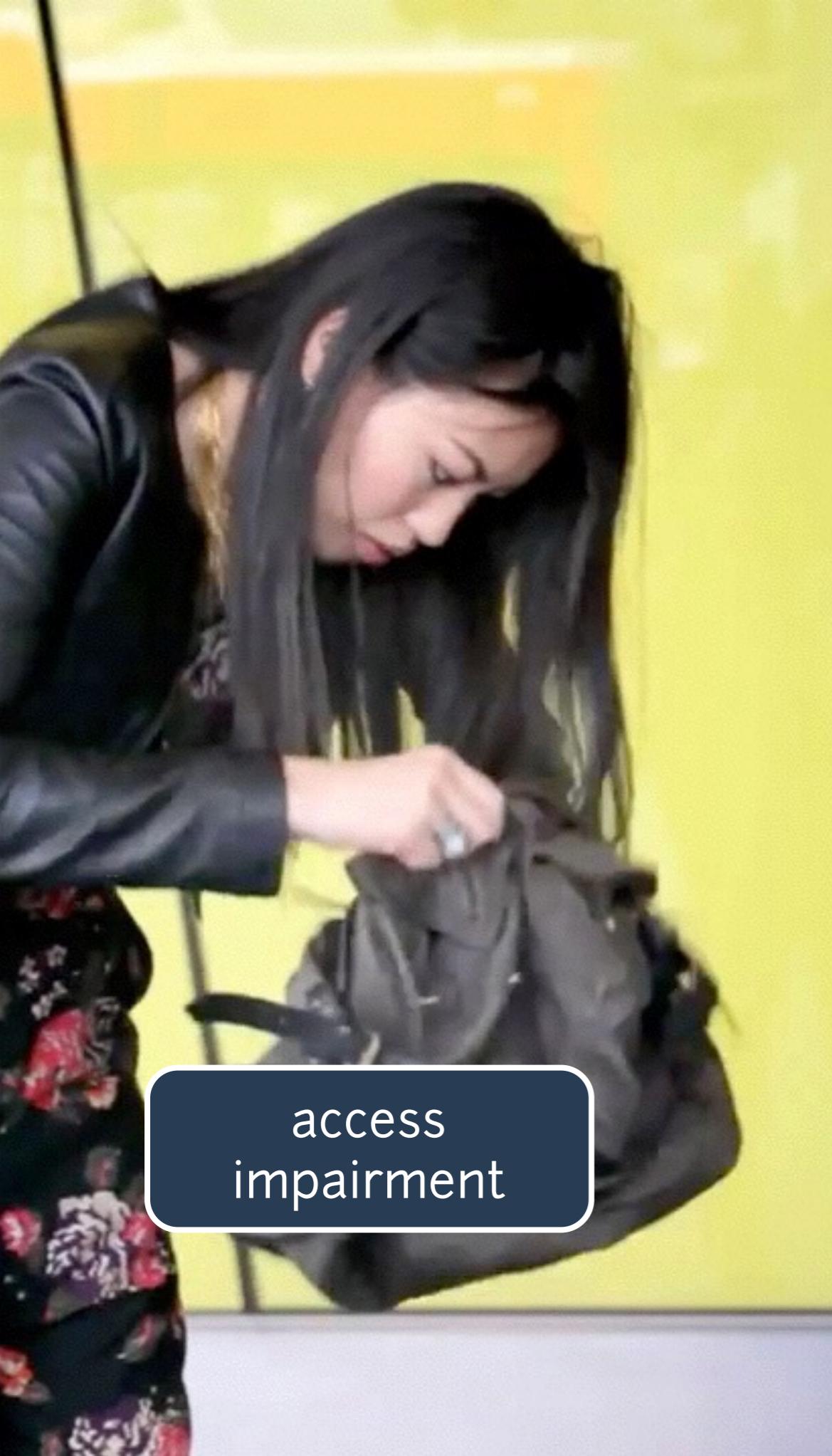




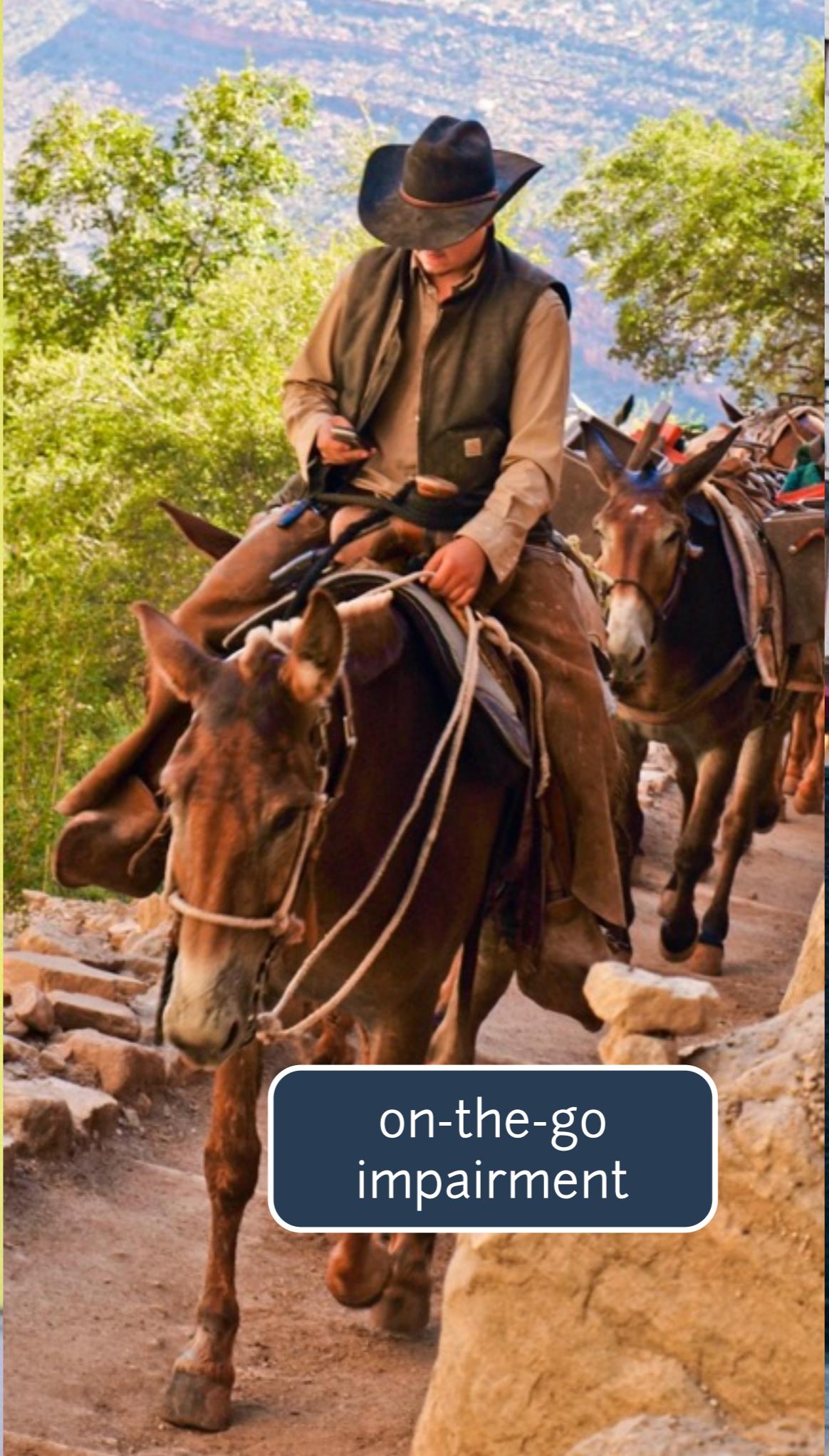
access
impairment



o
im



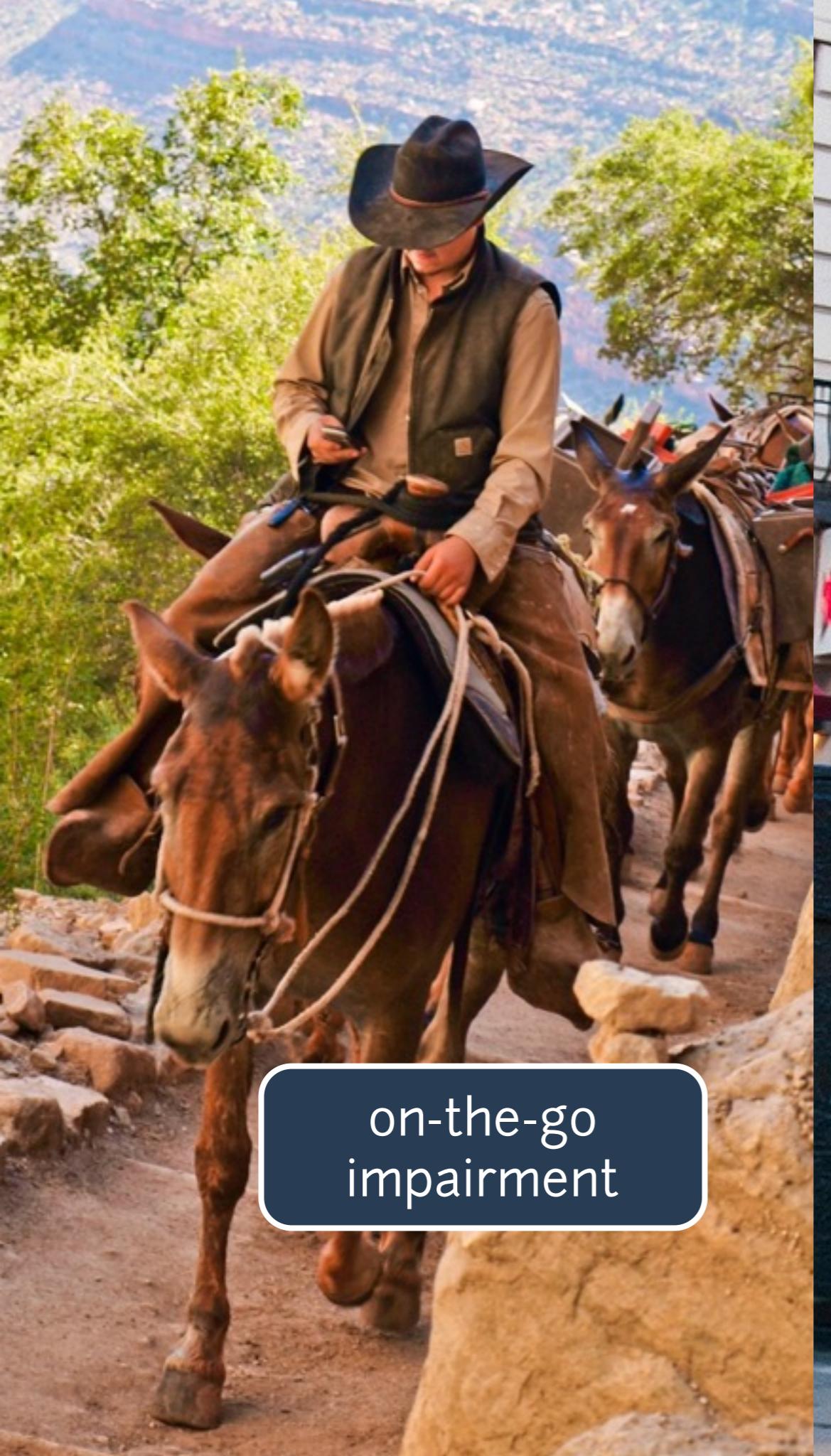
access
impairment



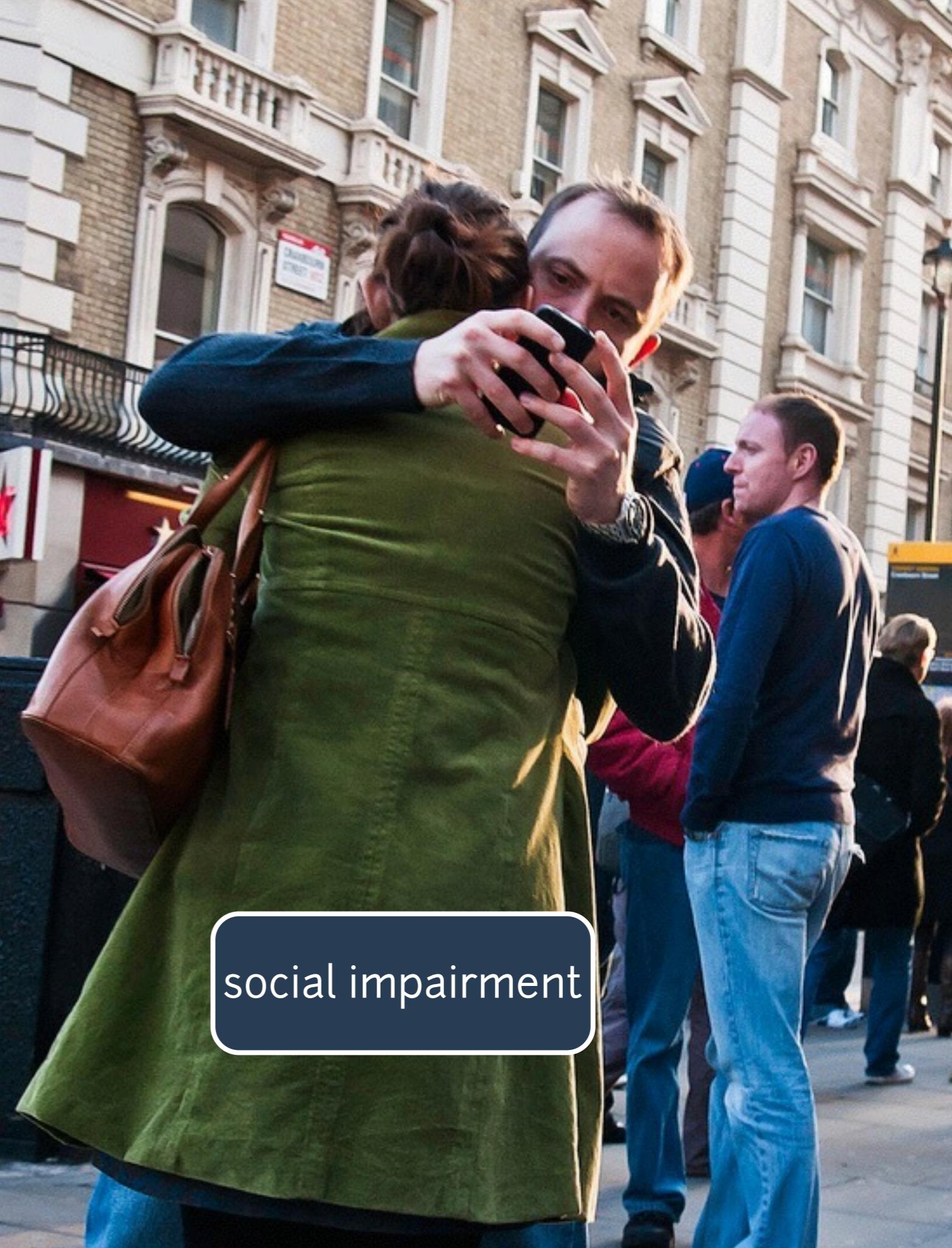
on-the-go
impairment



S



on-the-go
impairment

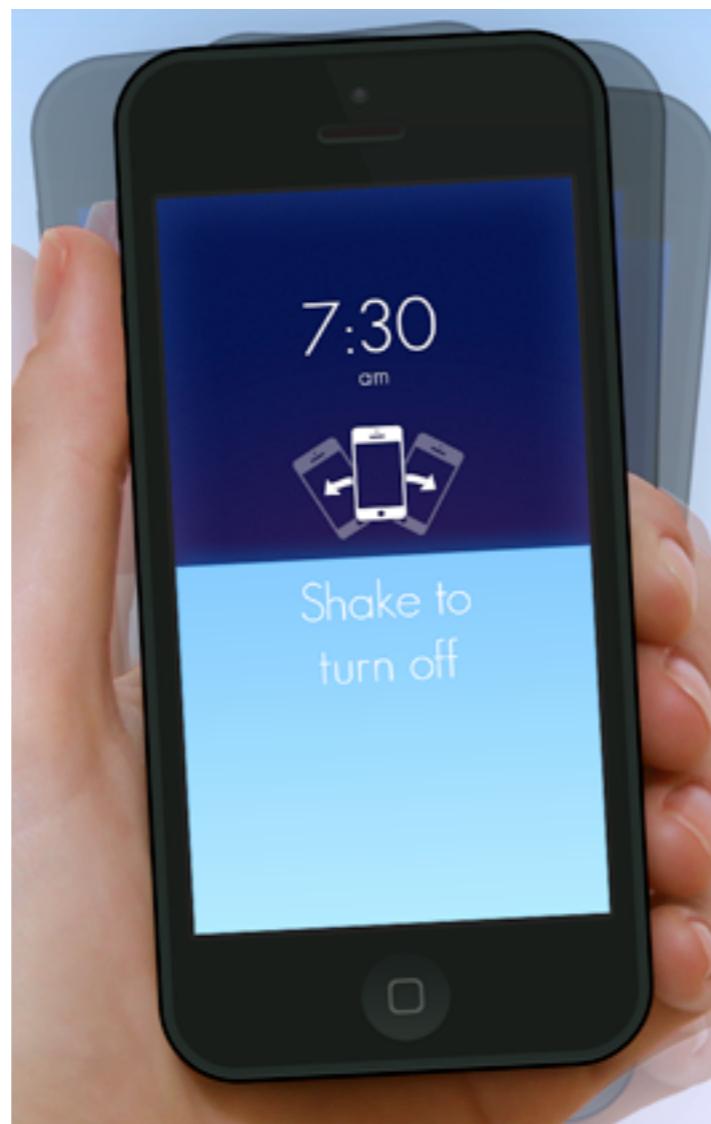


social impairment

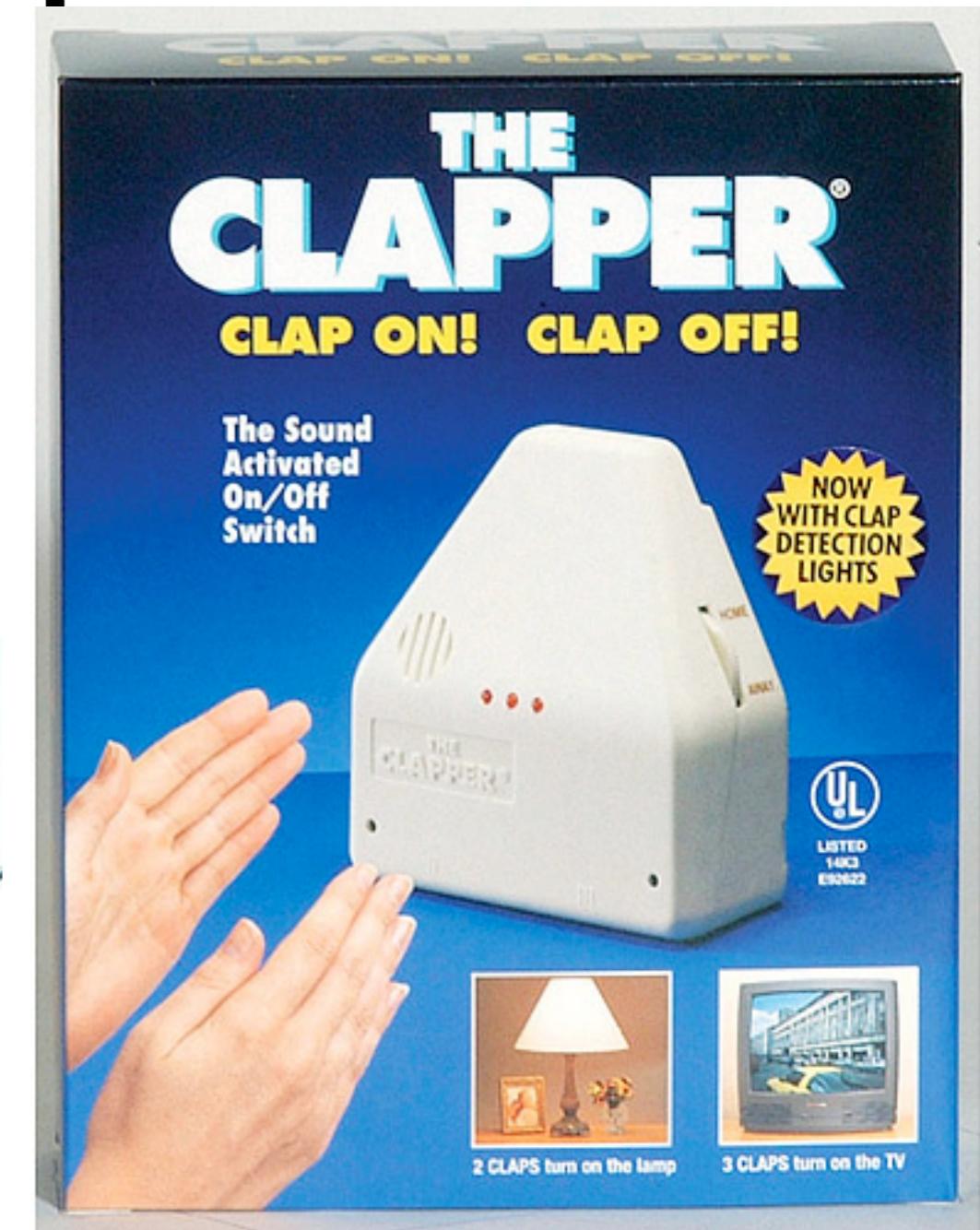
Input

- Digital vs analog
- Single vs multi
- Continuous vs sporadic

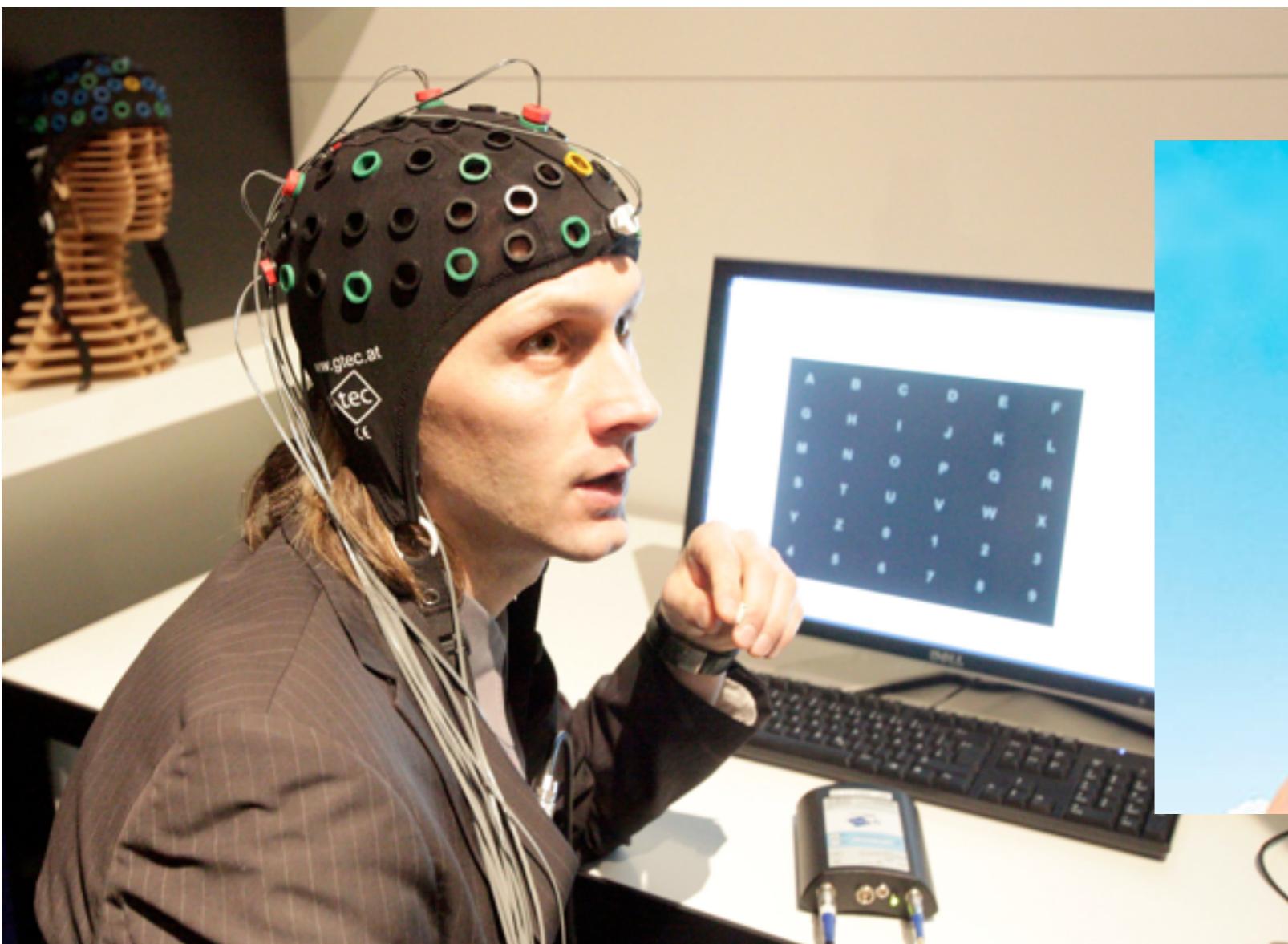
Physical input



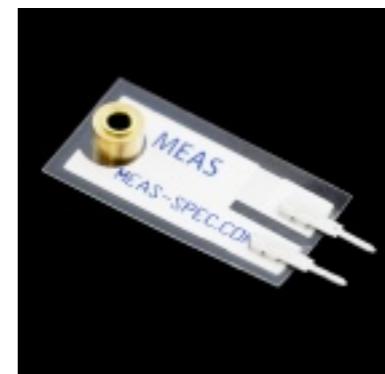
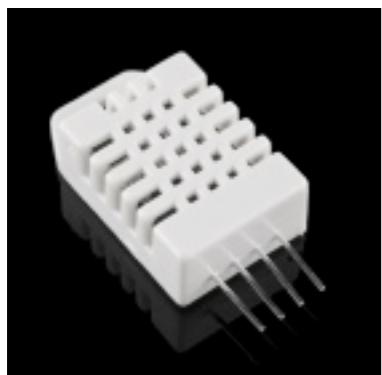
Sound input



Brain input



Sensors!



<https://www.sparkfun.com/categories/23>

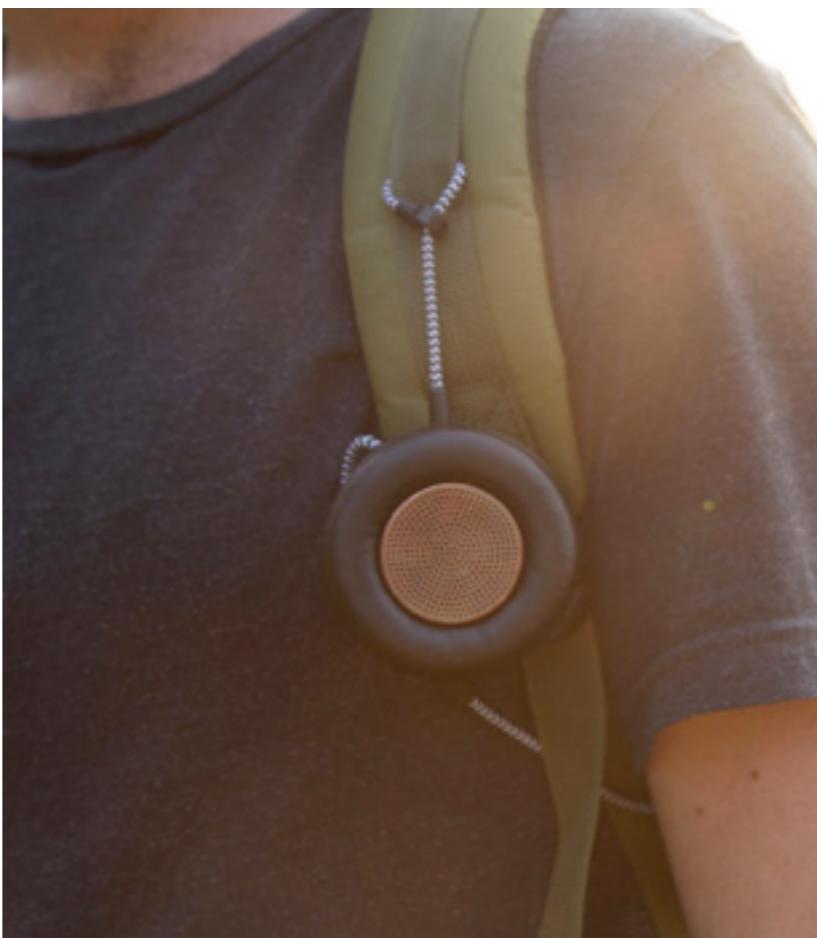
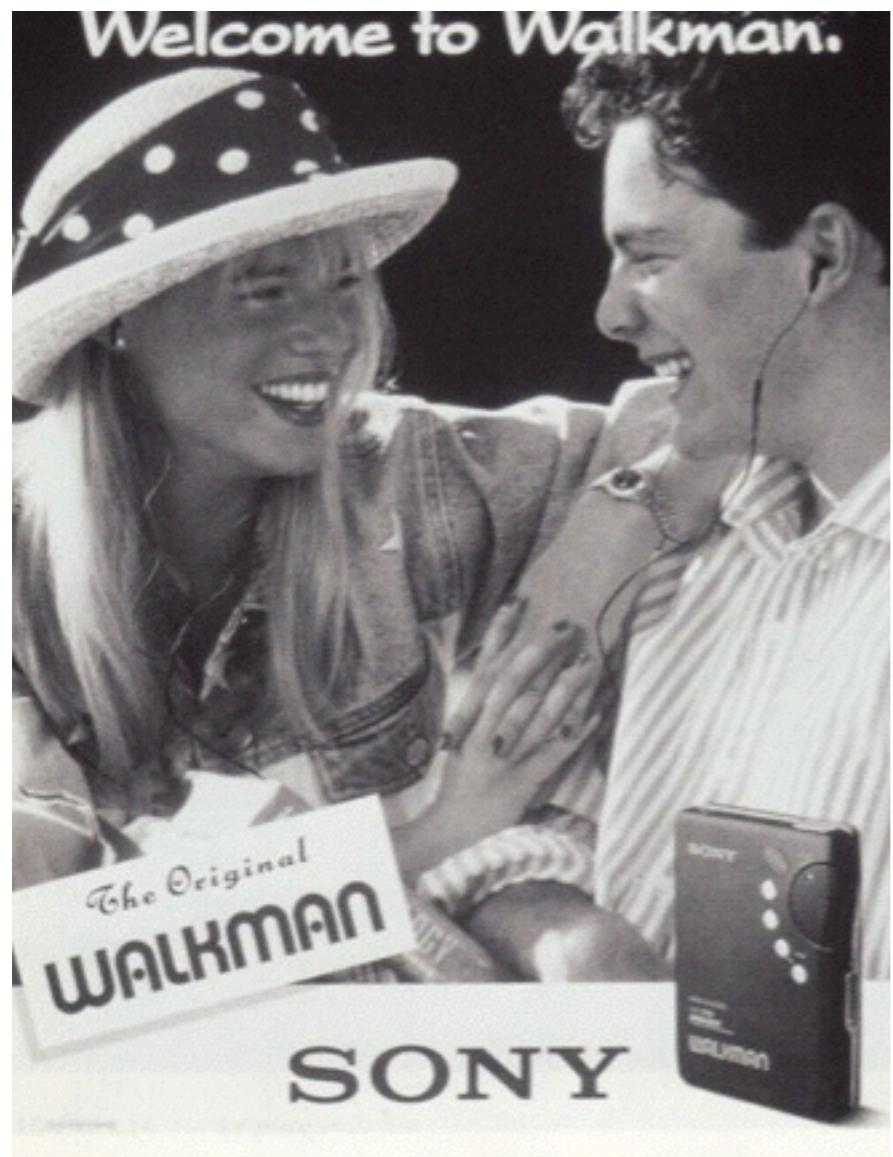
Output

- Digital vs analog
- Single vs multi
- Continuous vs sporadic

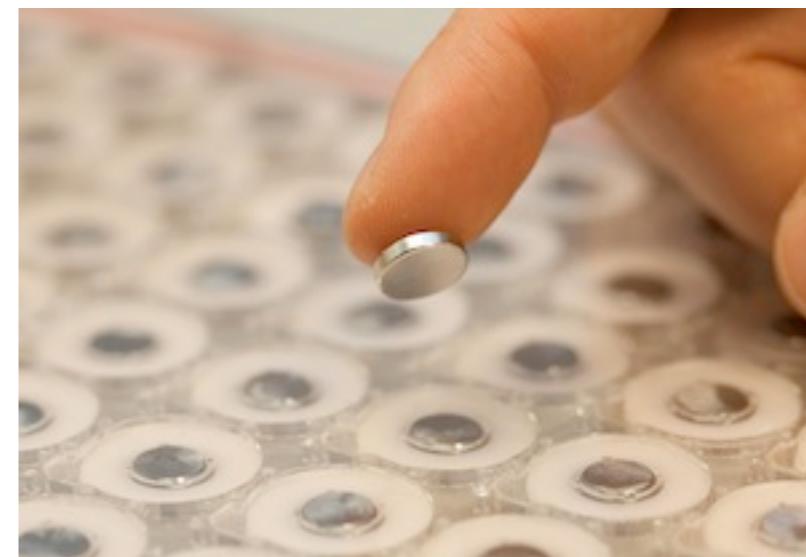
Visual output



Audible output



Haptic output



Summary for today

- By next class (Thursday Jan 28)
 - Get on Slack
 - Introduce yourself, your skills, and a project idea in #introductions on Slack
 - Start figuring out groups (in #team_formation and/or offline)
 - Sign up for reading presentation date (see link on web page)
 - Get the book and read Chapter 1
 - Read the other assigned readings (see web page)
- In 7 days (Tuesday Feb 2)
 - Turn in reading summaries via Slack Post DM to me
 - Groups should be formed and project decided on
- In 14 days (Tuesday Feb 9)
 - Project proposals due
- In 21 days (Tuesday Feb 16)
 - Updated proposals due
- In 23 days (Thursday Feb 18)
 - IRB certification due in Dropbox