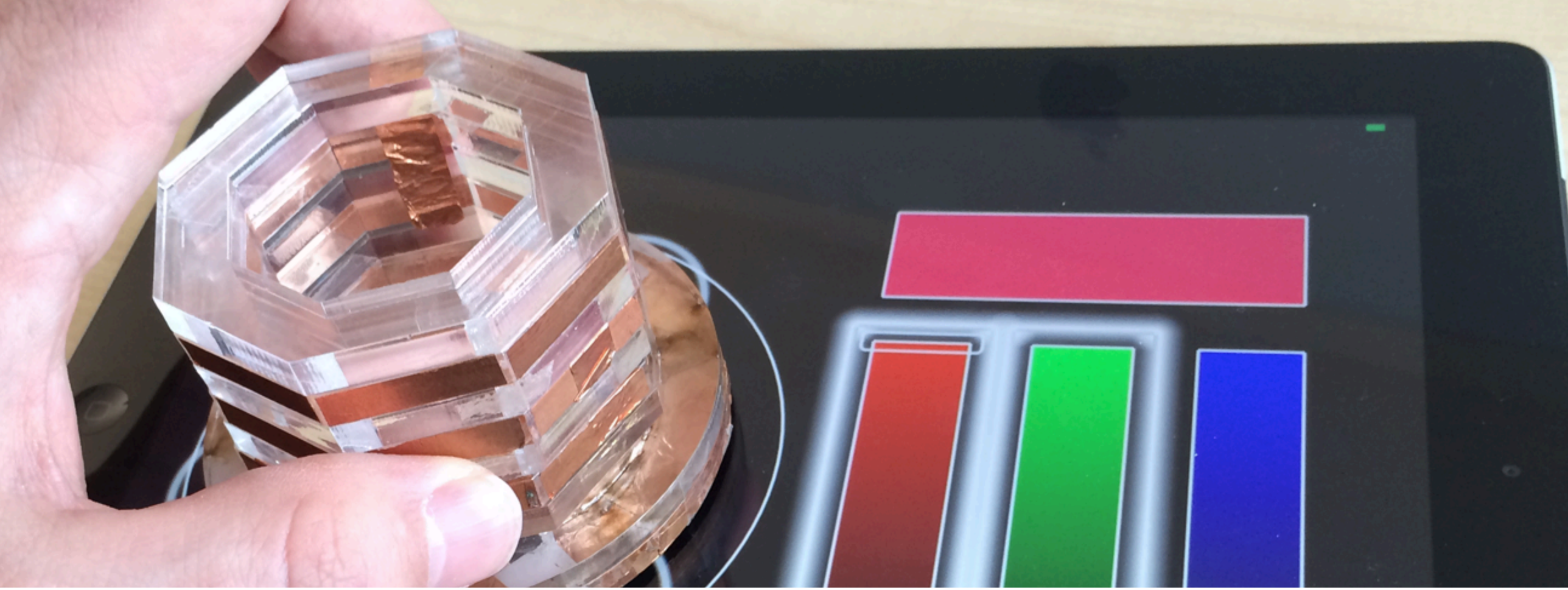


Tangibles on Tabletops

Christian Cherek

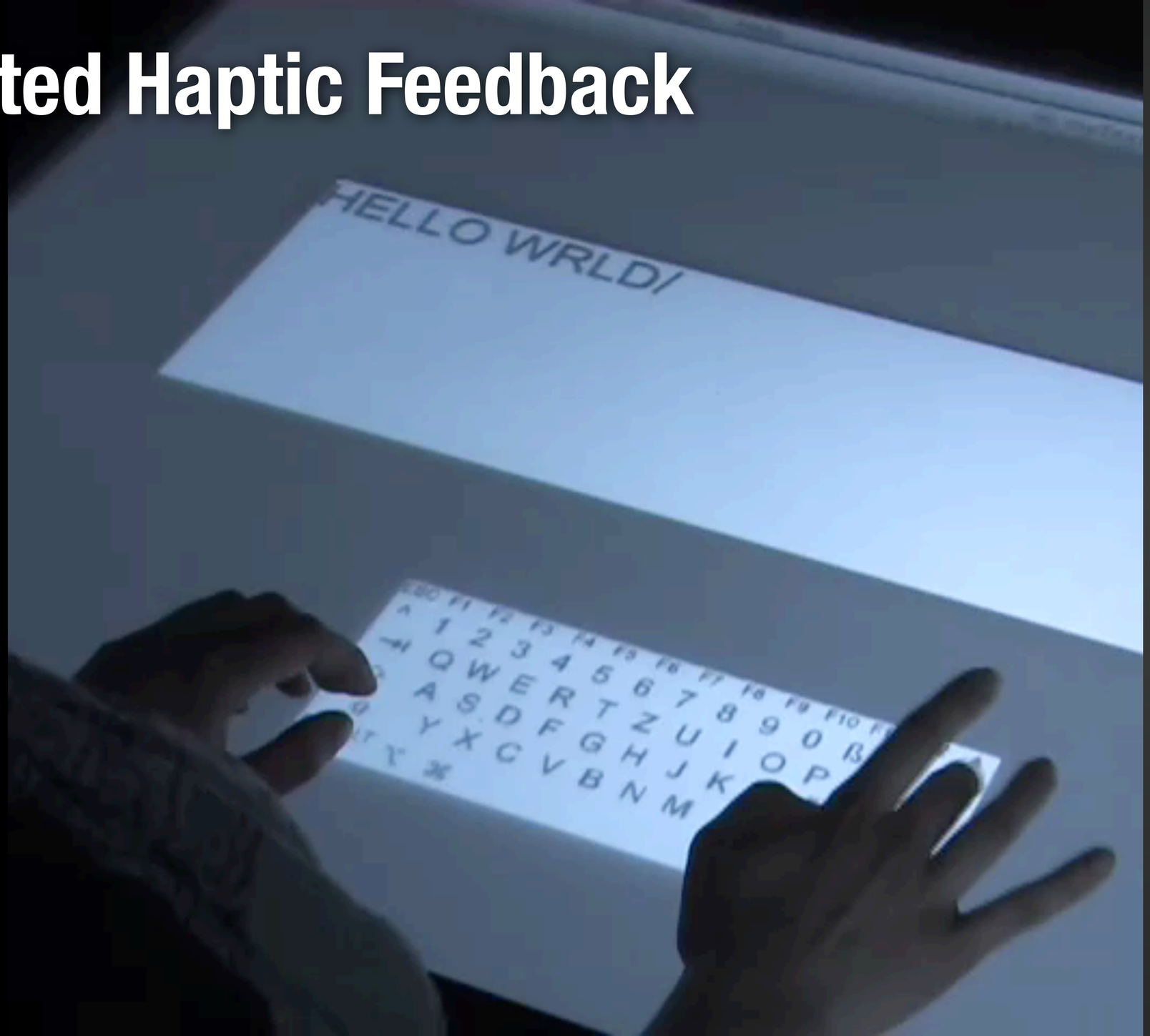
RWTH AACHEN UNIVERSITY

In-class Exercise: Typing Eyes-Free

Try to type on your
smartphone without looking
at the screen.

“Coming back to where you started is not the same as never leaving ”

Limited Haptic Feedback



UI cannot be felt

- No haptic feedback for button position
- No click feeling
- Drift of fingers

Accidental activation

No resting on keyboard

Focus on typing

- Typing eyes-free is hard

Limited Haptic Feedback

Hard to select small targets

Inaccuracies on release

Touch screens require visual focus to avoid input errors

Tangible Objects on Touchscreens

PERCs [Voelker et al. UIST 2015]

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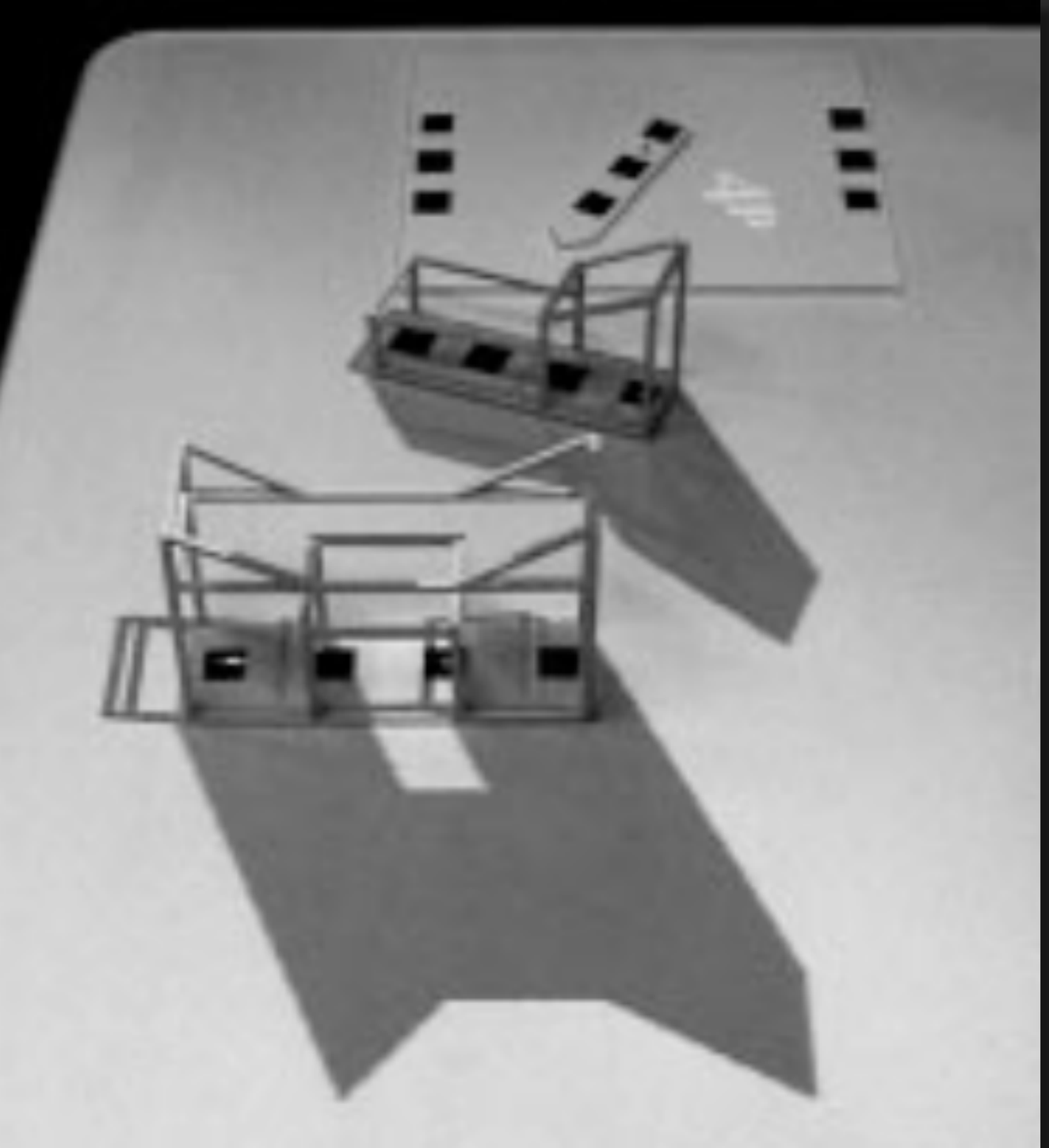

Urp: A Luminous-Tangible Workbench for Urban Planning and Design

Underkoffler, Ishii CHI’ 99

Tangibles represent buildings

- Shadowfall depending on a set time
- Wind simulation

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Reactable

A tangible interface to create music, commercially available.

Jordà et al.
TEI 2000

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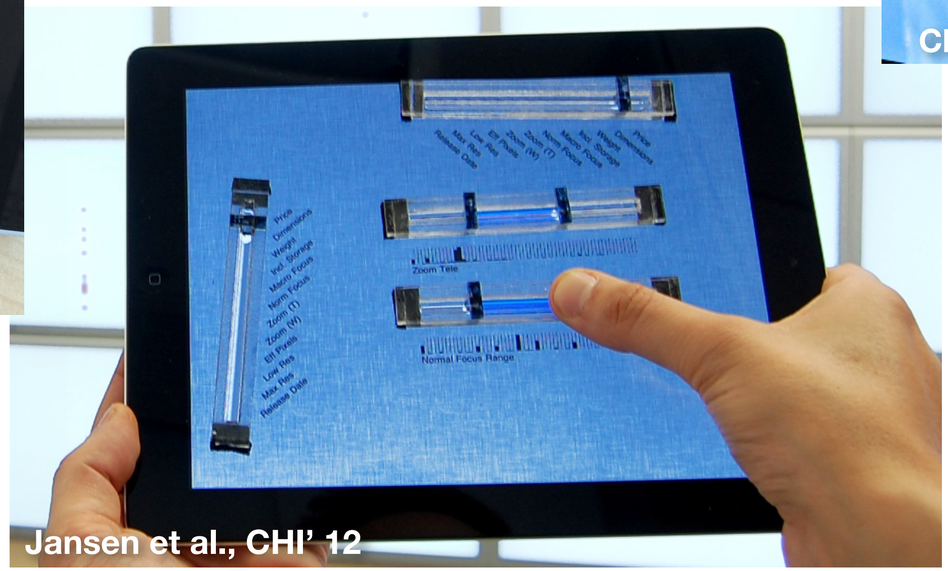
Tangibles on Interactive Surfaces



Jansen et al., CHI' 12


Chan et al., CHI' 12

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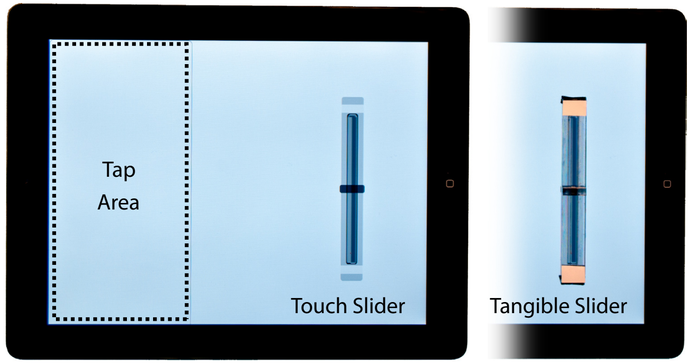
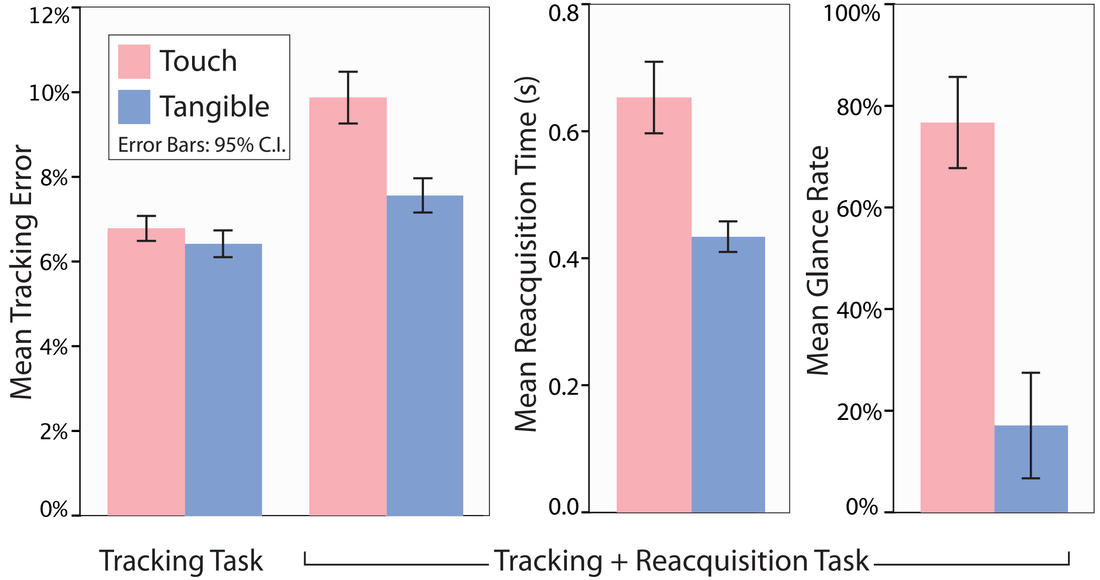
Tangible Remote Controllers for Wall-Size Displays — Jansen et al., CHI' 12



- A tangible slider outperformed a touch slider especially when the **user needed to interact with other areas** on the touch device.
- Switching to the tangible slider was faster
- Participants watched less at their input device when using the tangible slider



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How to Build a Tangible Object?

PERCs [Voelker et al. UIST 2015]

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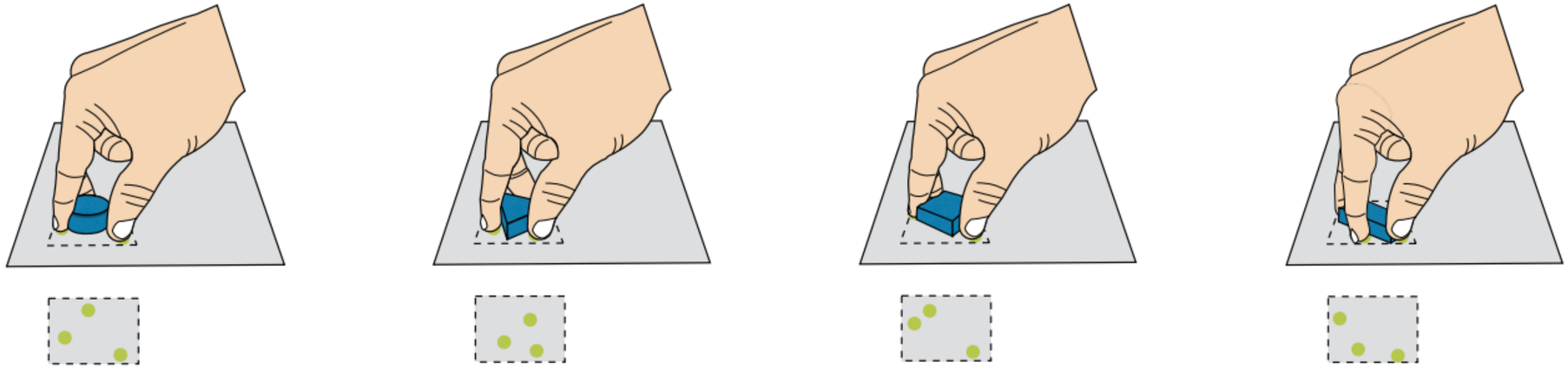
TouchTokens



Guiding Touch Patterns with Passive Tokens

TouchTokens
Gonzalez et al.
CHI’ 16

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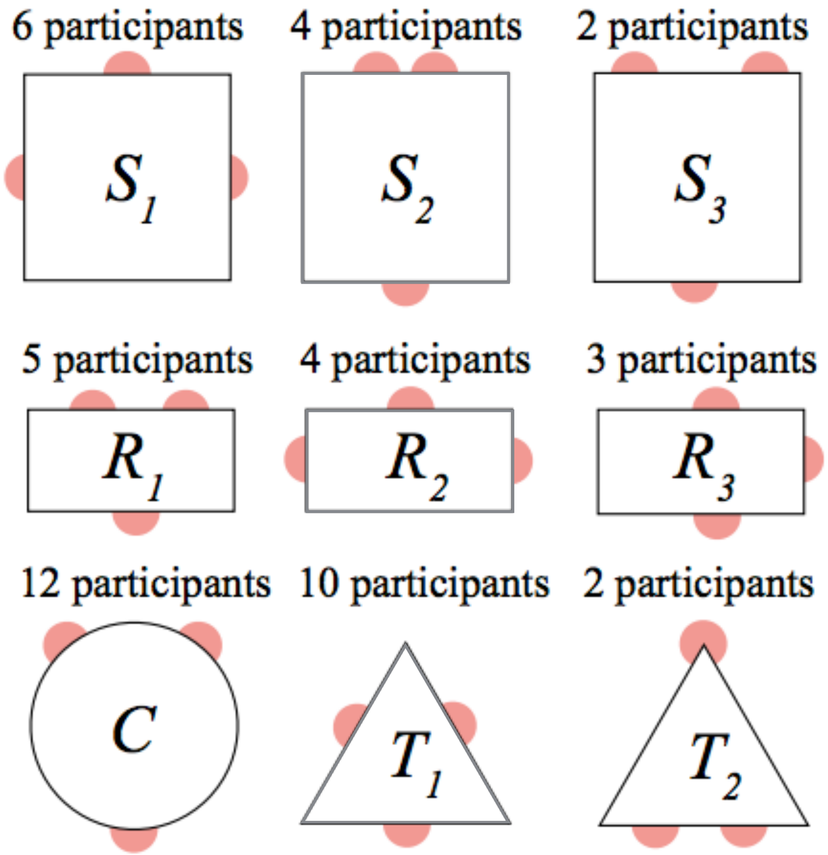
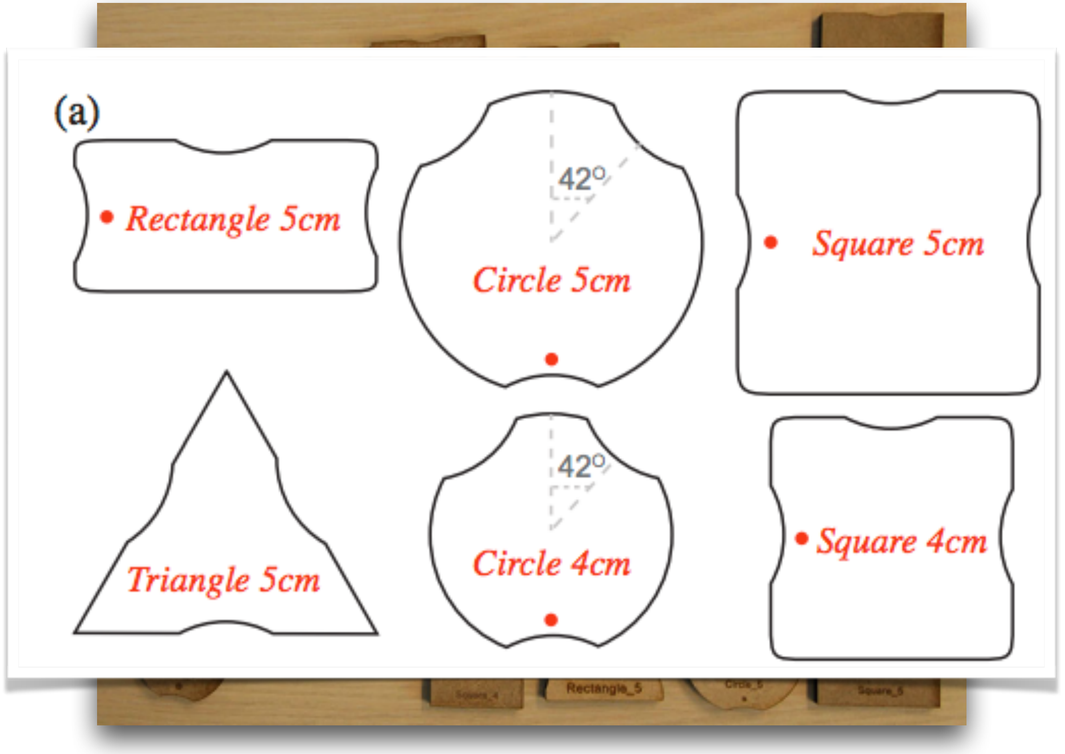
TouchTokens





[Gonzalez et al. CHI '16]

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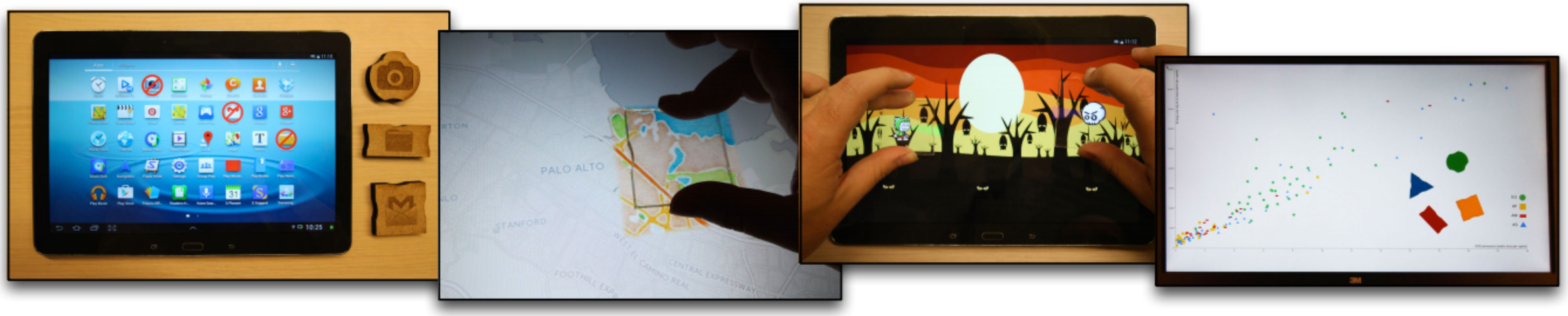
TouchTokens



[Gonzalez et al. CHI ’16]

Capactive Screens

Tangible Awareness [Cherek et al. CHI 2018]

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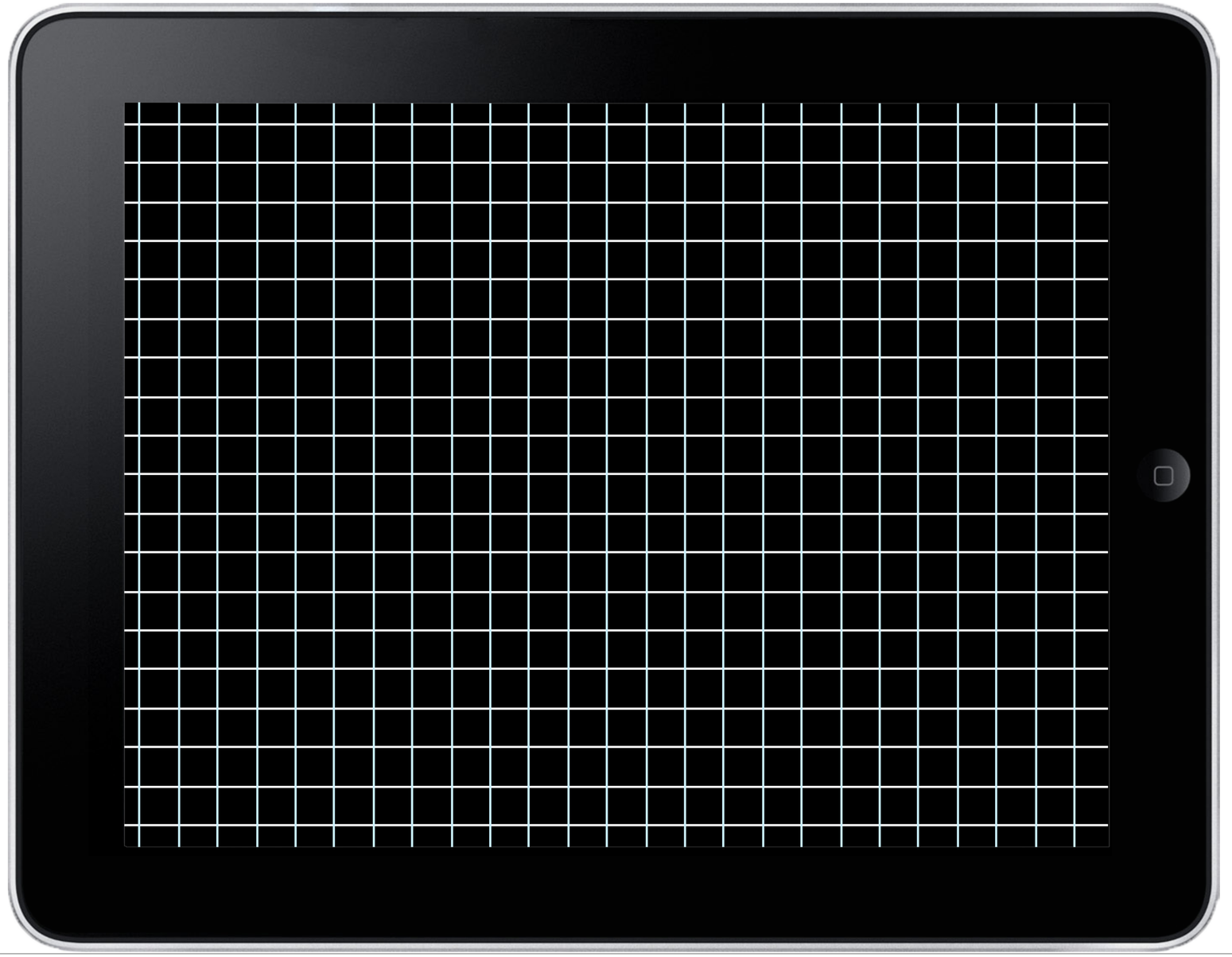
Receiving Electrodes

Transmitting Electrodes



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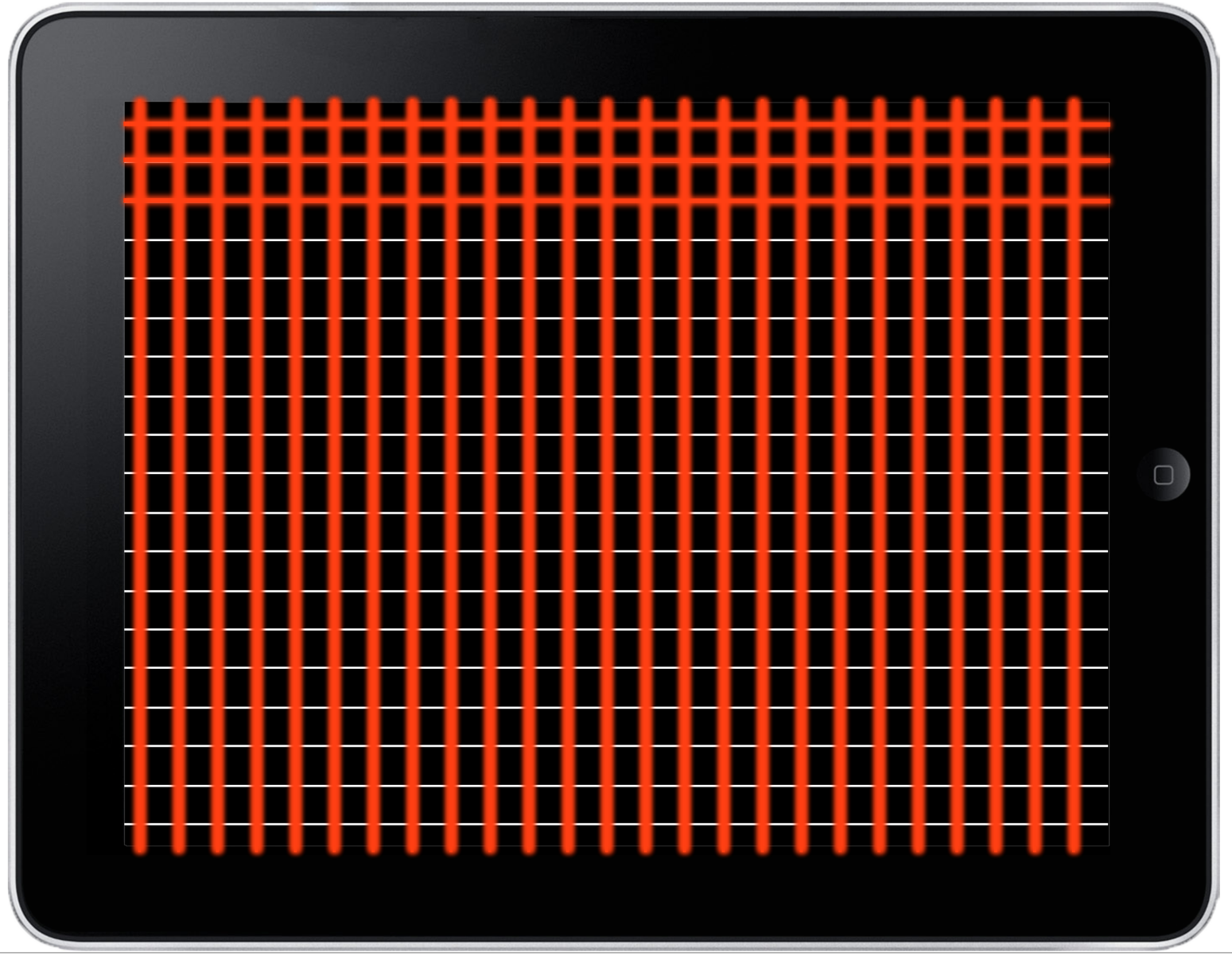
Receiving Electrodes

Transmitting Electrodes



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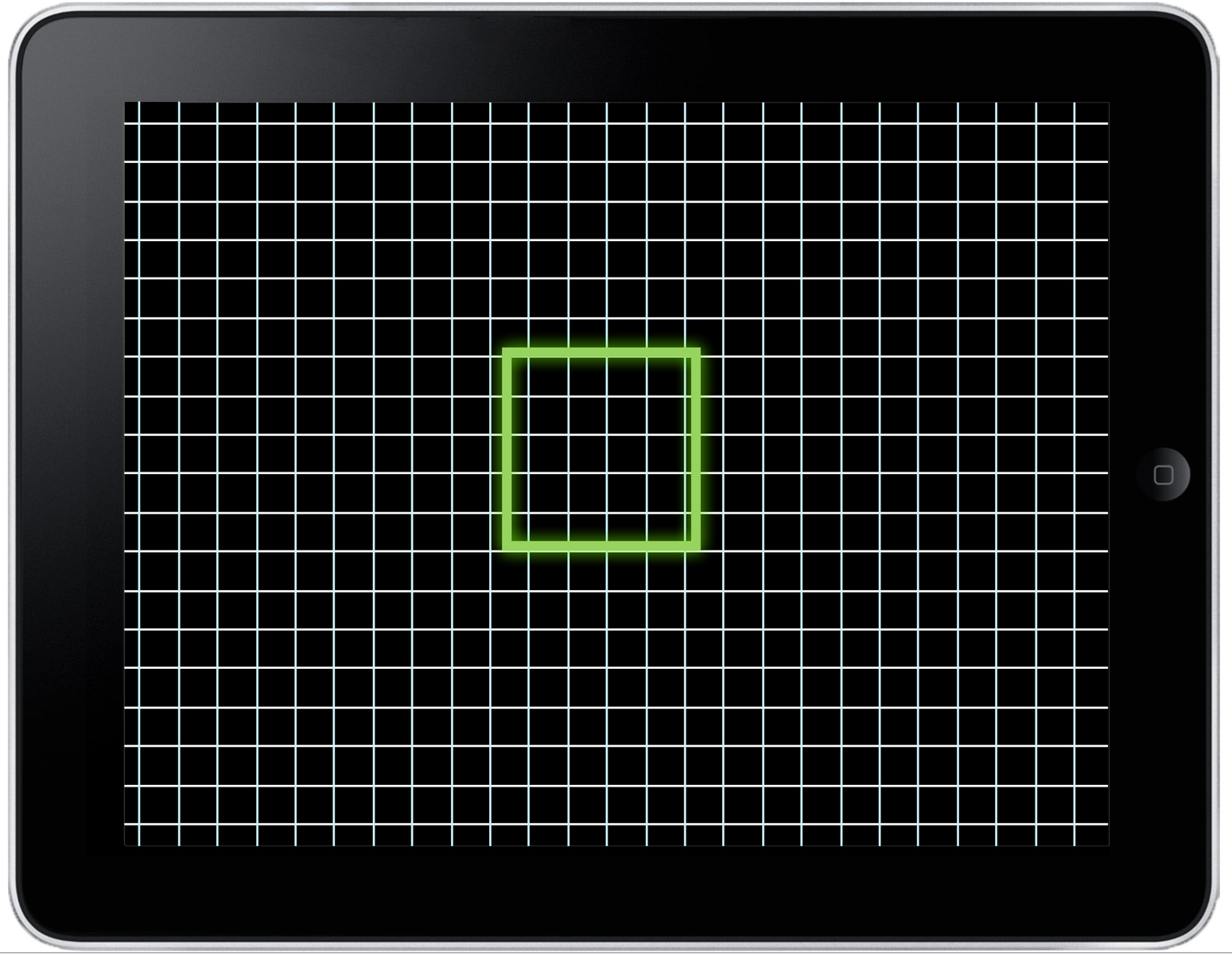

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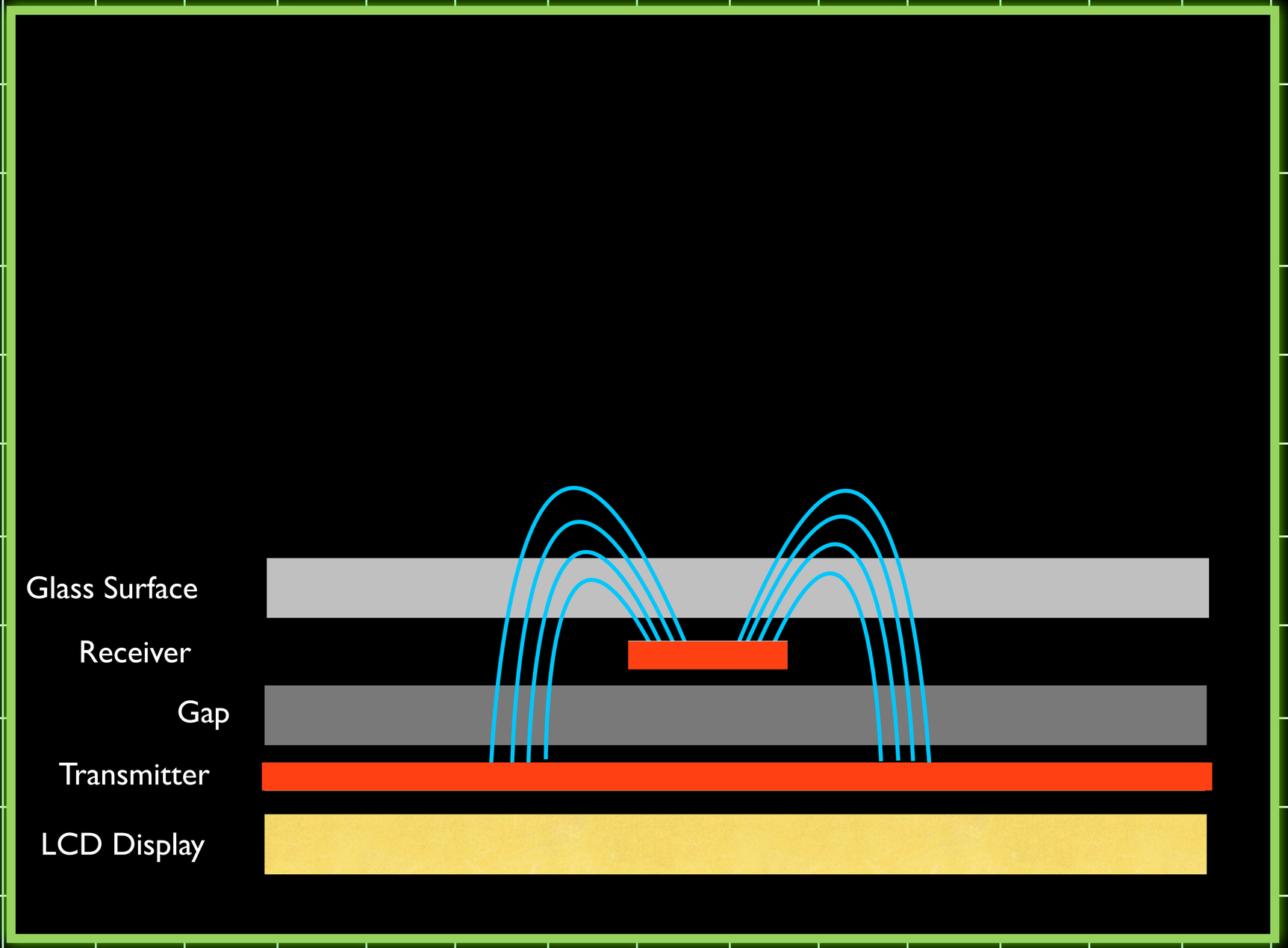
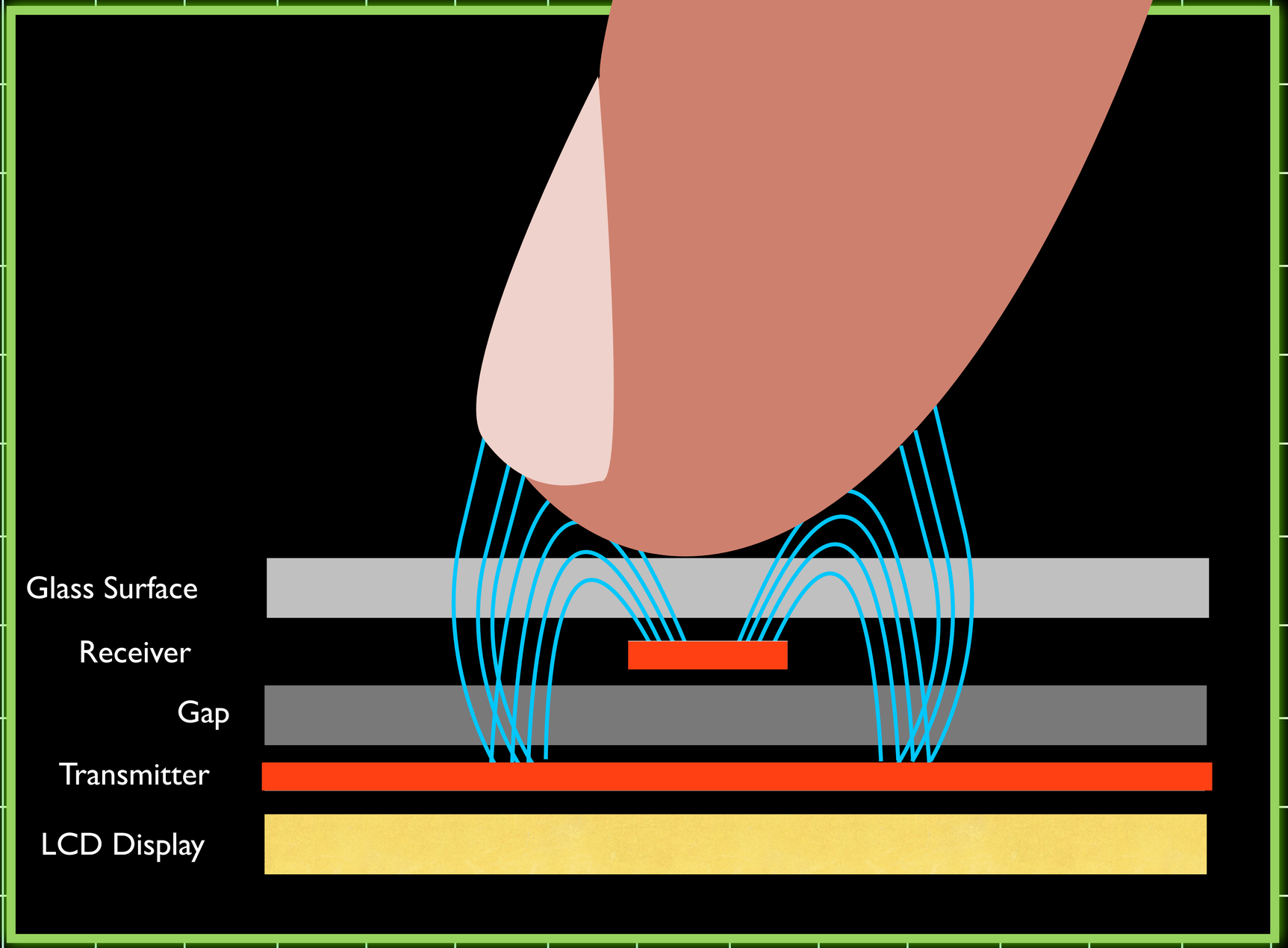

Glass Surface
Receiver
Gap
Transmitter
LCD Display


Glass Surface
Receiver
Gap
Transmitter
LCD Display

How to Detect an Object?

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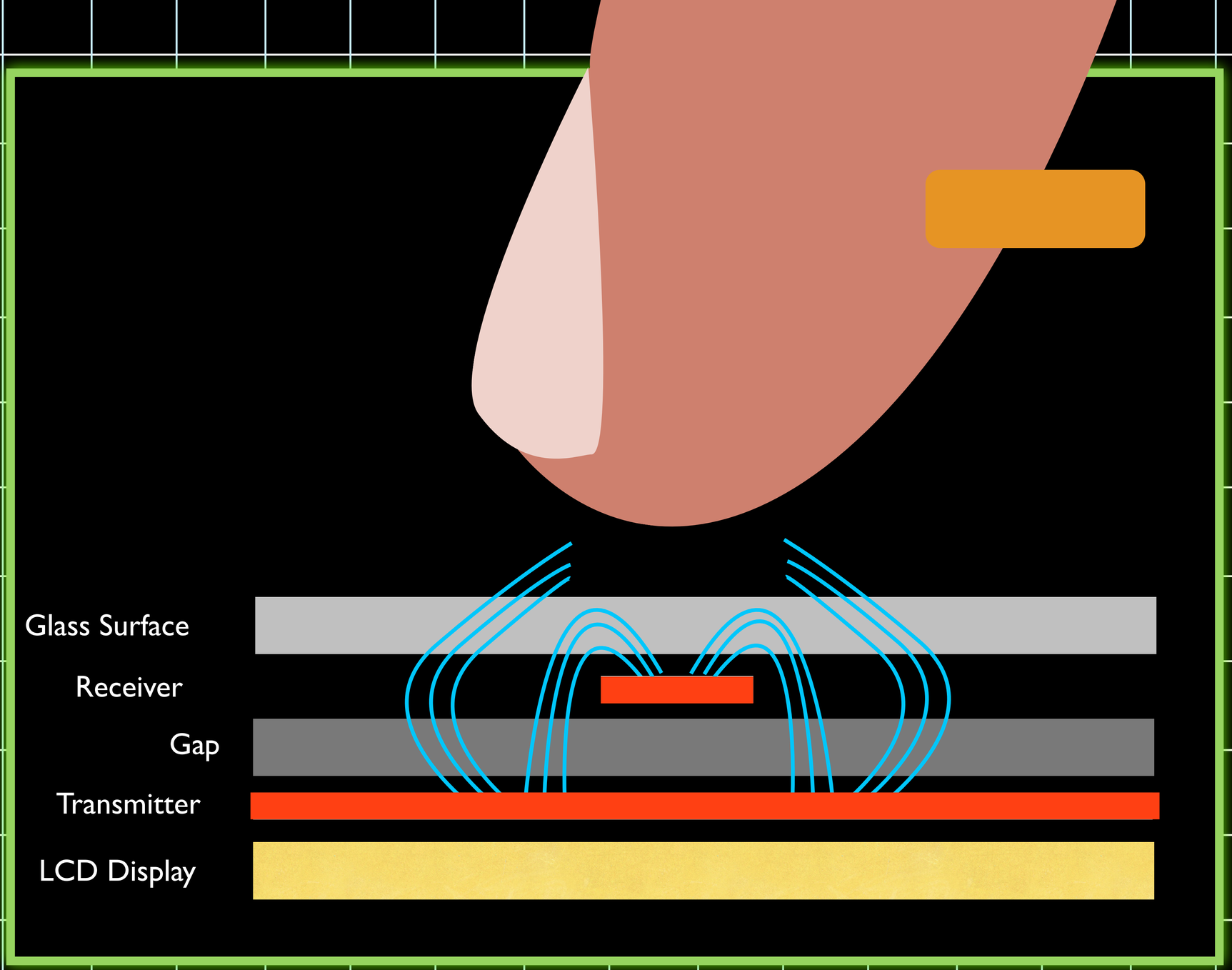
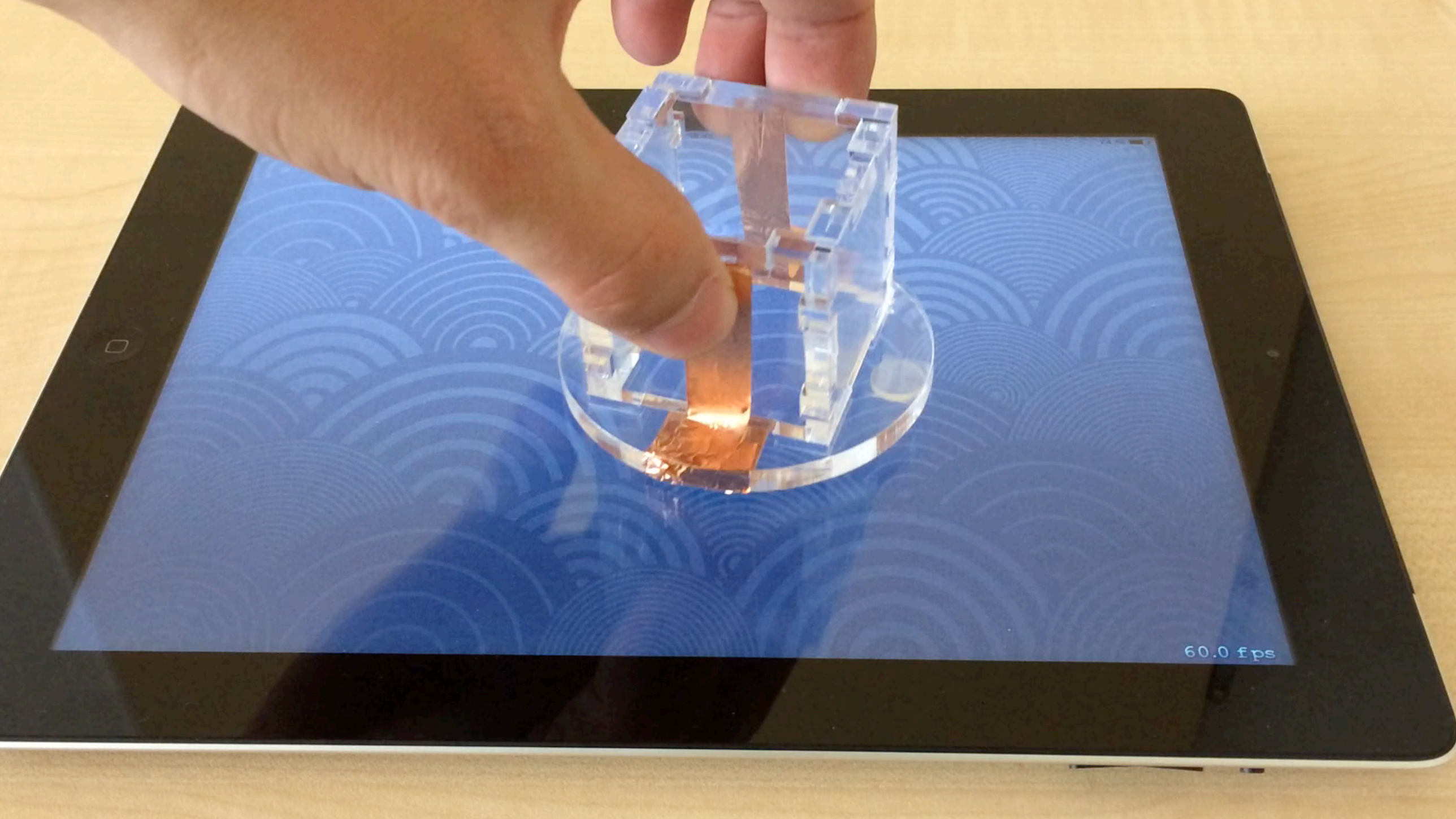

Glass Surface
Receiver
Gap
Transmitter
LCD Display


60.0 fps

Releasing or Removing an Object?

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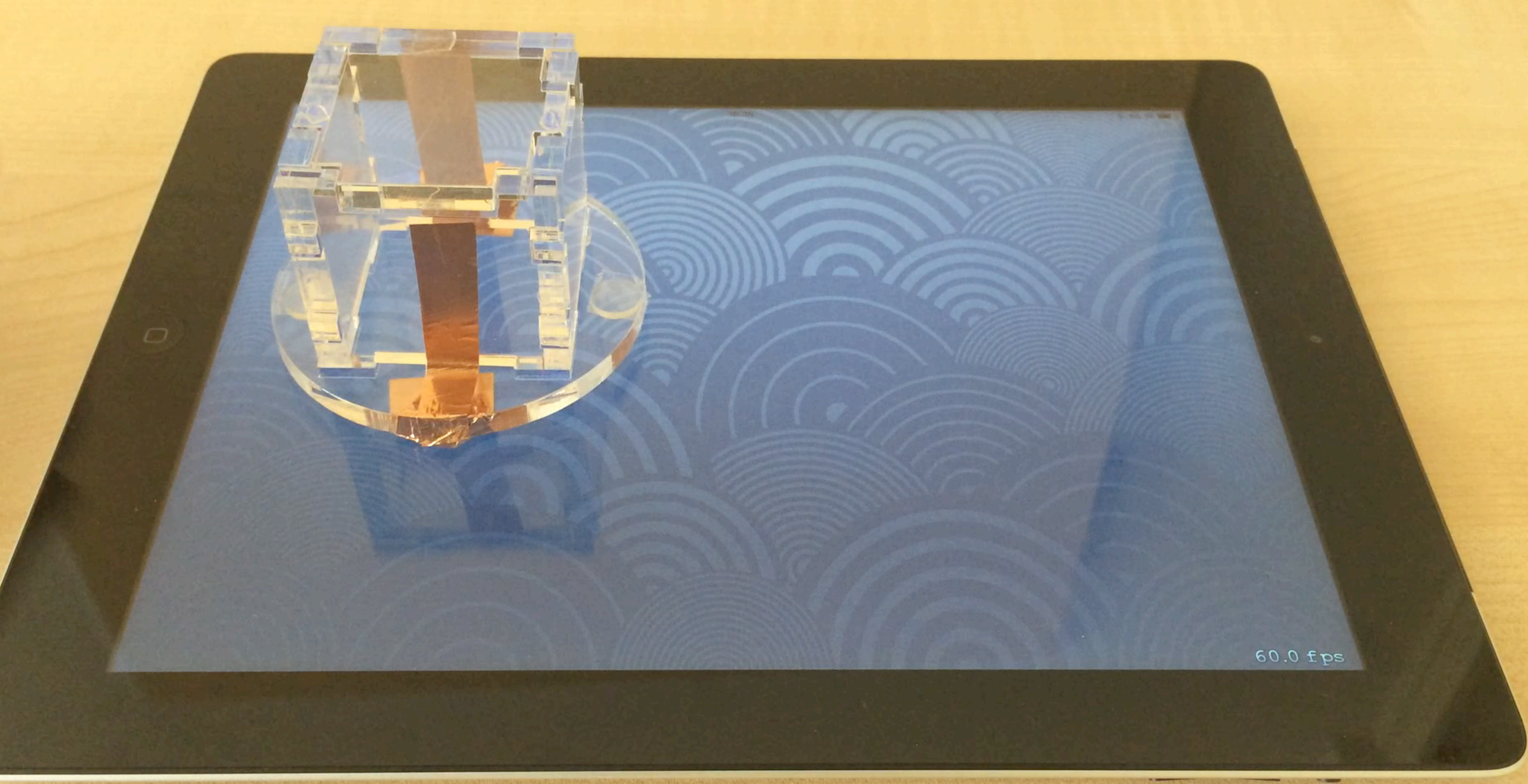
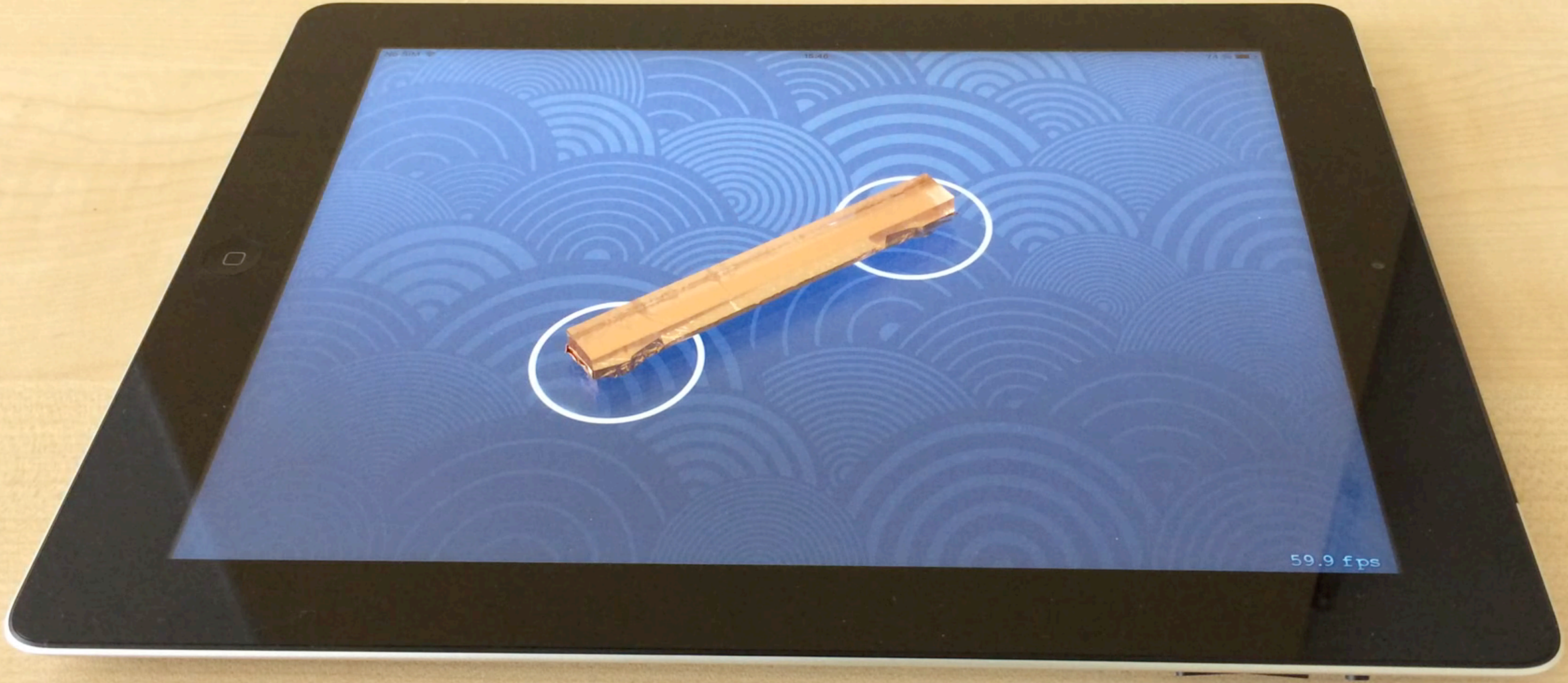
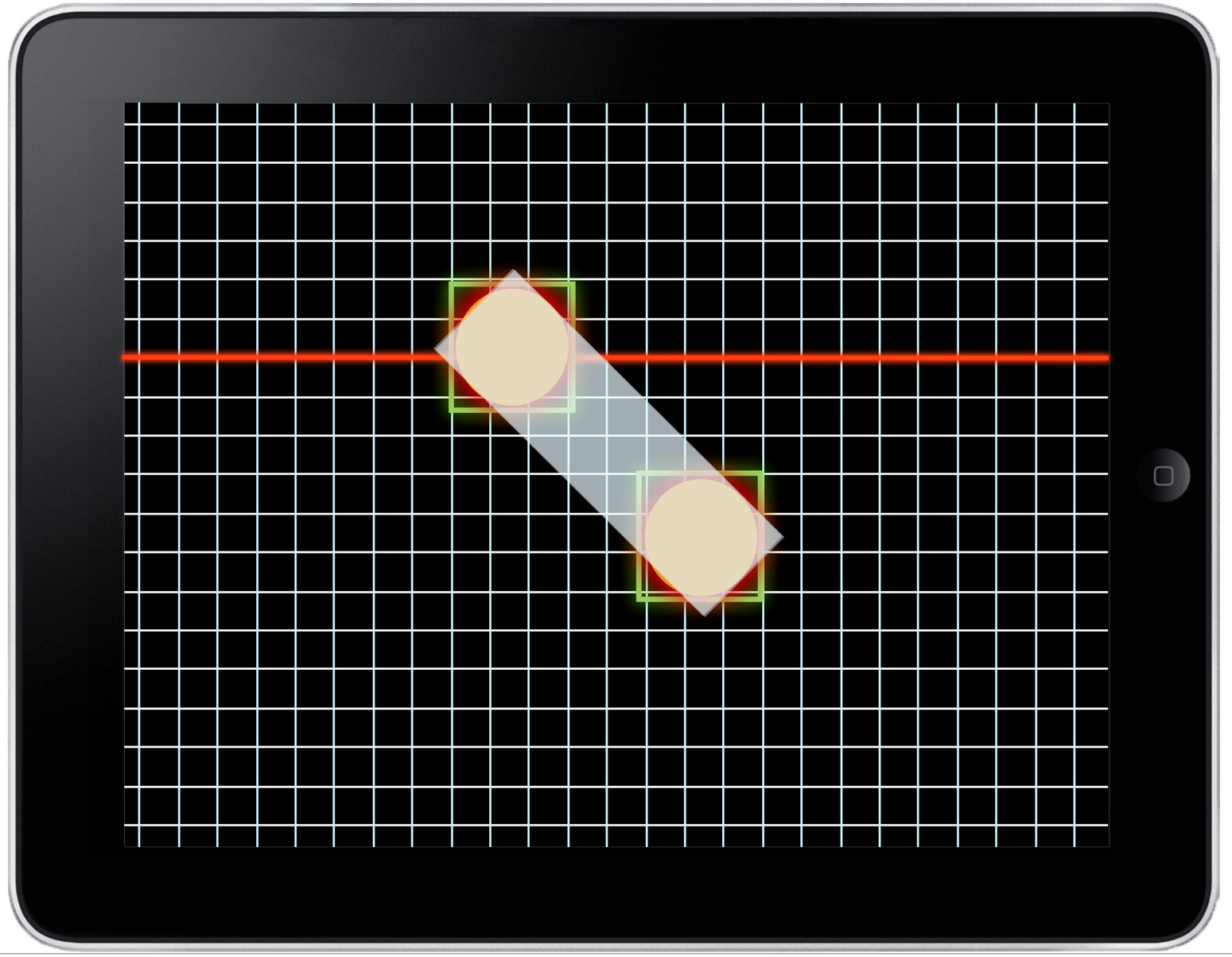

60.0 fps

PUCs: Passive Untouched Capacitive Widgets



Receiving Electrodes

Transmitting Electrodes



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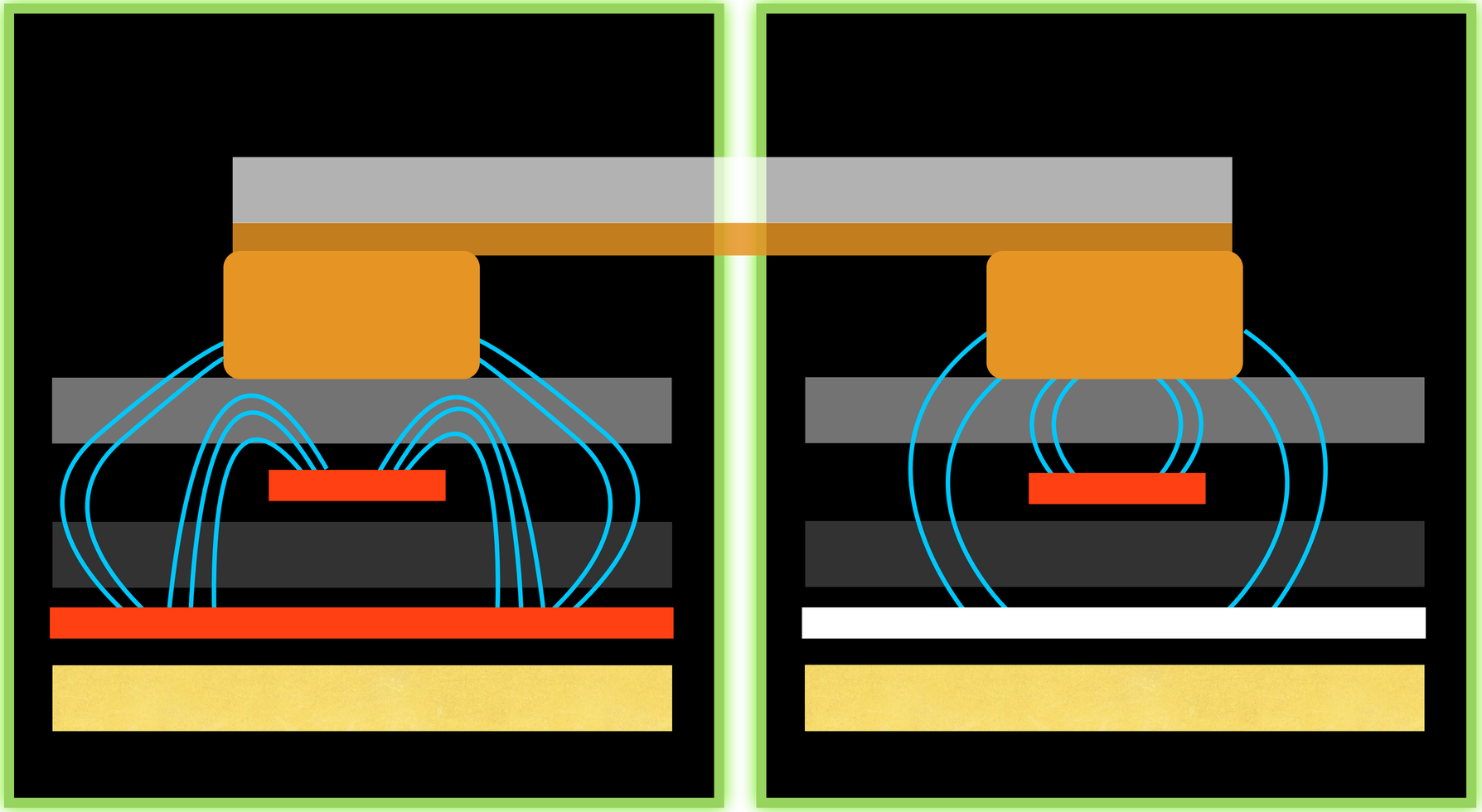

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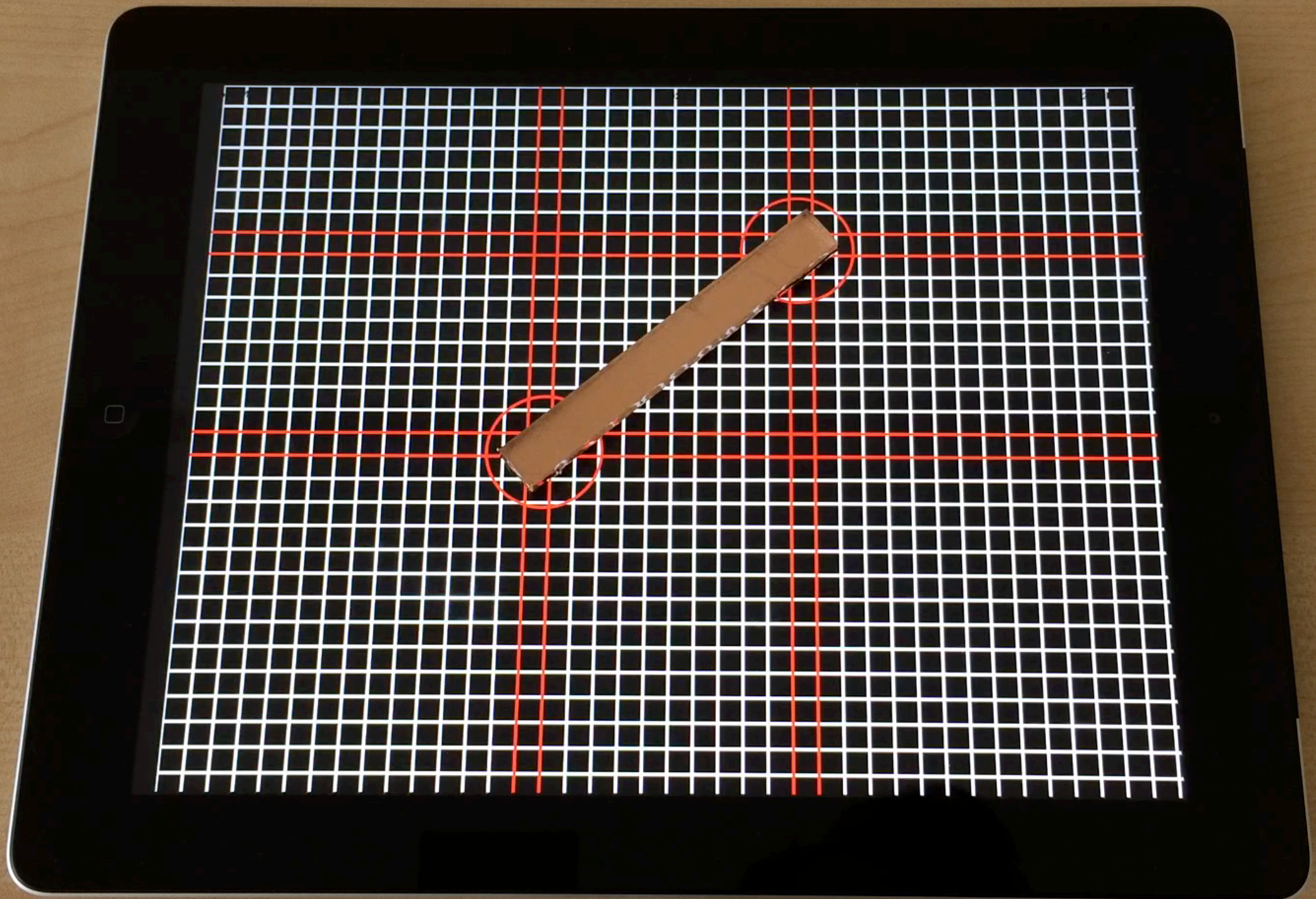

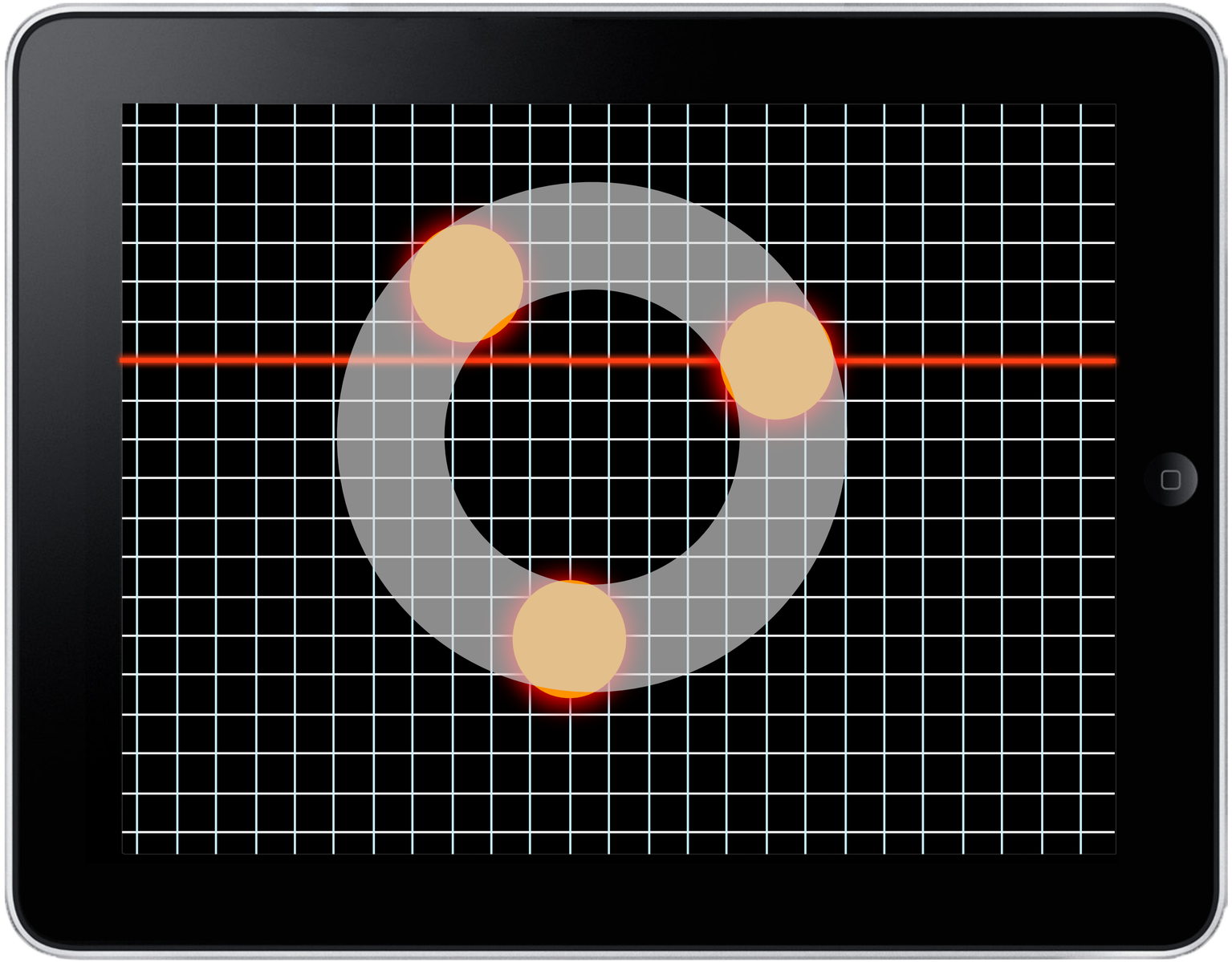

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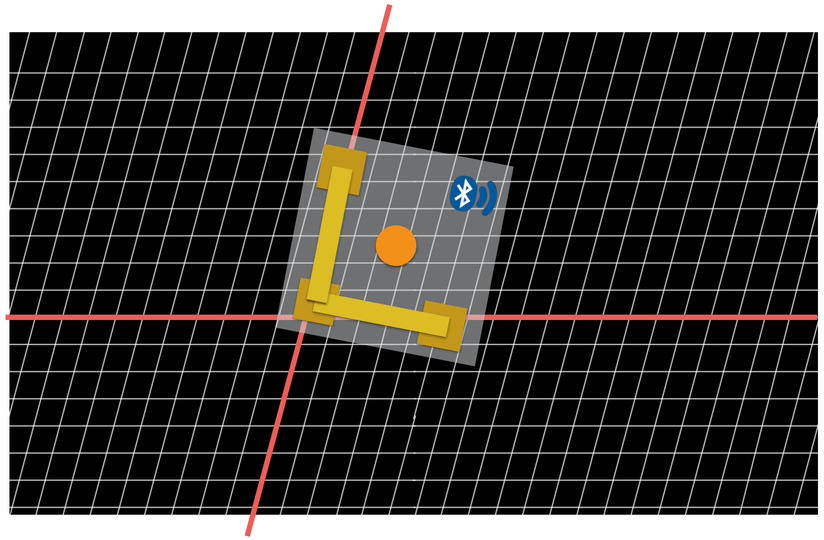
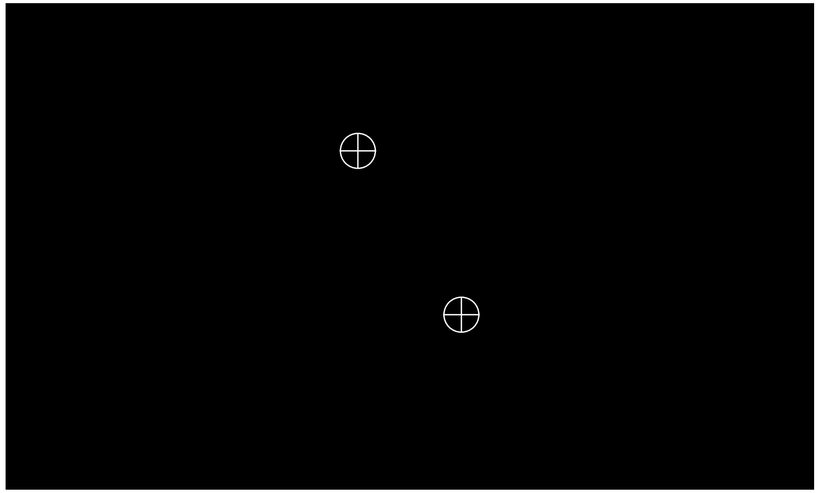
Problem: Edgecases & Adaptive Filtering





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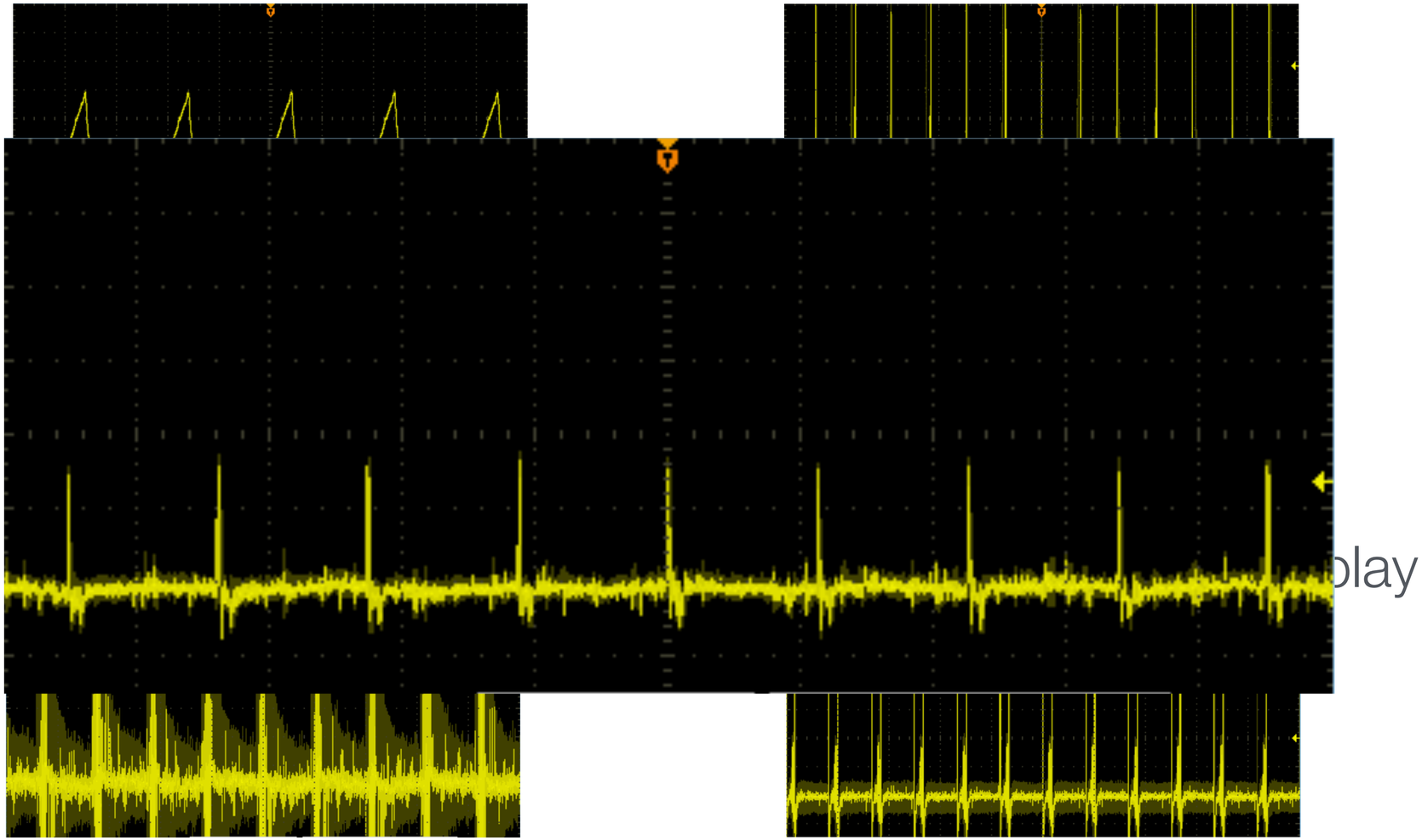
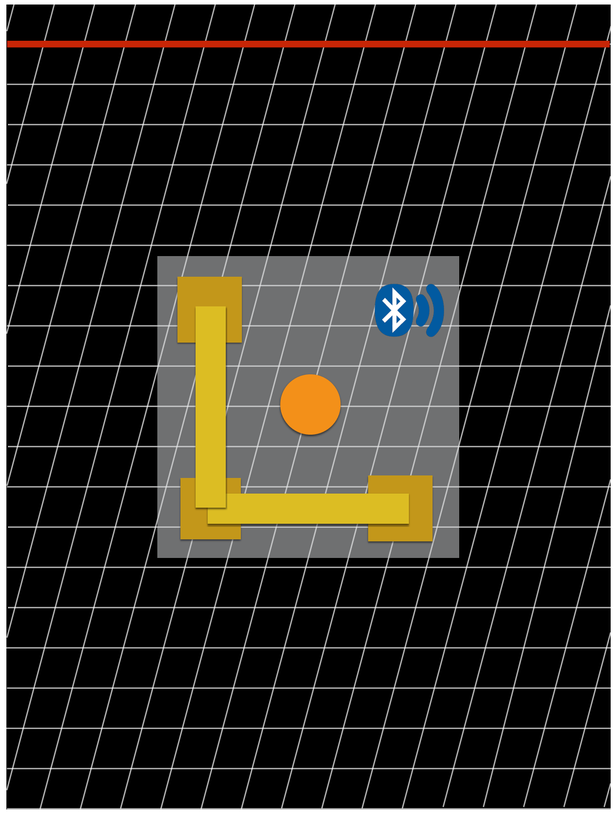
Scan line Signal



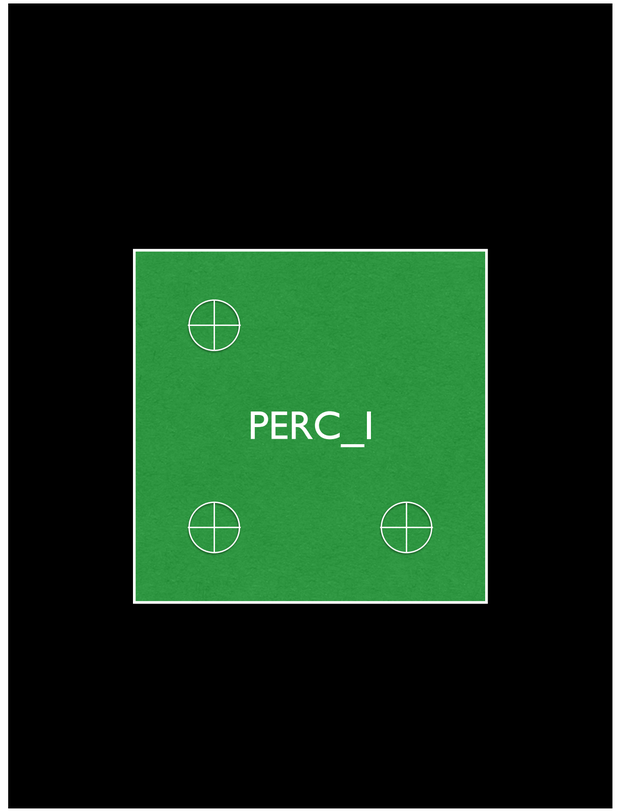
3M 46” Display

Microsoft 55” Display

Is the Tangible Still On the Screen?



Tangible PERC_I **on** Surface



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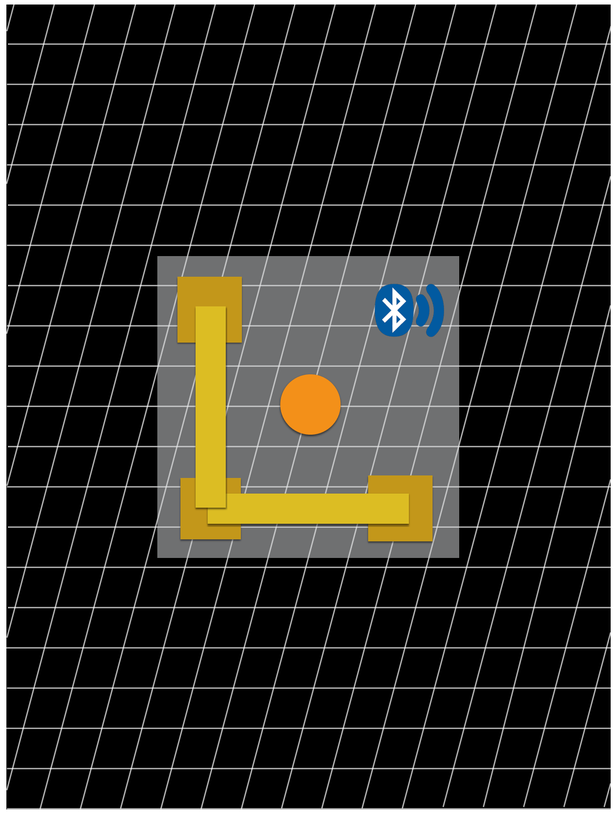
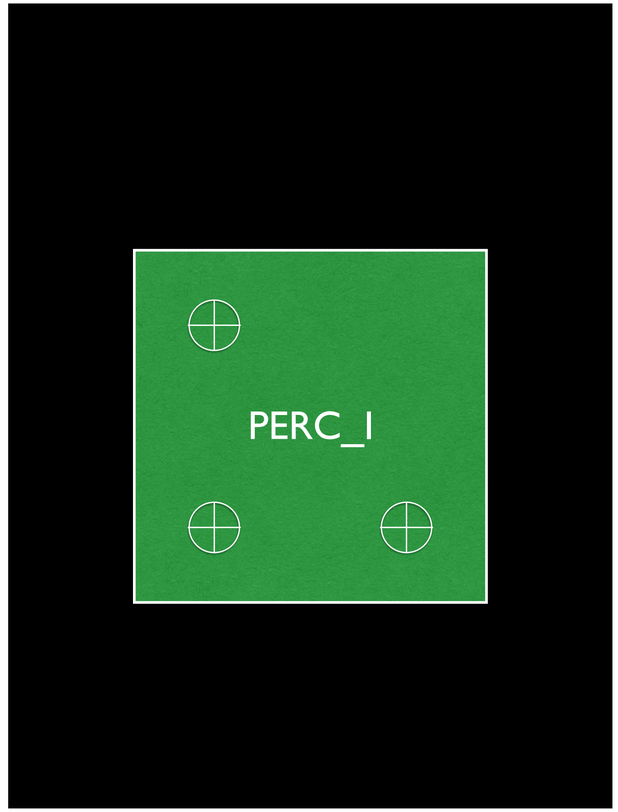
Is the Tangible Still On the Screen?



Tangible PERC_I **off** Surface



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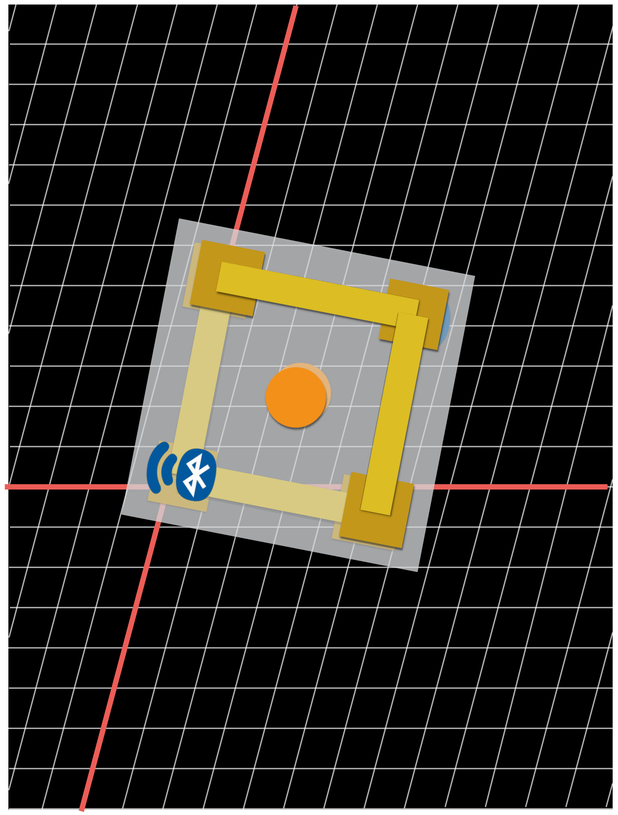
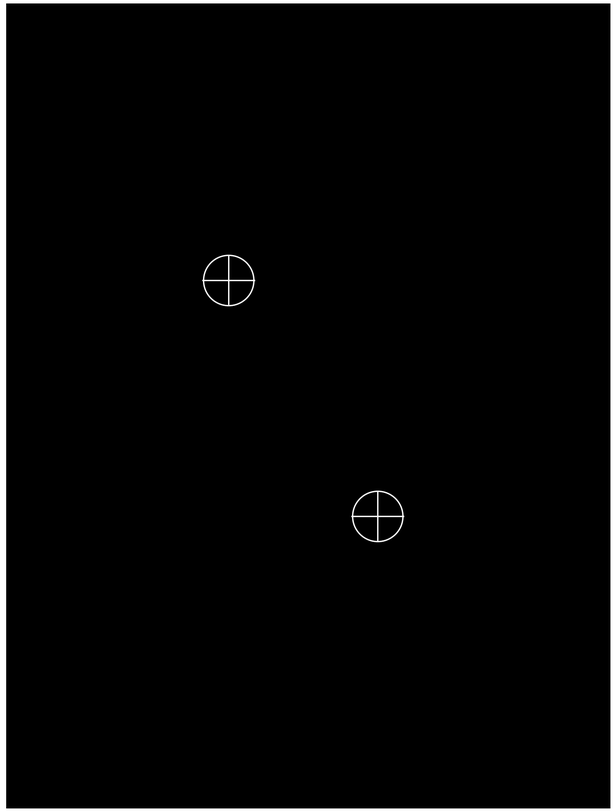
What is the Tangible's Orientation?



Tangible PERC_I **on** Surface



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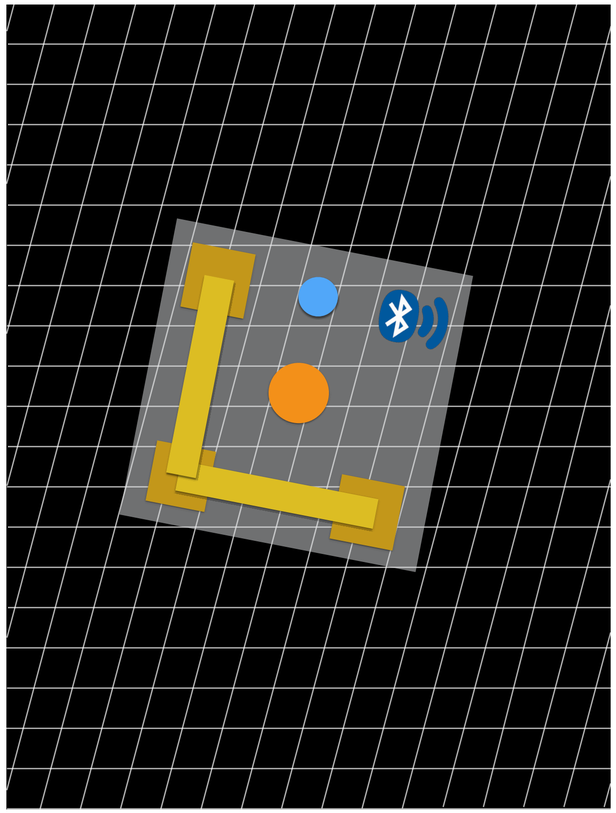
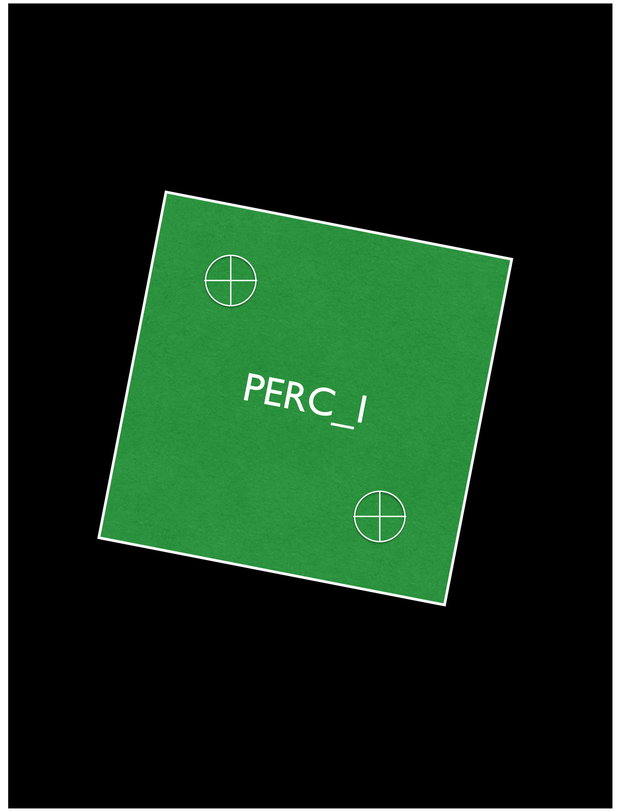
What is the Tangible's Orientation?



Tangible PERC_1 **on** Surface

Color changed



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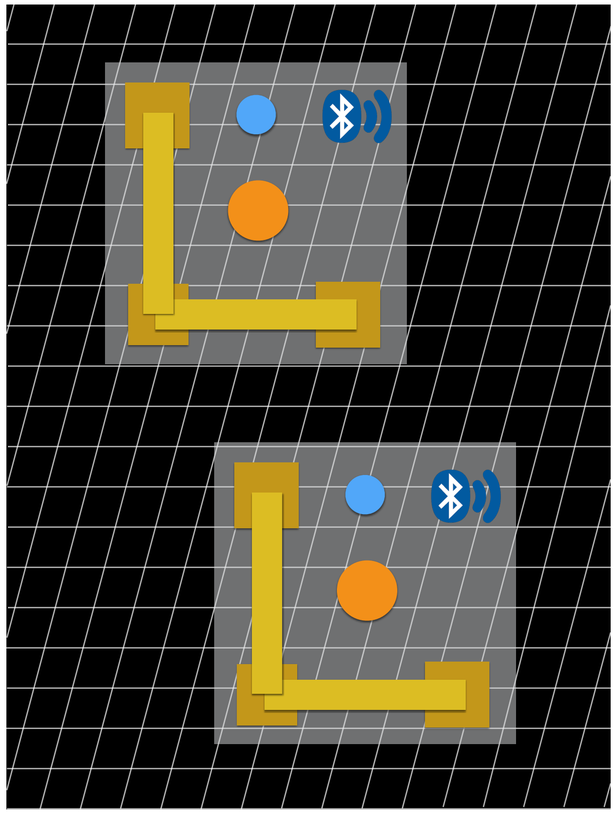
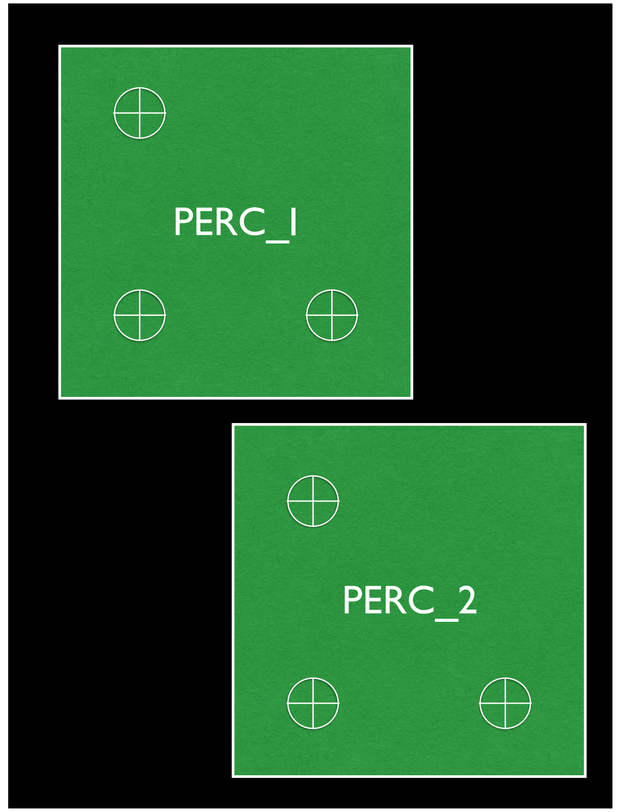
Identifying Tangibles



Tangible PERC_1 **on** Surface

PERC_1 **Color**

Tangible PERC_2 **on** Surface



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Tangible Applications

Tangible Awareness [Cherek et al. CHI 2018]

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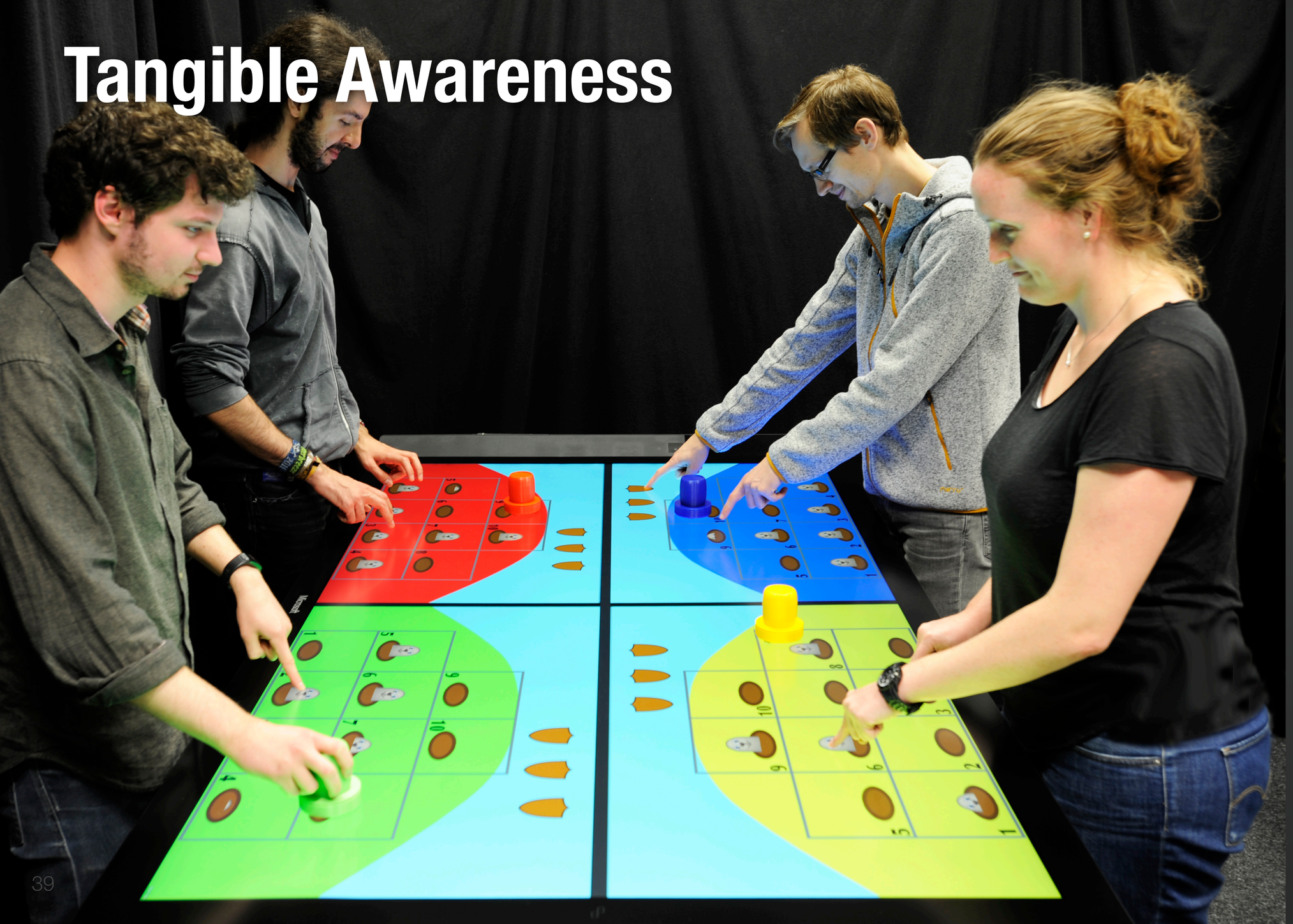
Tangible Awareness



Evaluating tangibles impact on user awareness

Tangible Awareness
Cherek et al.
CHI 2018

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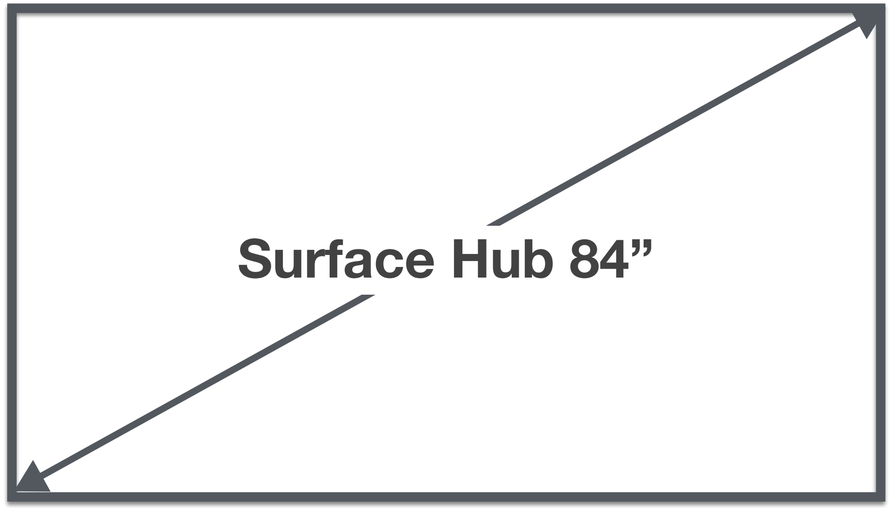
Multi-Touch Displays



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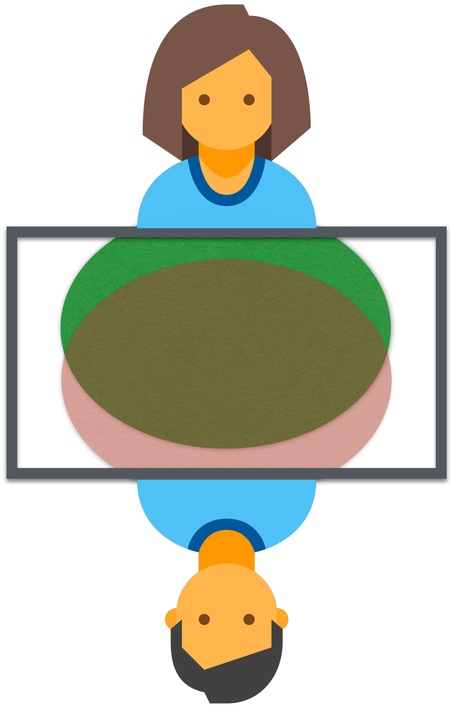
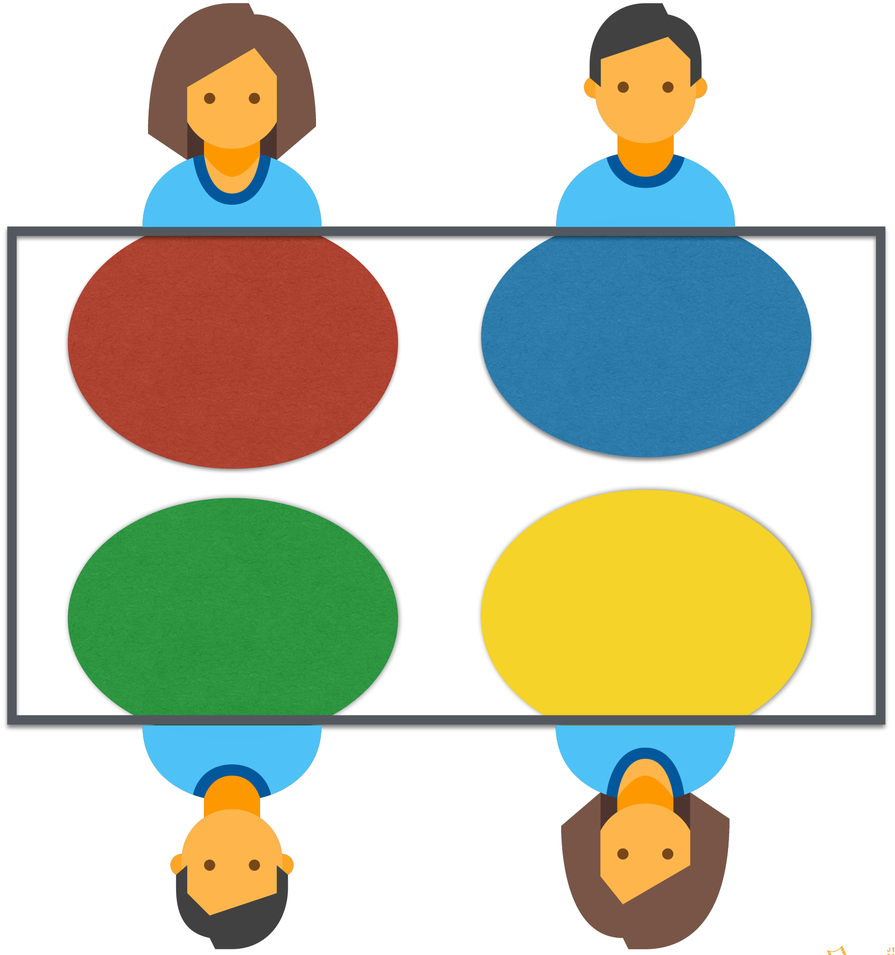
Collaboration





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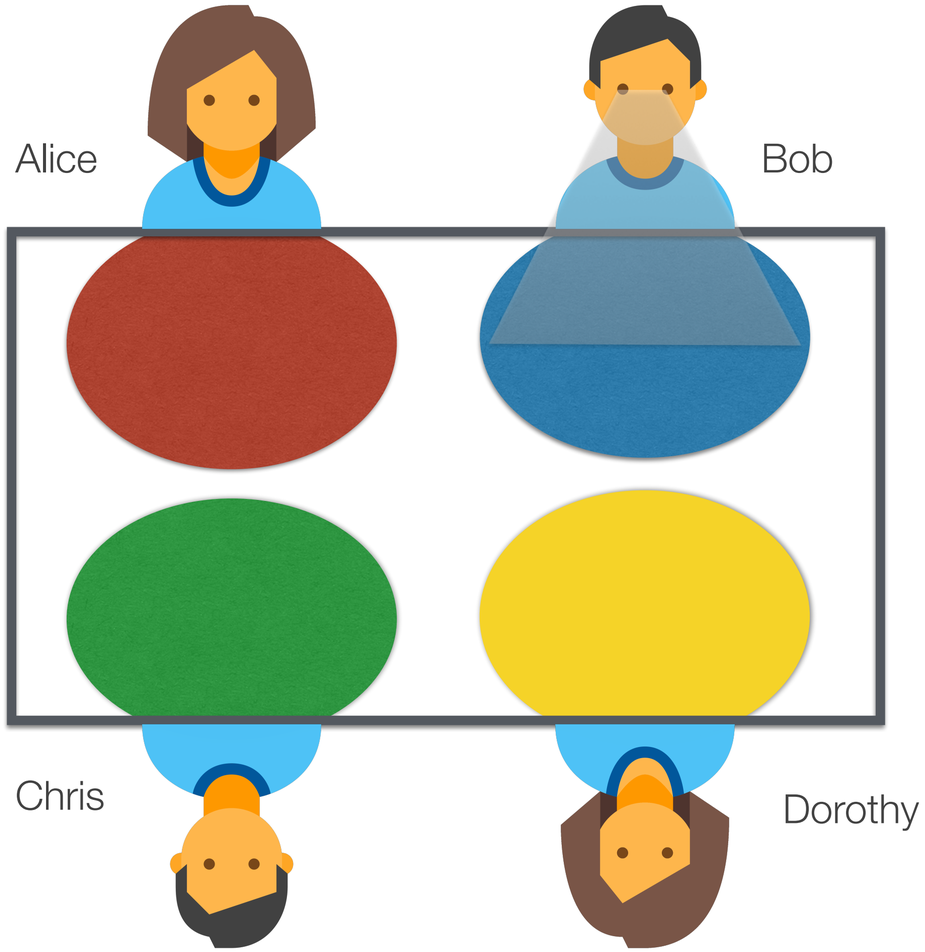
Secondary Tasks



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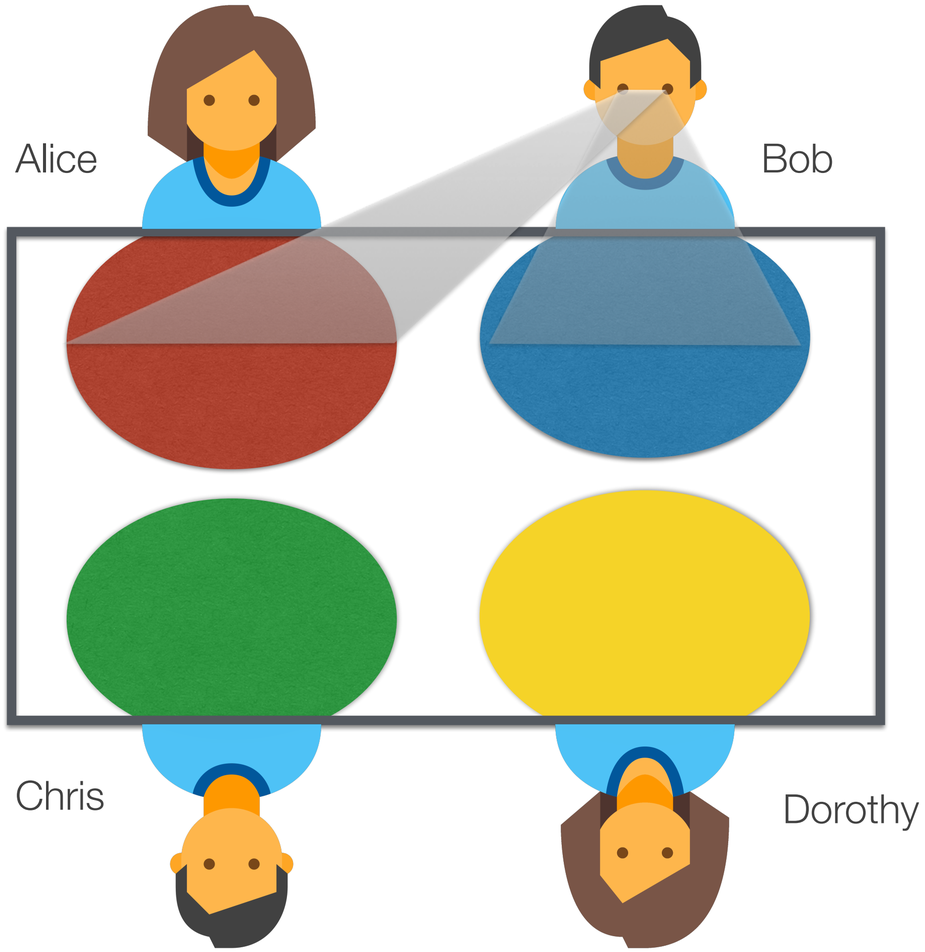
Secondary Tasks



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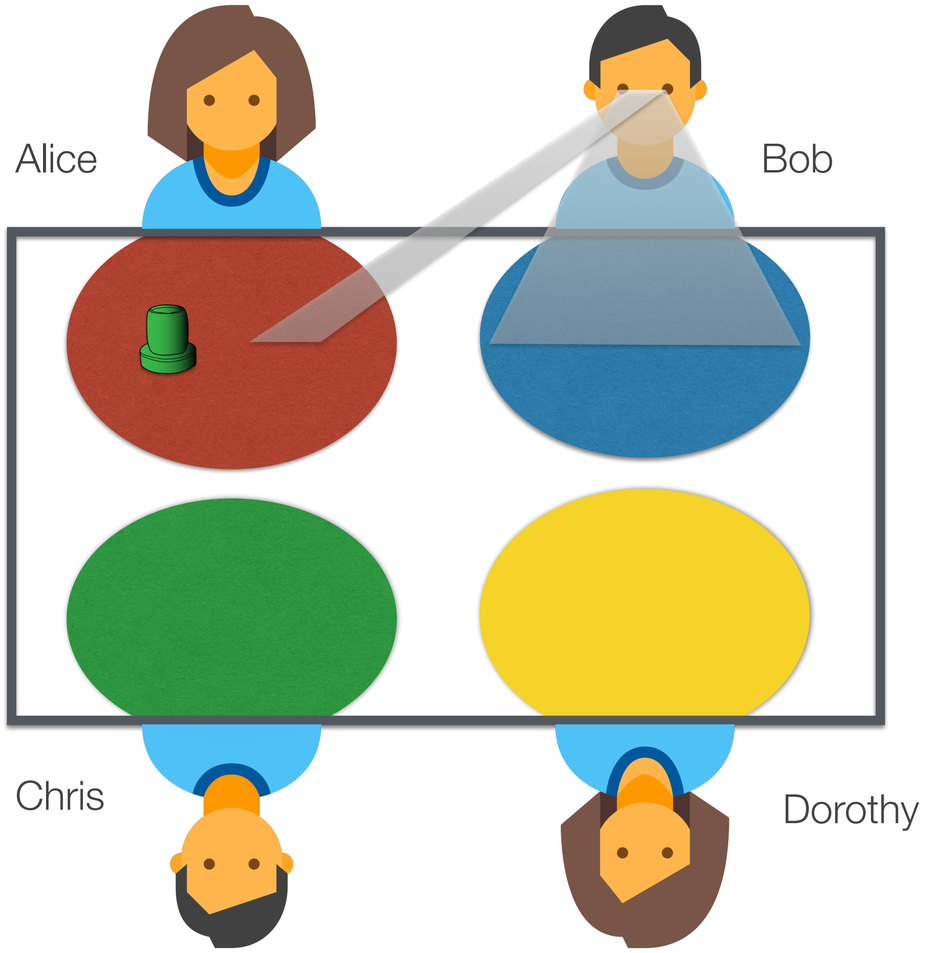
Do Tangibles Increase Secondary Task Awareness?



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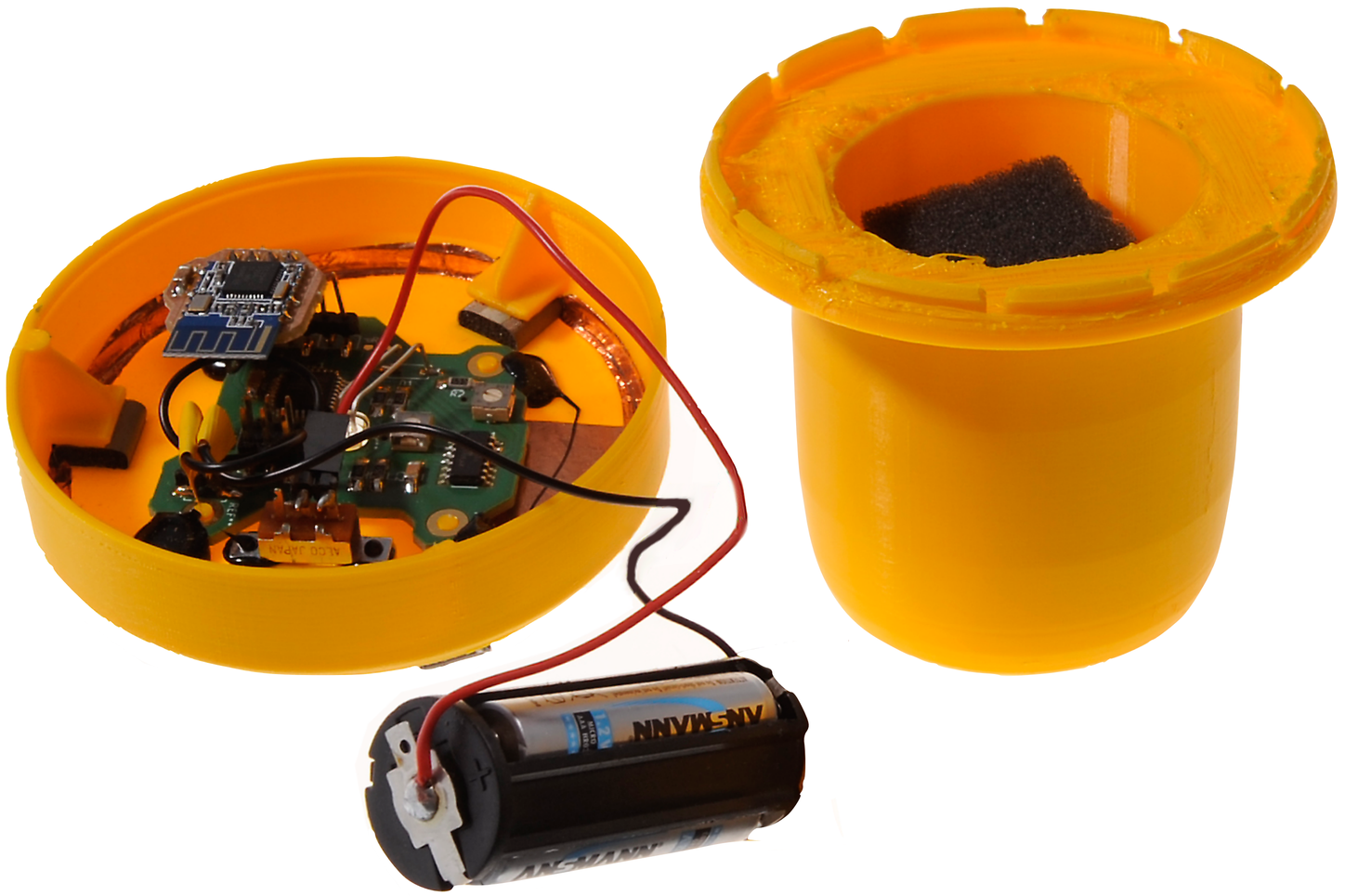
Tangible Awareness



Evaluating tangibles impact on user awareness

Tangible Awareness
Cherek et al.
CHI 2018

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4
7
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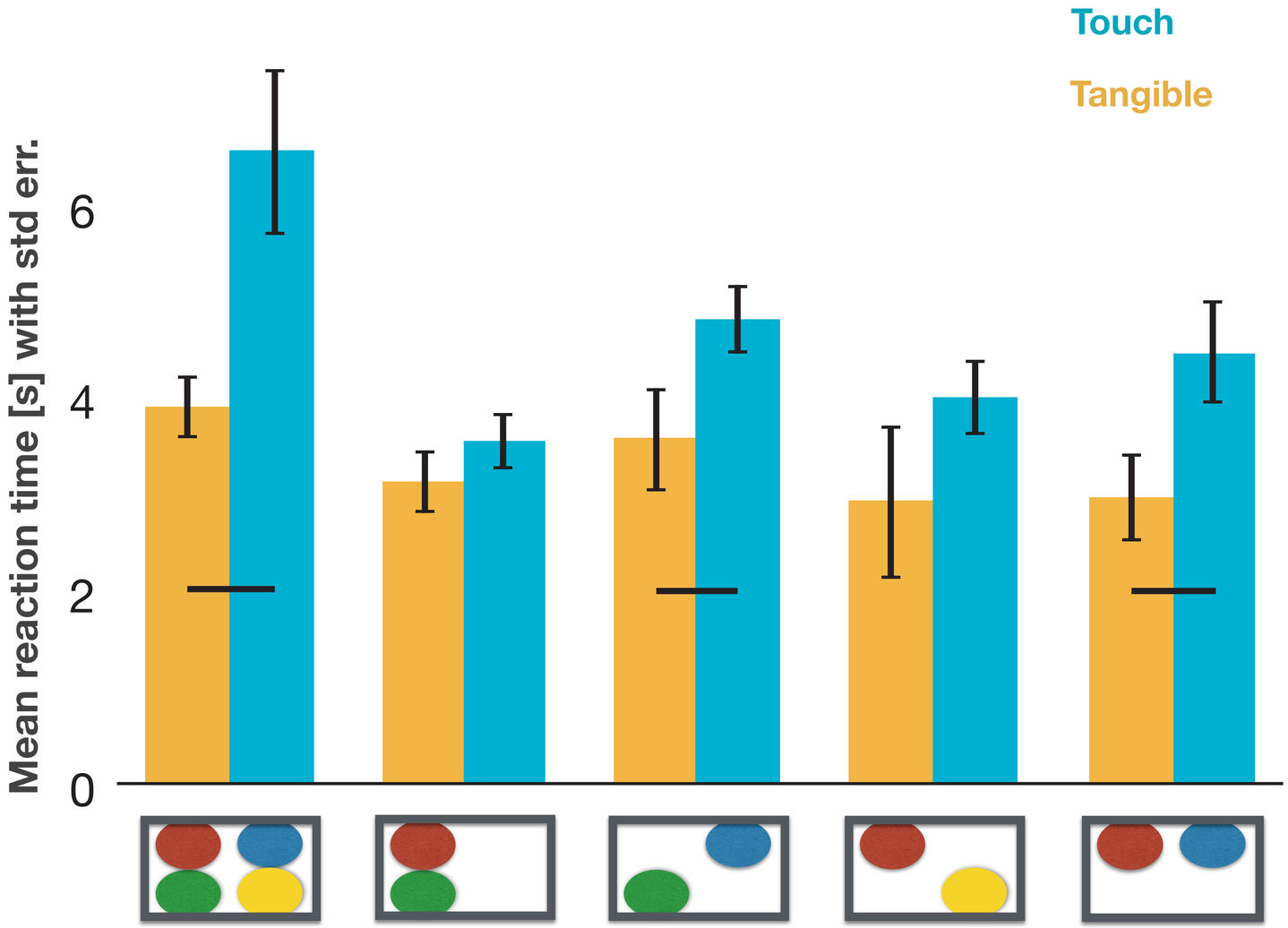
Reaction Time



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Bots & (Main)Frames:

Exploring the Impact of Tangible Blocks and Collaborative Play in an Educational Programming

Edward Melcer
eddie.melcer@nyu.edu

Katherine Isbister
katherine.isbister@ucsc.edu

♫ "Cheery Monday" by Kevin MacLeod (incompetech.com)
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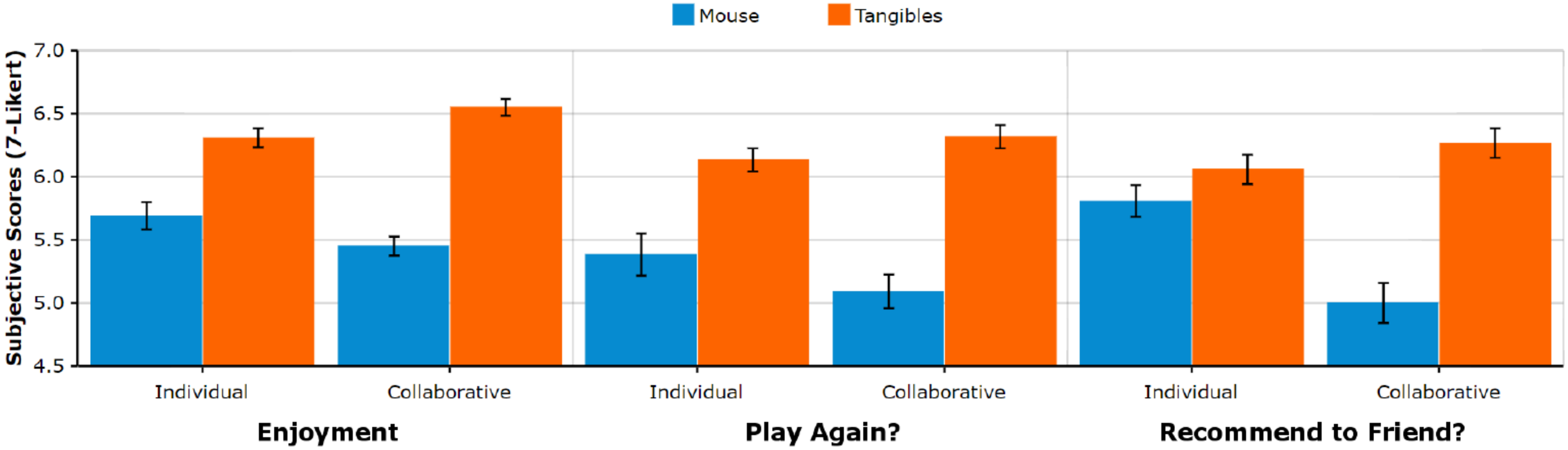
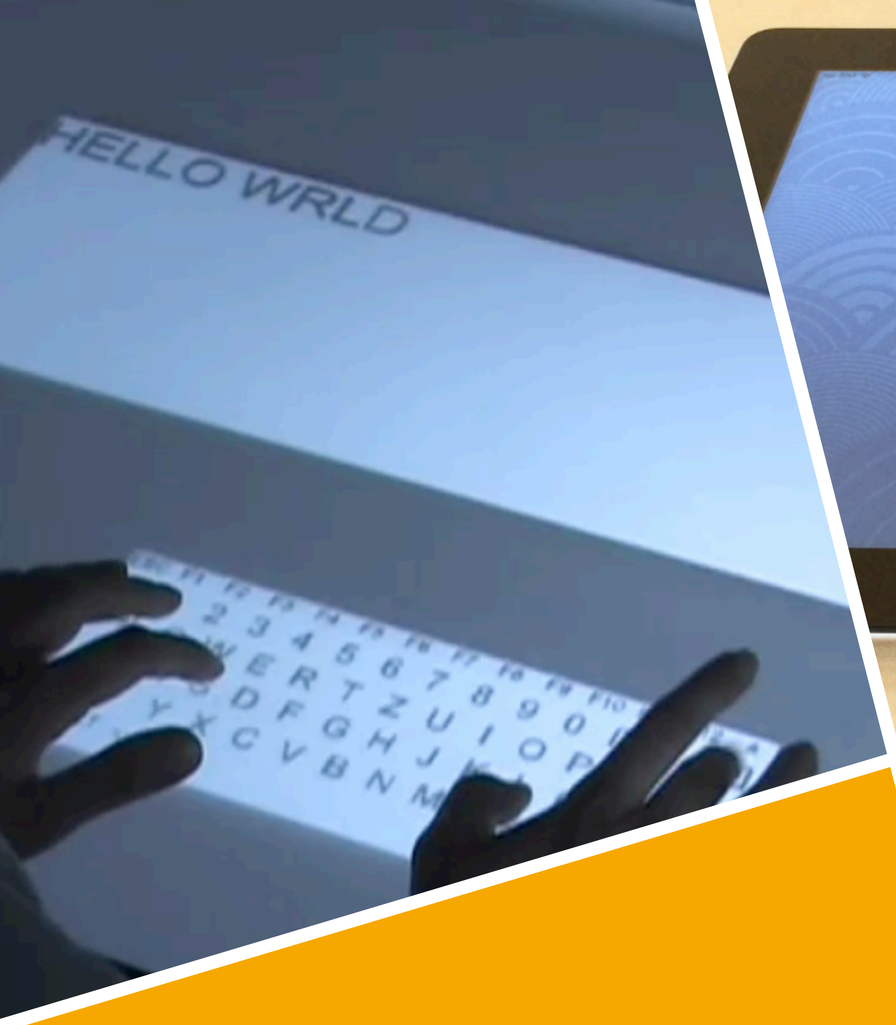
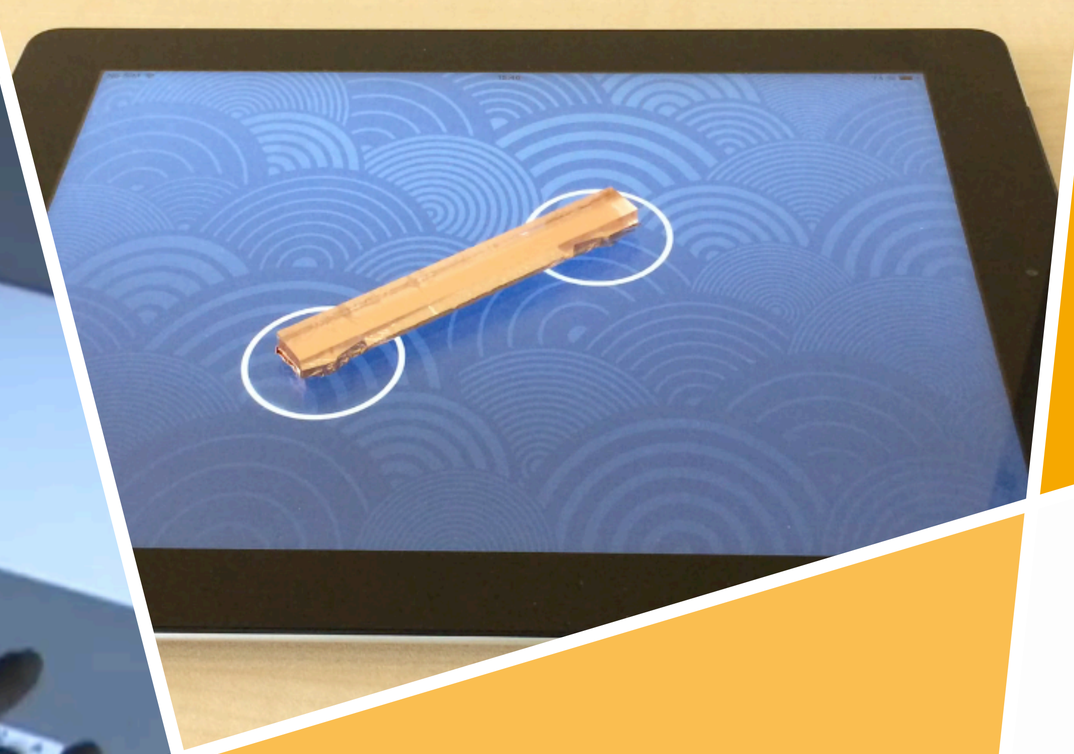
Bots & Mainframes



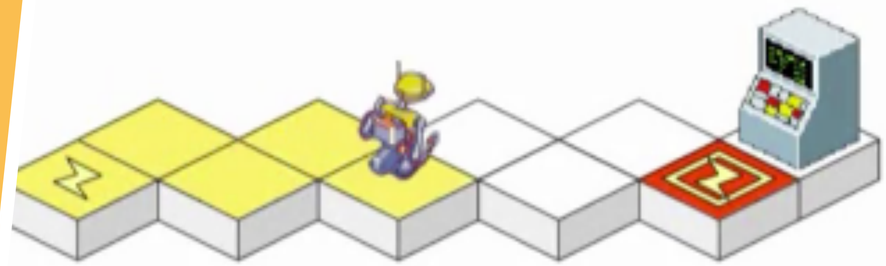




Applications

Haptic Feedback

Building Tangible Objects



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