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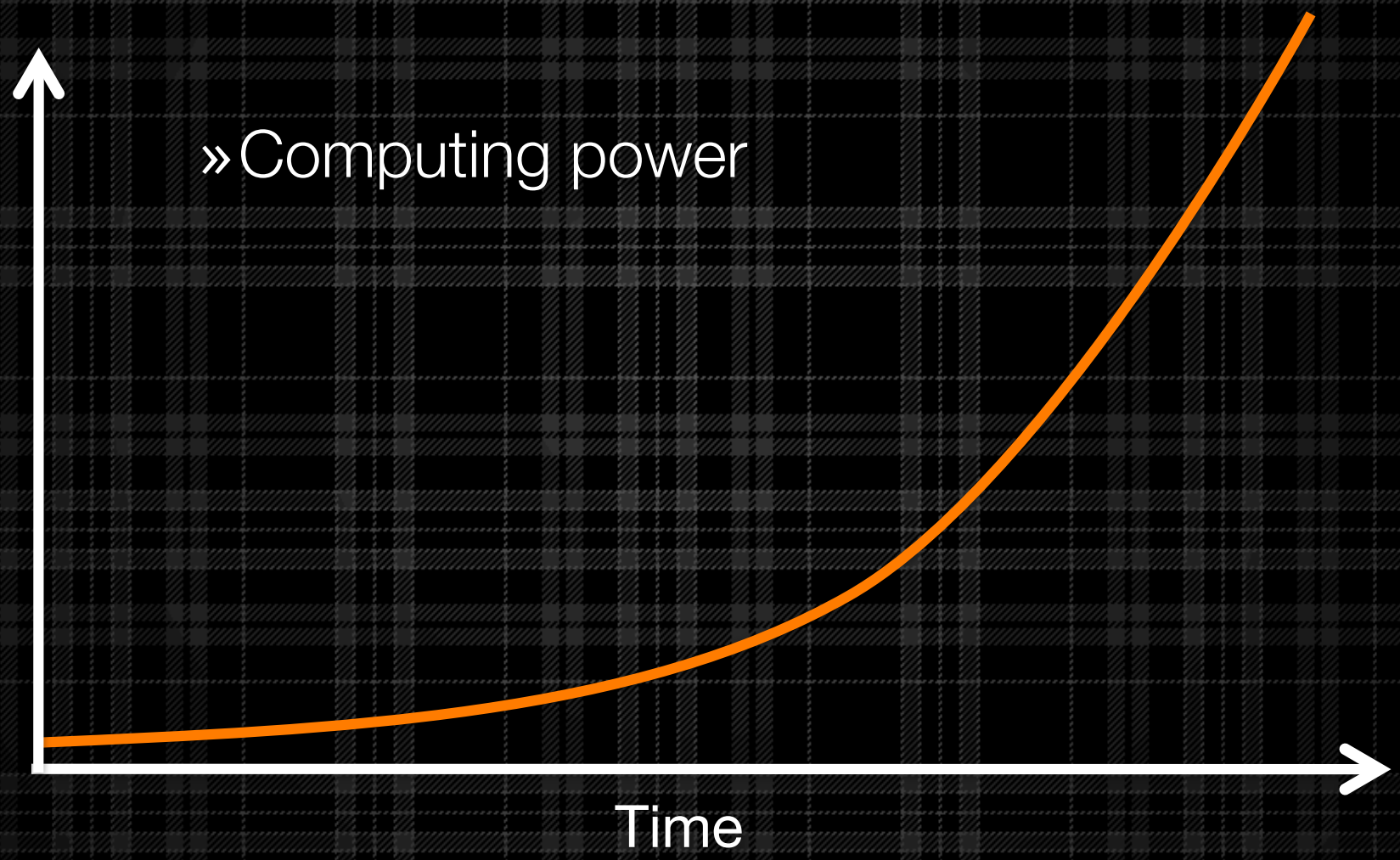
Interacting with Small Devices in Big Ways

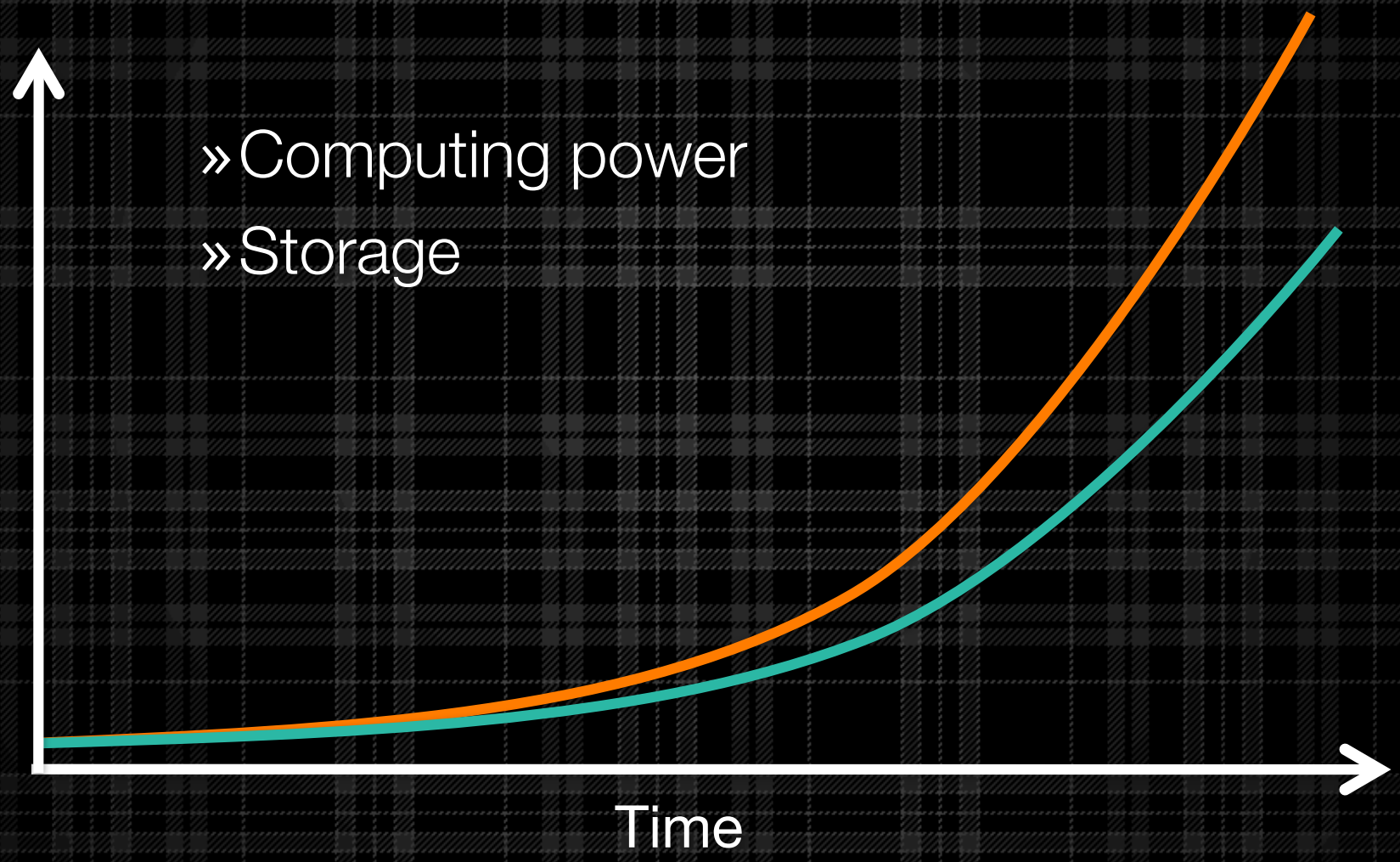
Chris Harrison

Small + Powerful

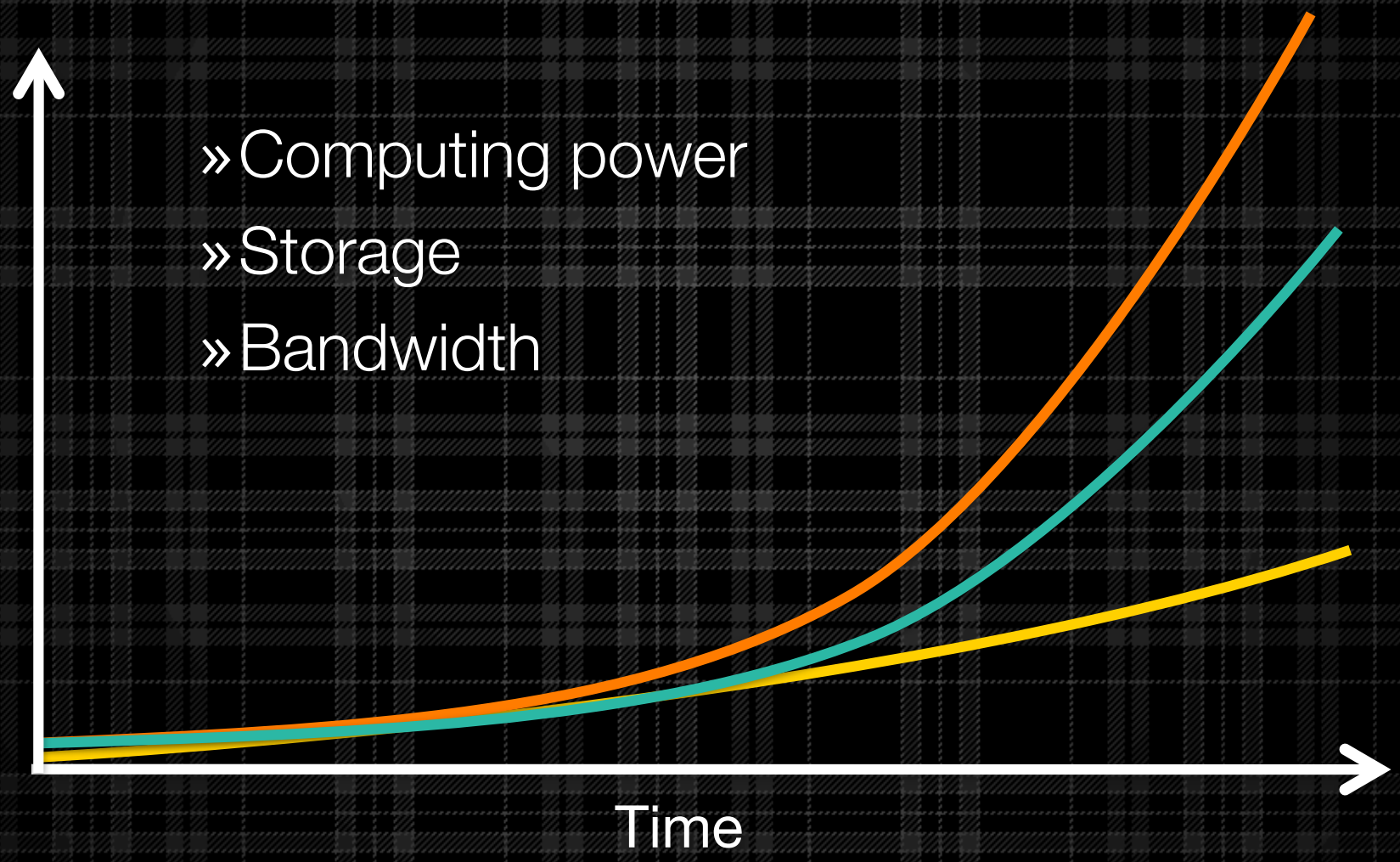
Computing Factors



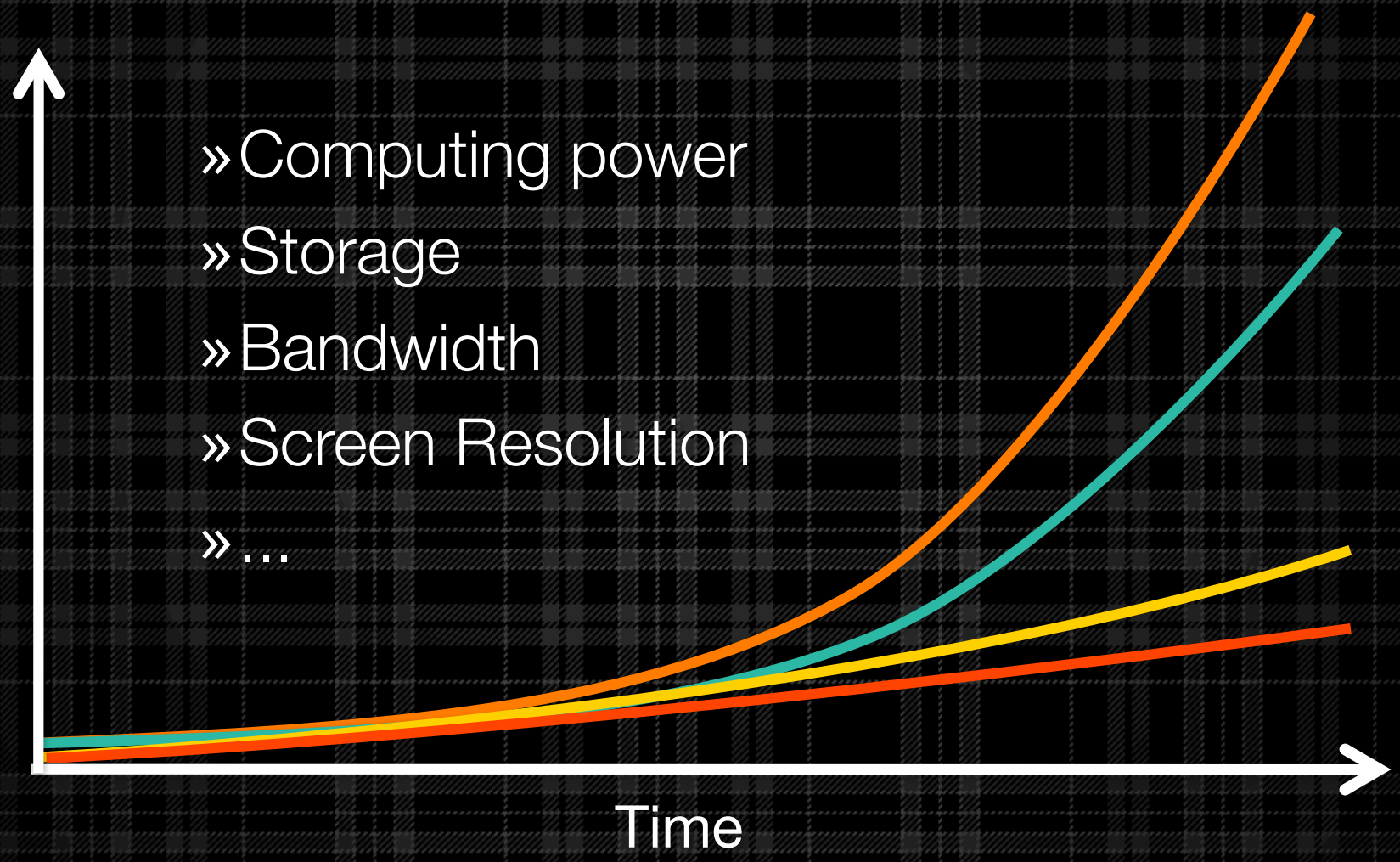
Computing Factors



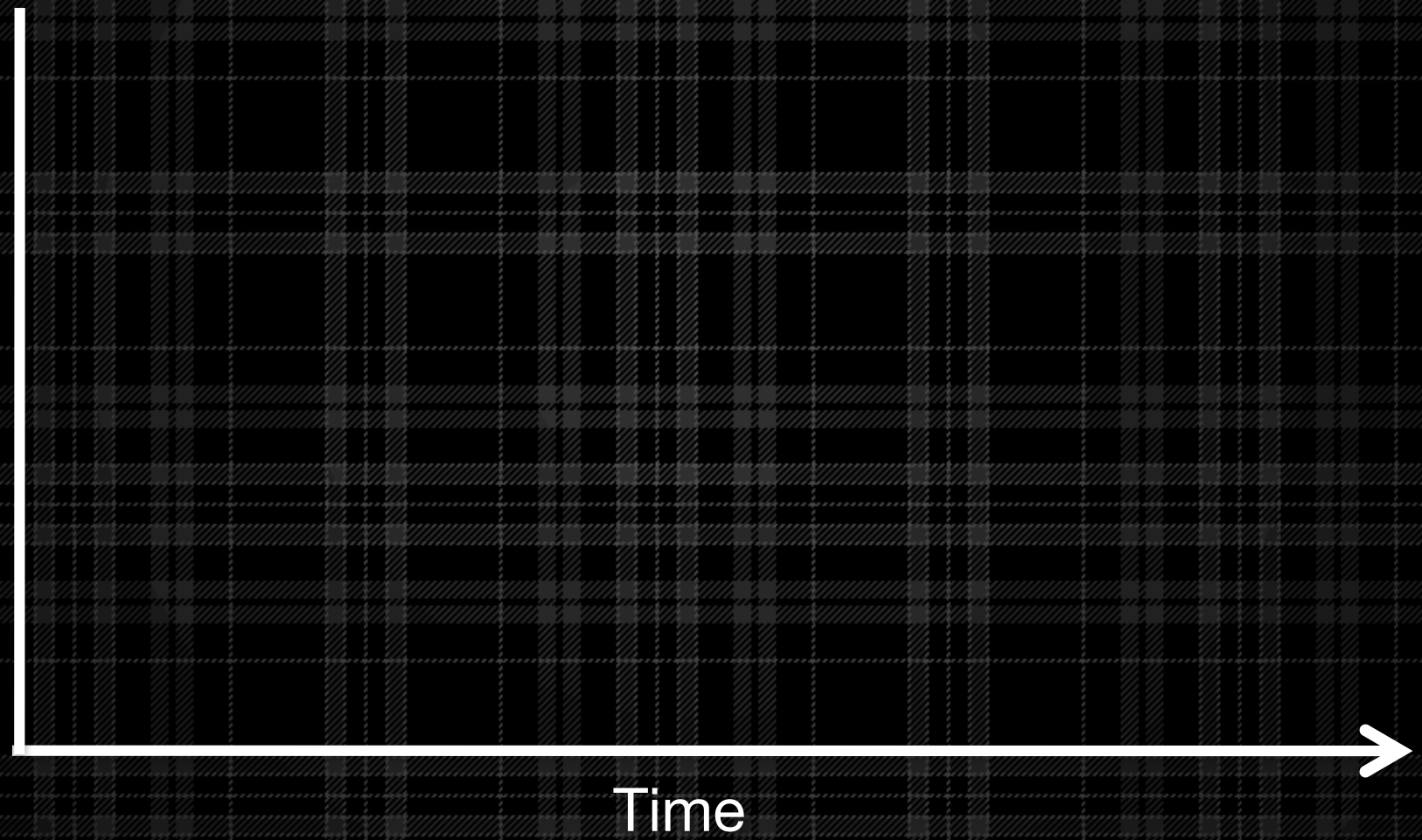
Computing Factors



Computing Factors

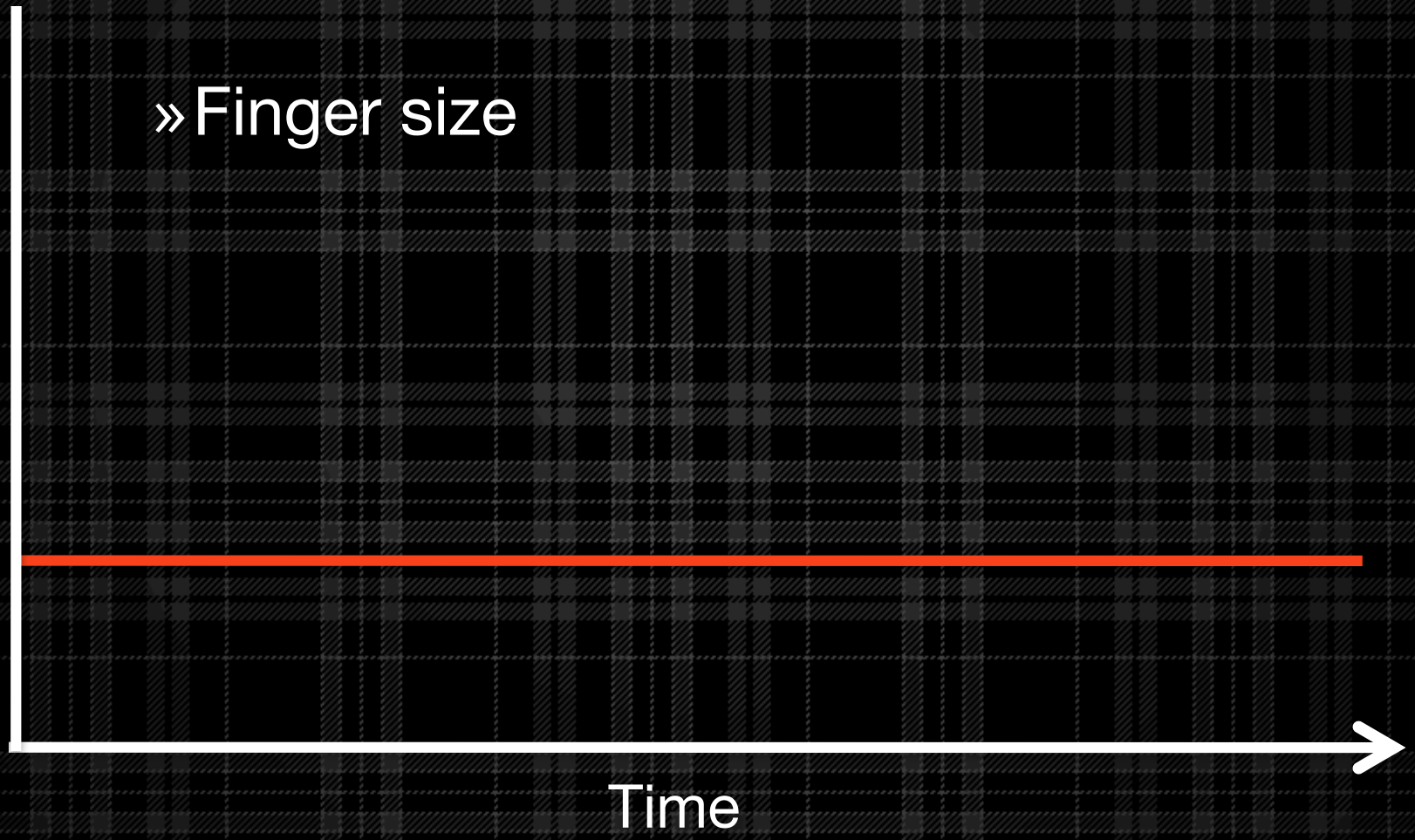


Human Factors



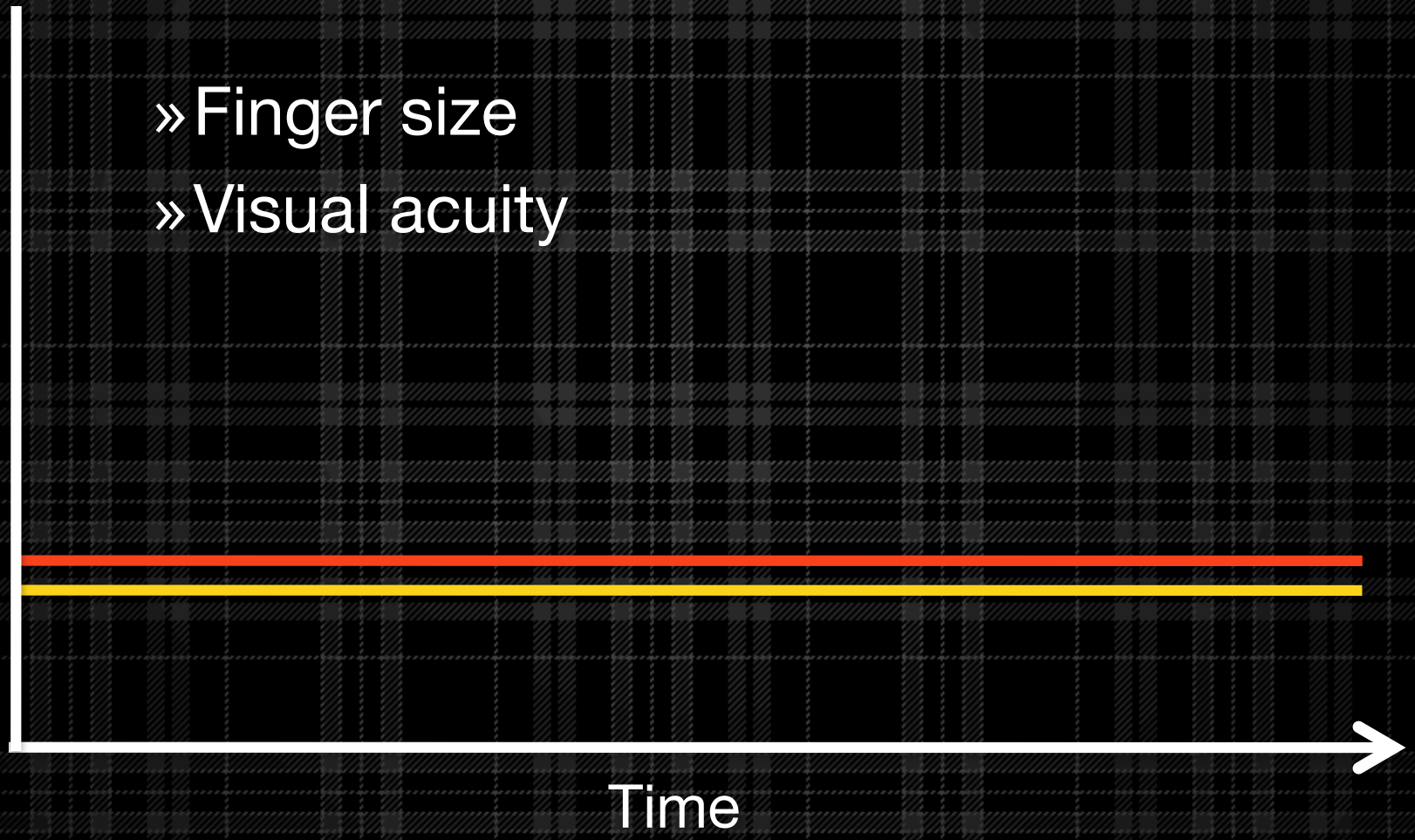
Human Factors

- Finger size



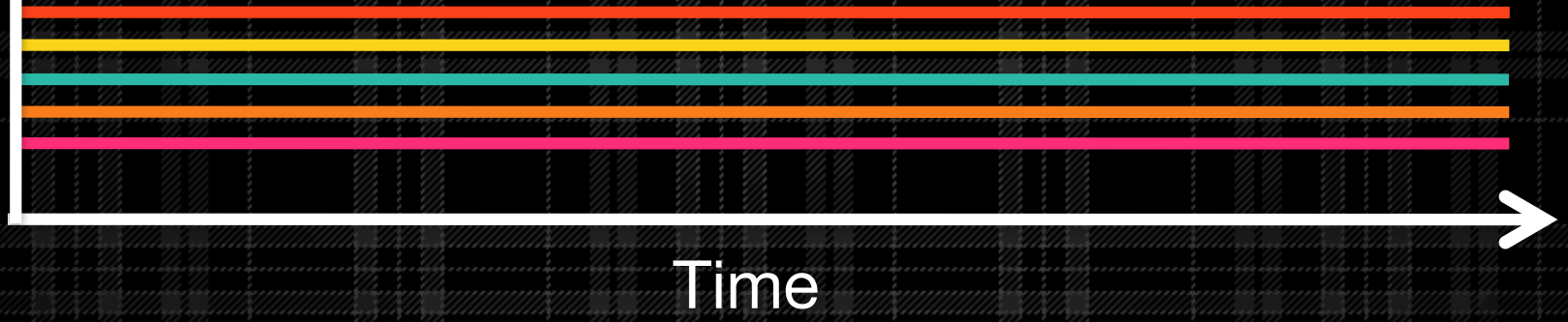
Human Factors

- Finger size
- Visual acuity

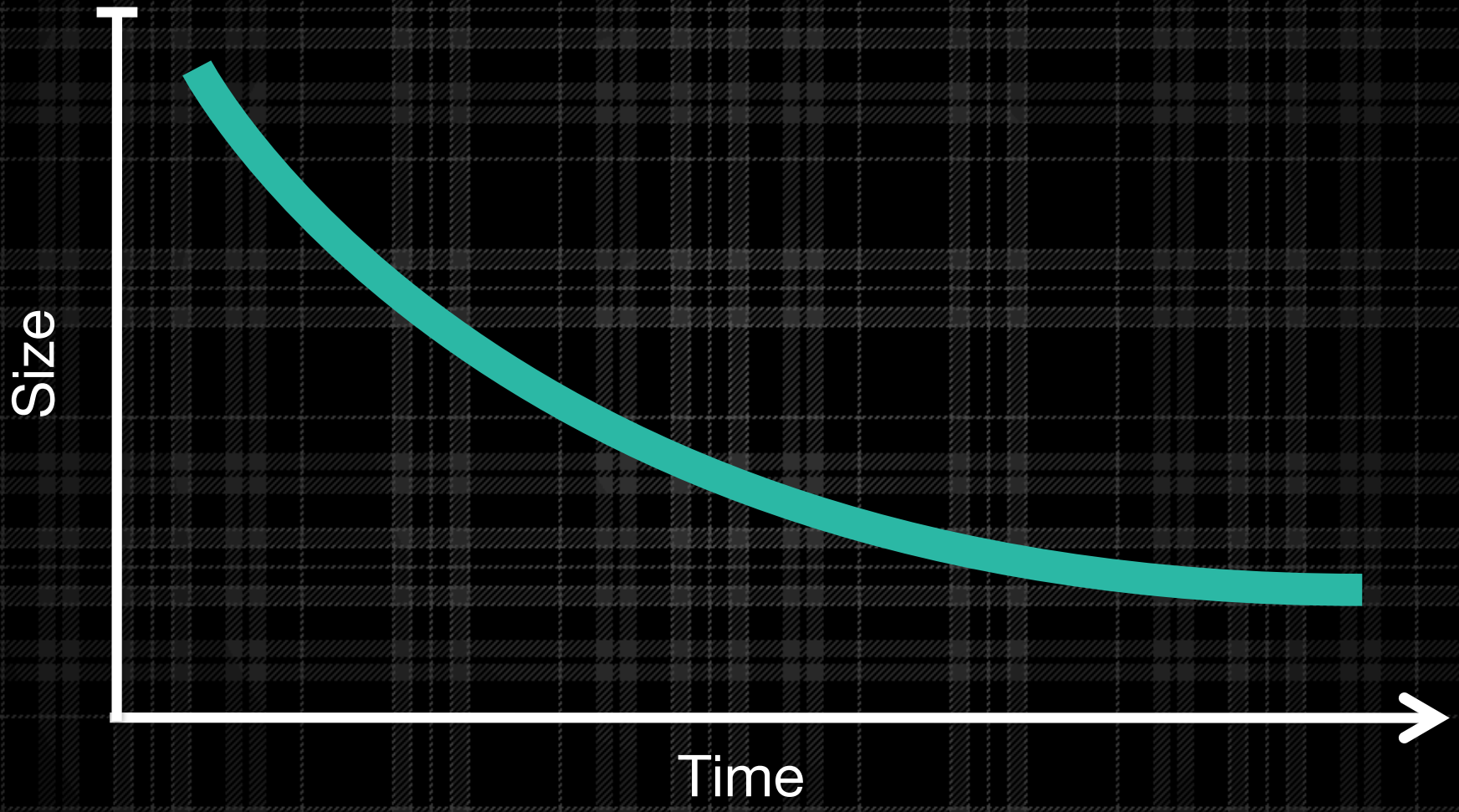


Human Factors

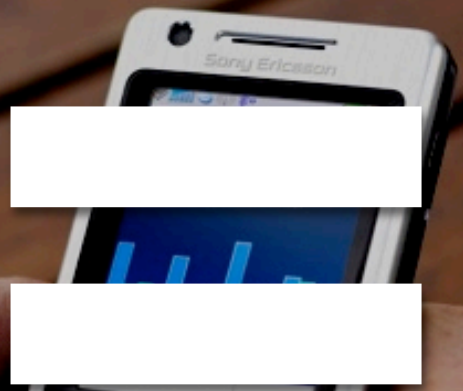
- Finger size
- Visual acuity
- Manual dexterity
- …



Mobile Device Size



mobile device



limited surface area

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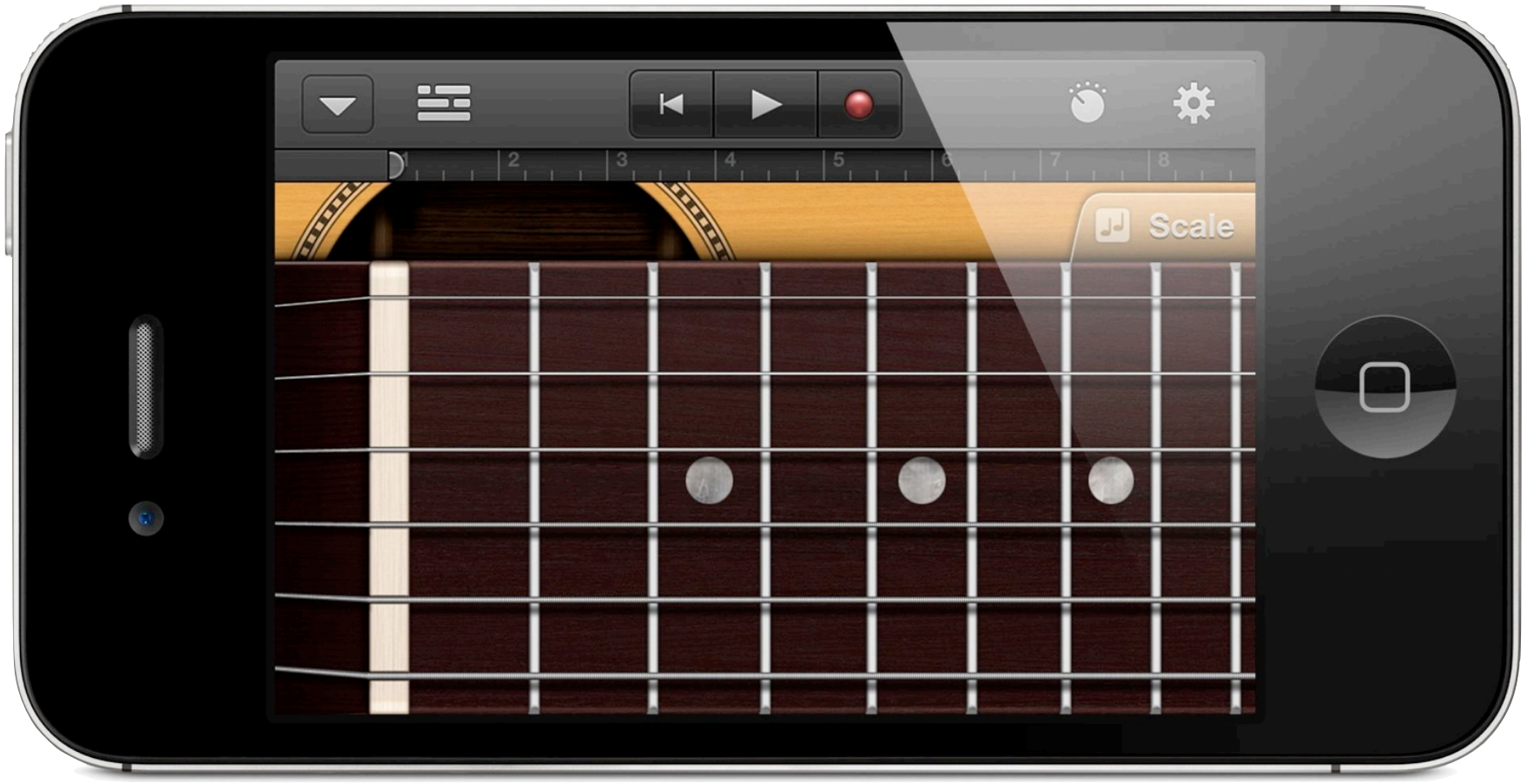
2
3
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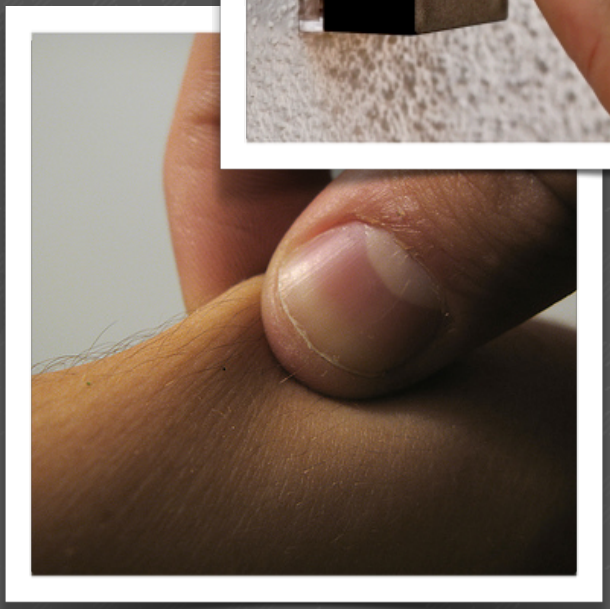
Scale



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mobile device
=
=
limited input richness

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Scratch Input++

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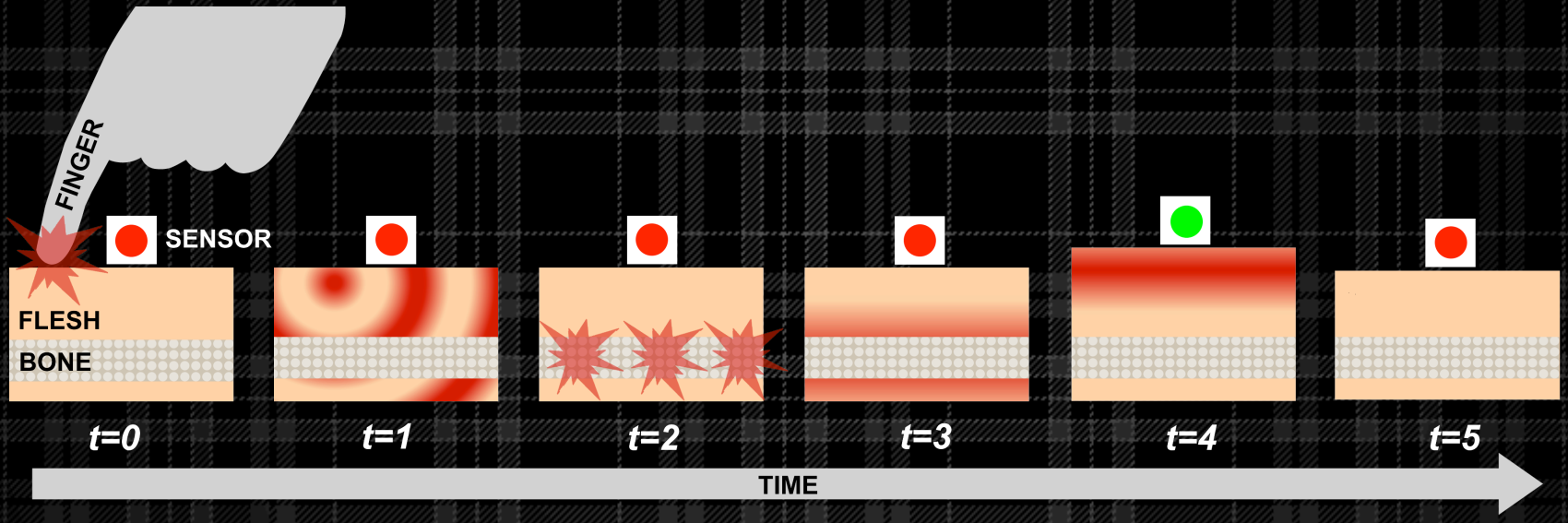
Scratch Input

Project Idea

- One or more microphones on underside of device
- 1) Localize taps around the device on an ad hoc surface
- 2) Listen and classify gestures being performed (non-spatial)
- Some combination of the two above
- Possible uses: Laptop, smartphone, kitchen, light switch
- Reach goal: couple with projector for interactive graphics
  - Oblique from smartphone
  - From lid of laptop

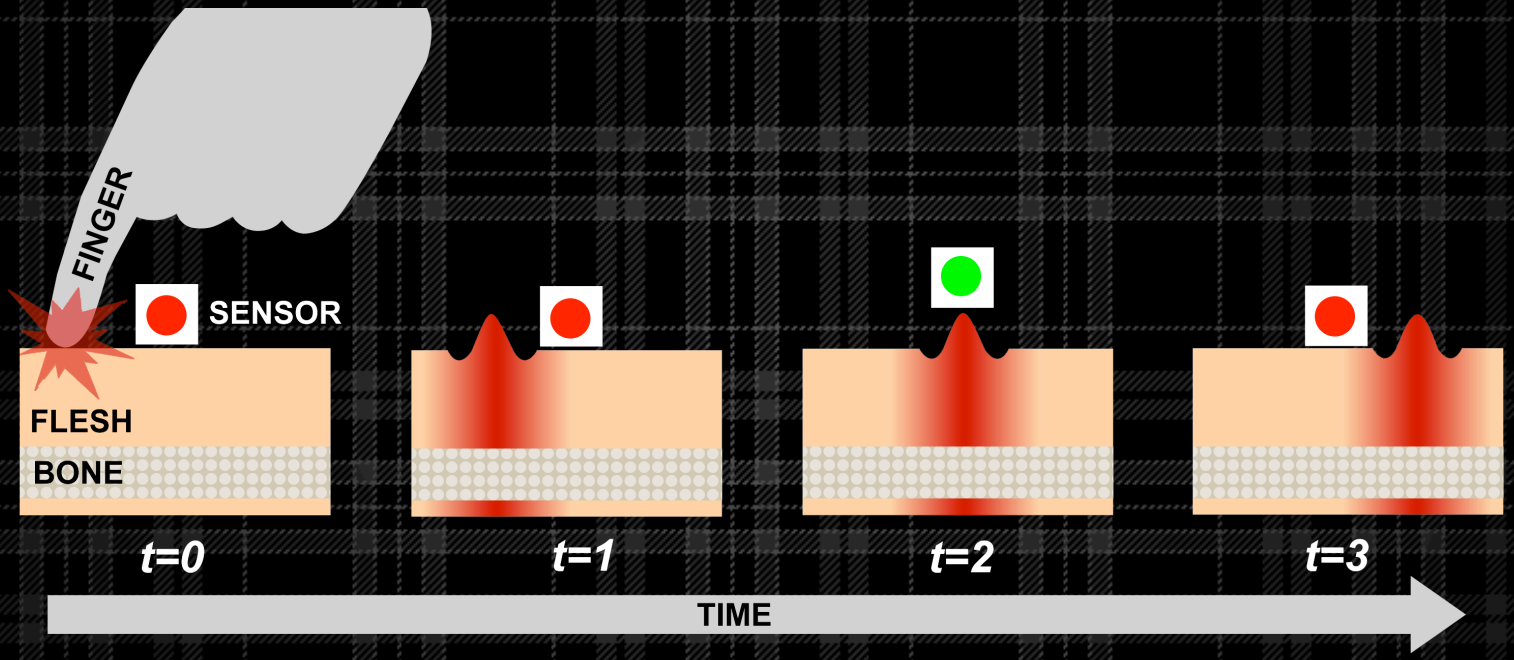
On-Body Interfaces

Acoustics on the Body

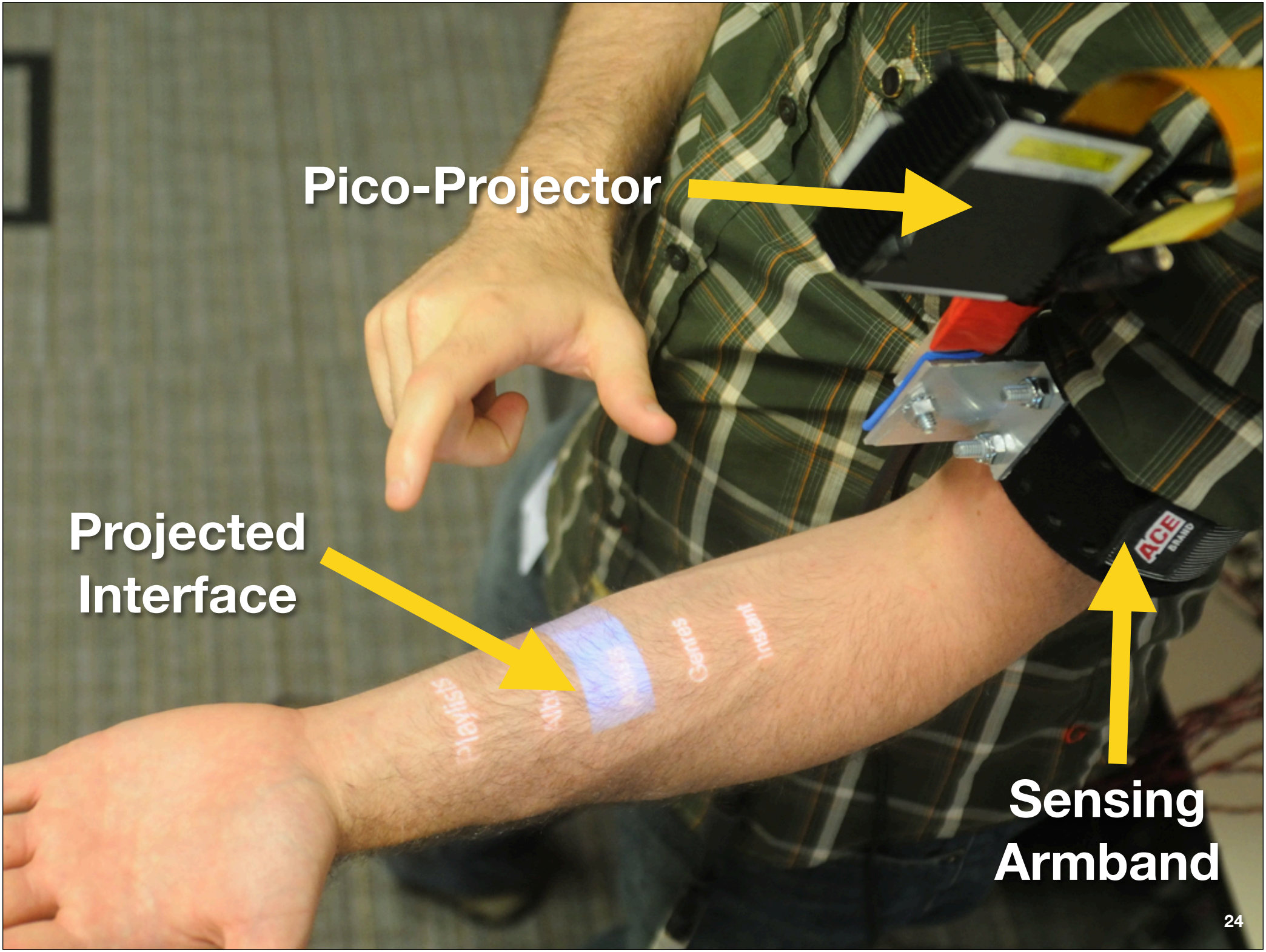


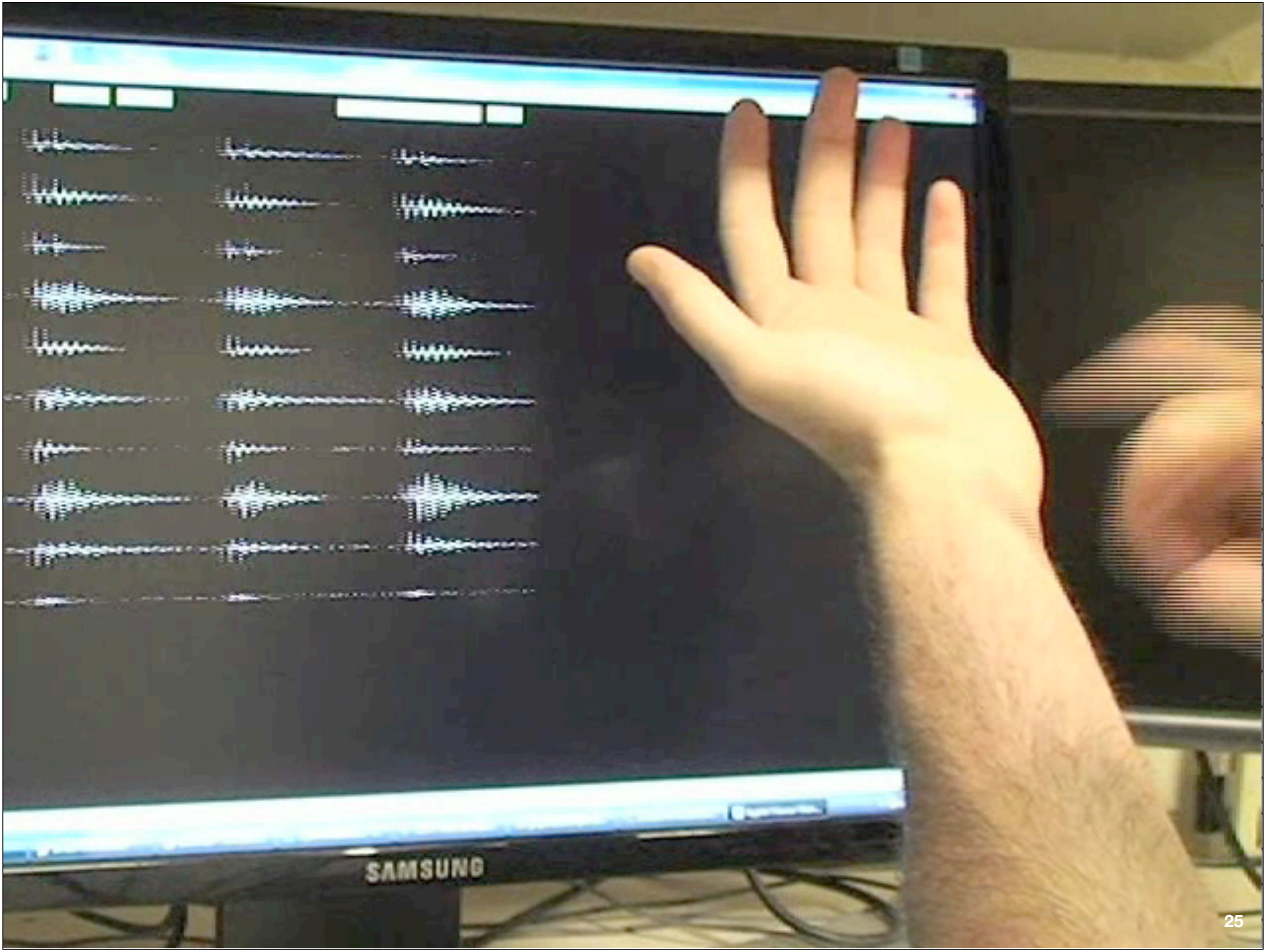
Longitudinal (compression) waves

Acoustics on the Body



Transverse surface distortions (ripples)


Pico-Projector
Projected Interface
Sensing Armband
ACE


SAMSUNG

Project Idea

1. Skinput++ Entirely passive approach; better signal processing and machine learning
2. High resolution Skinput on the wrist (perhaps using accelerometers on wrist bone assembly)
3. 1D (along arm) time of flight.
4. Add active elements to the skin, look at e.g., reflected signal, attenuation of particular frequencies.
5. Phase offset (receiver/transmitter pair on upper arm/wrist)

Warning!

- Not for the feignt of heart!
- These projects need research, not just engineering
- Self motivated team
- I can advise project, but will be traveling a lot

- Expected end result is a publication

Analyzing Calls for Closeness

Project Idea

- Large corpus of phone calls
- Mine calls for acoustic features
- See if personal closeness of the two individuals can be predicted
- Example app: bootstrapping sharing/privacy settings on social networking sites

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Thank You

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