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HAPTICS FOR COMMUNICATION IN A SOCIALLY DISTANCED WORLD

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Departments of Computer Science
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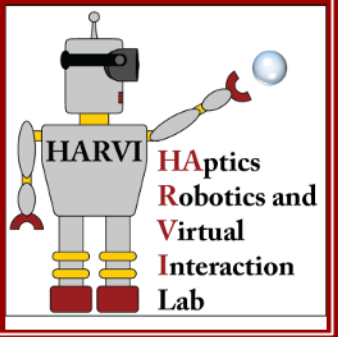
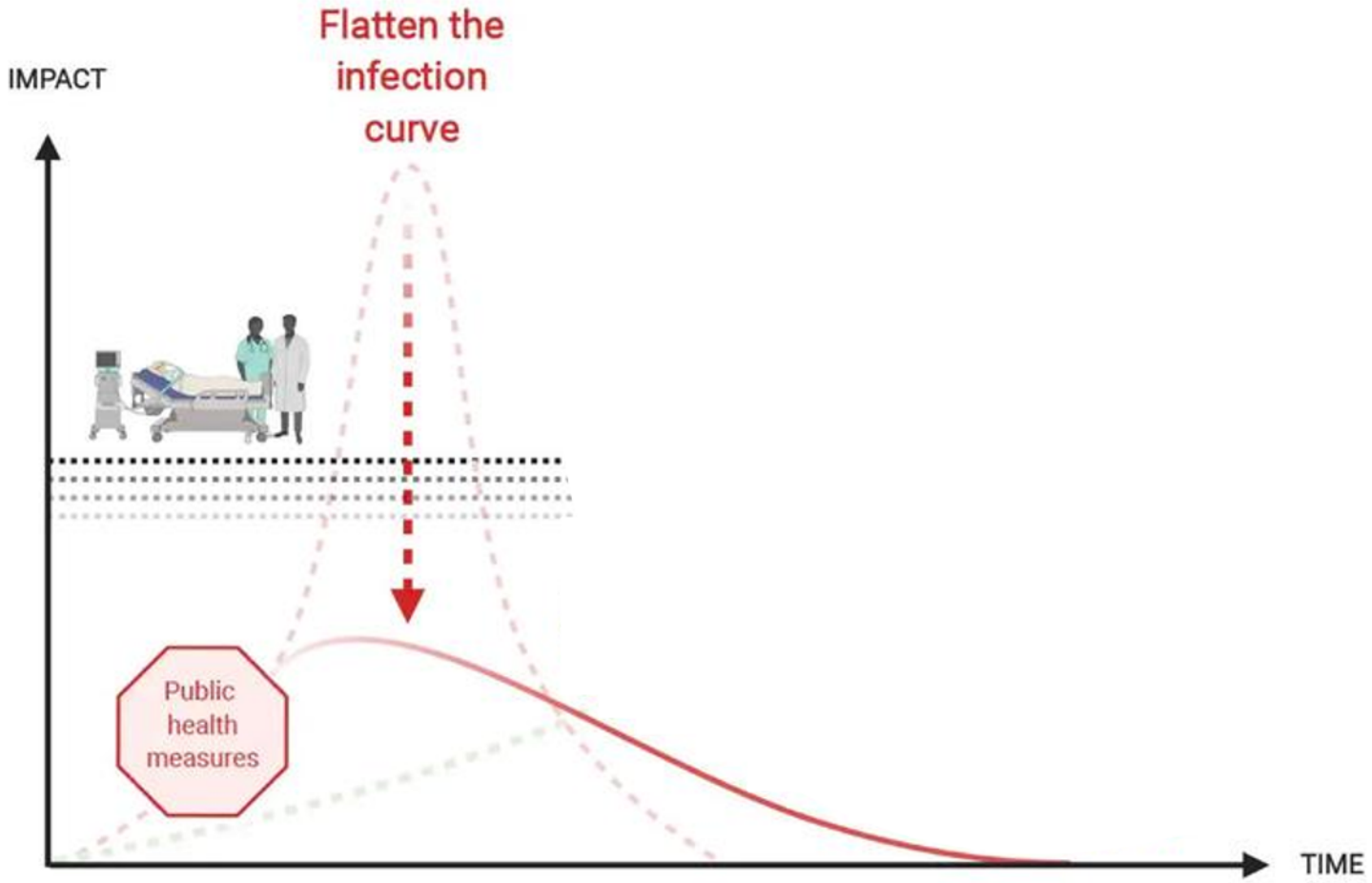


SOCIAL DISTANCING

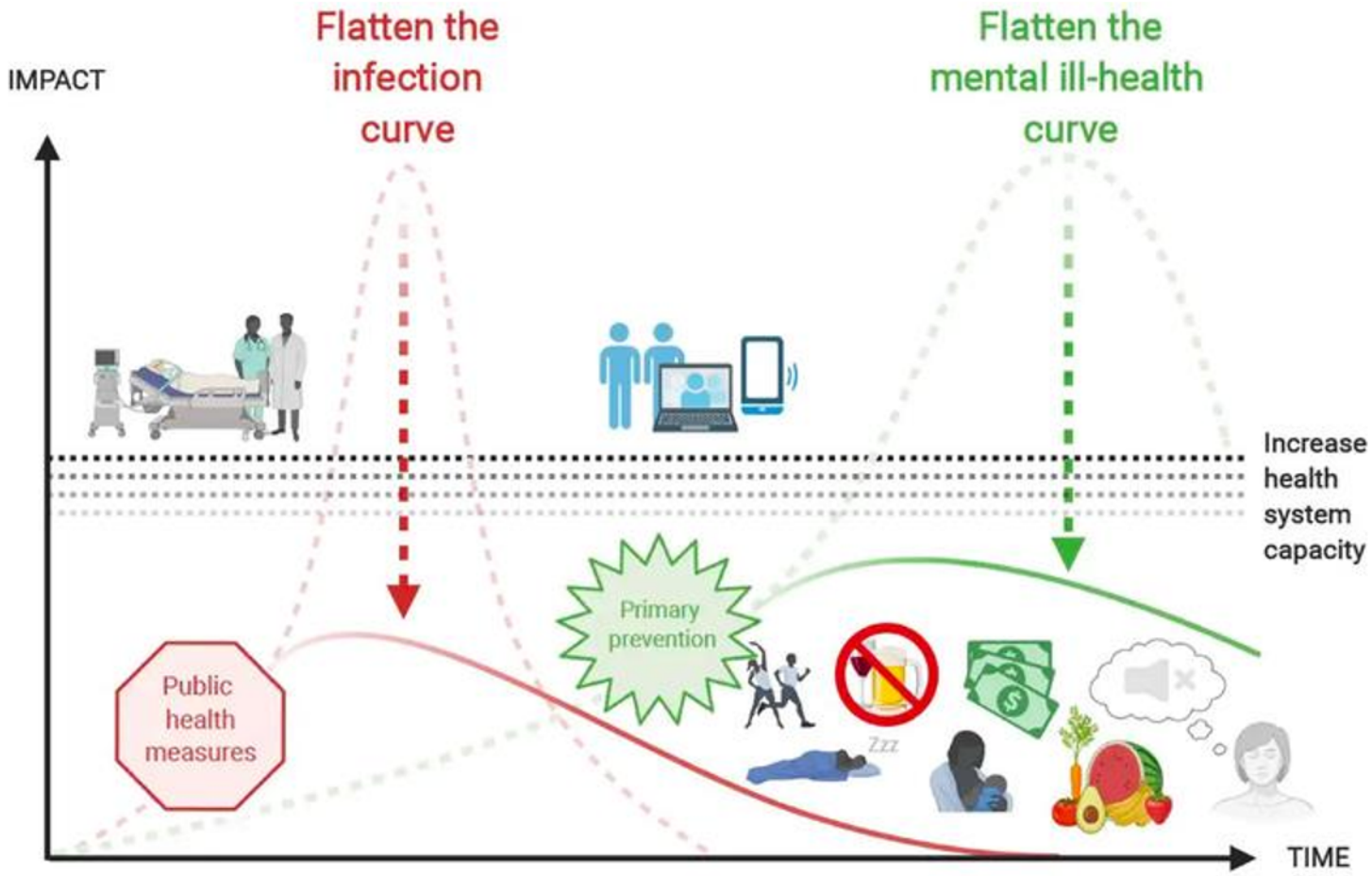
New York Times, 2020

FLATTENING THE CURVE



Adapted by Dr Lachlan Kent from Twitter post by Dr Victor Tseng (@VectorSting Mar 31)

FLATTENING THE CURVE(S)

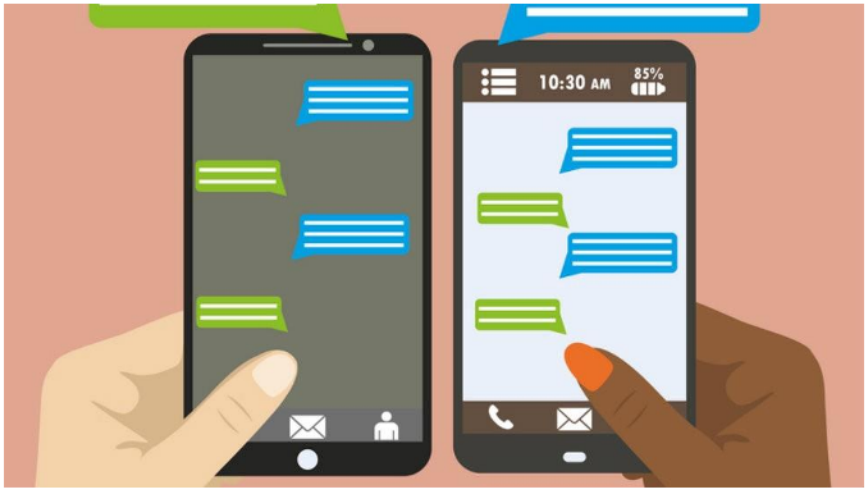


Adapted by Dr Lachlan Kent from Twitter post by Dr Victor Tseng (@VectorSting Mar 31)

DISTANT SOCIALIZING

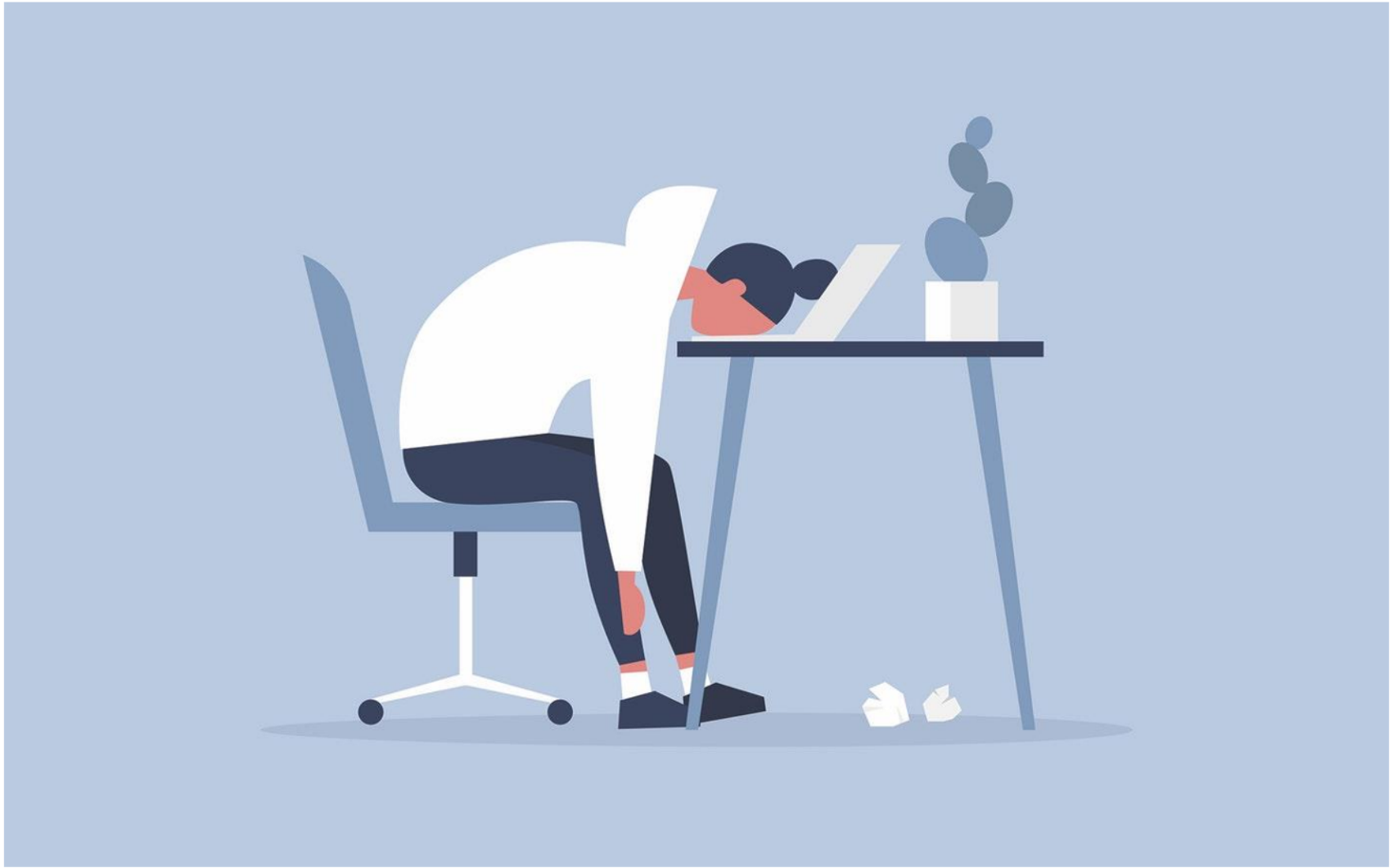
parade.com

bt.com



komando.com

ZOOM FATIGUE

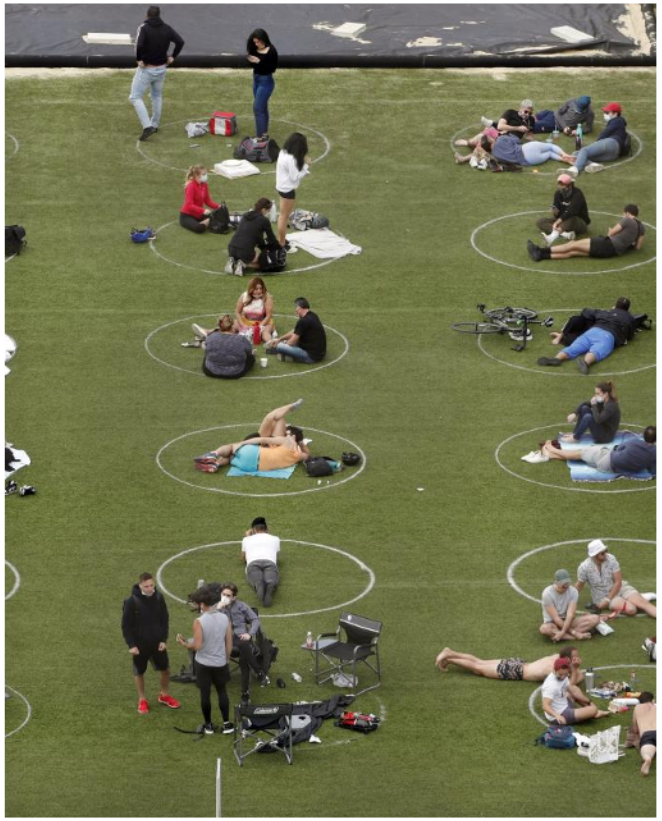


Mindful.org

HOW TO SAFELY SOCIALIZE?

insider.com

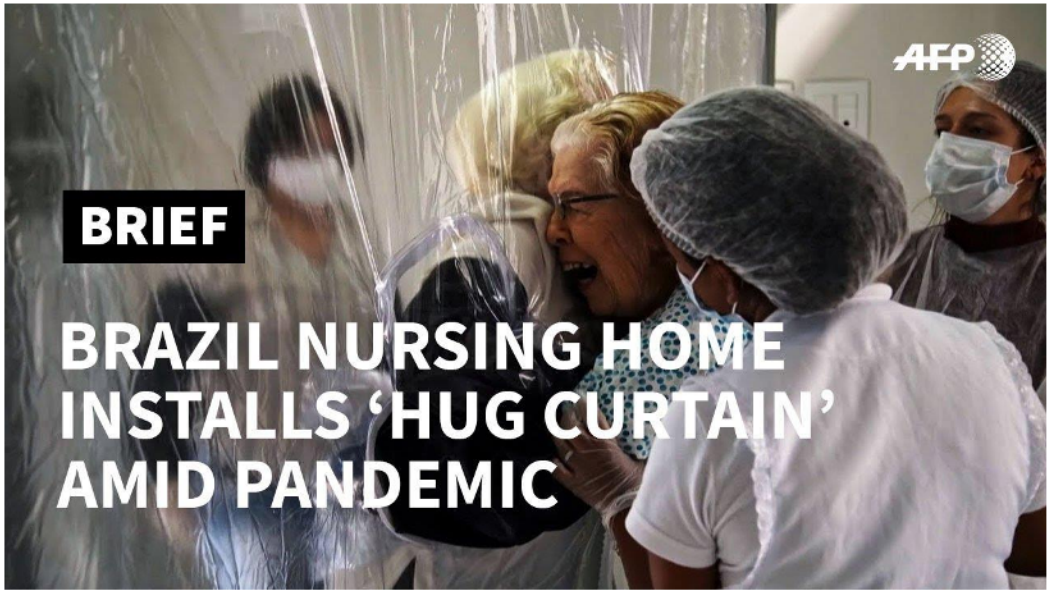
freakonomics.com



mprnews.org

TOUCH STARVATION

ctvnews.ca



mom.com

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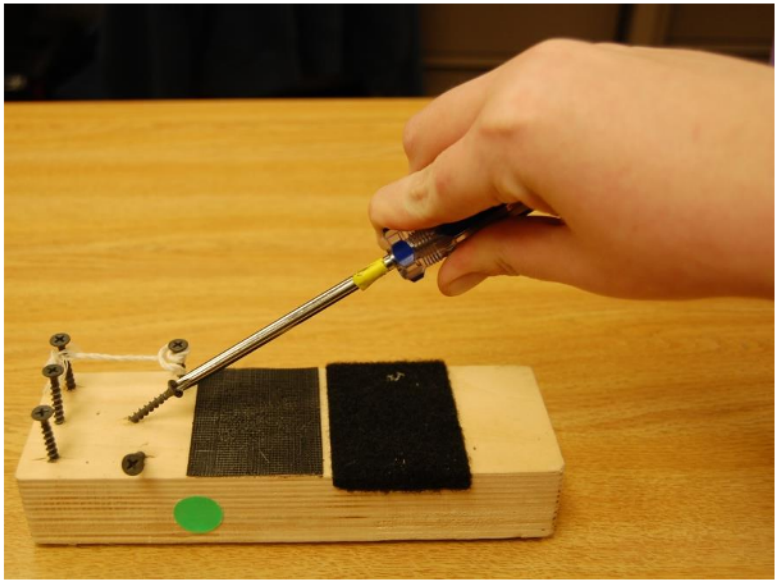
HAPTICS: A NEW WAY TO DISTANTLY SOCIALIZE

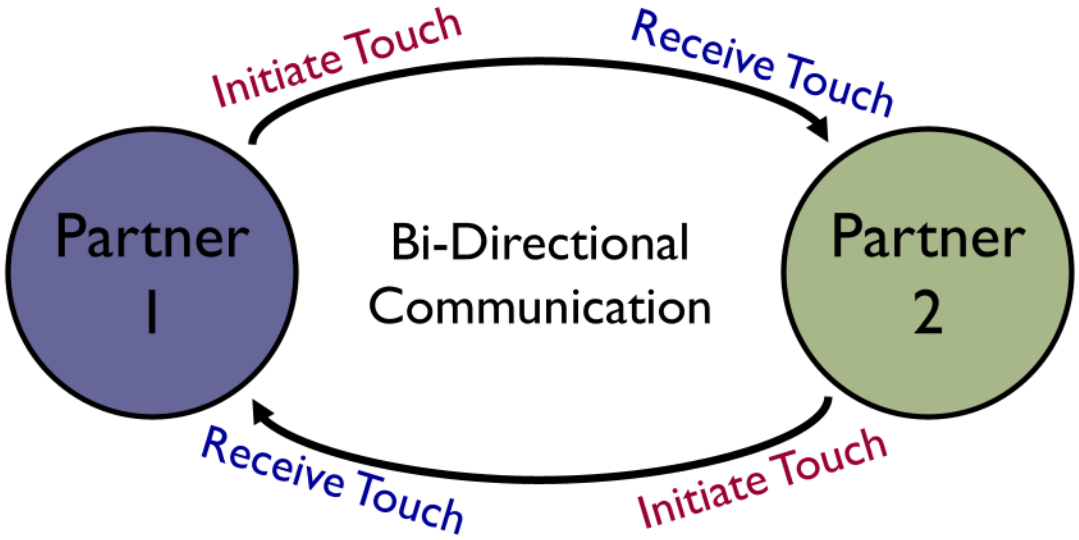
WHAT IS haptics?

Adj. Of or relating to the sense of touch.
[Greek *haptikos*, from *haptesthai*, to grasp, touch.]

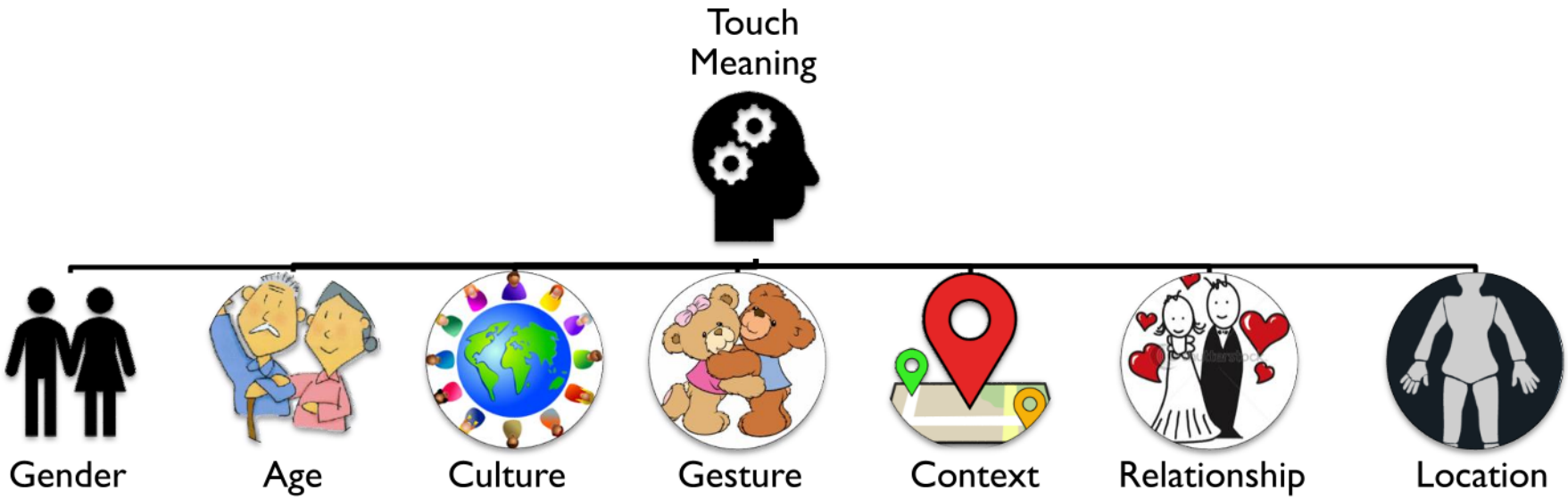


GRASP
LABORATORY

SOCIAL TOUCH



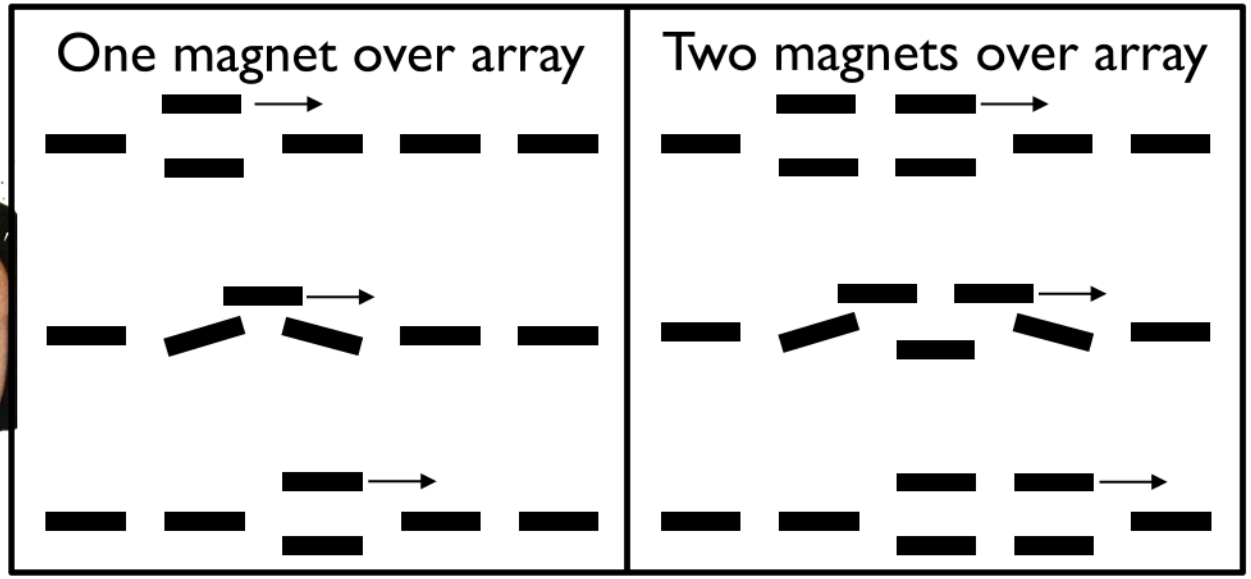
FACTORS AFFECTING SOCIAL TOUCH



CONVEYING EMOTION

- Love
- Sympathy
- Sadness

HAPTIC SKETCHING



VOICE COIL ARRAY

- Hardware Requirements:
  - Apply 1 N force
  - Actuate at low frequencies (1-5 Hz)
  - At least 3 mm of motion

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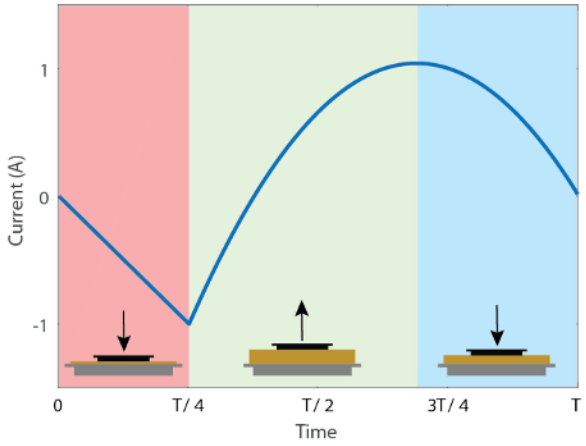
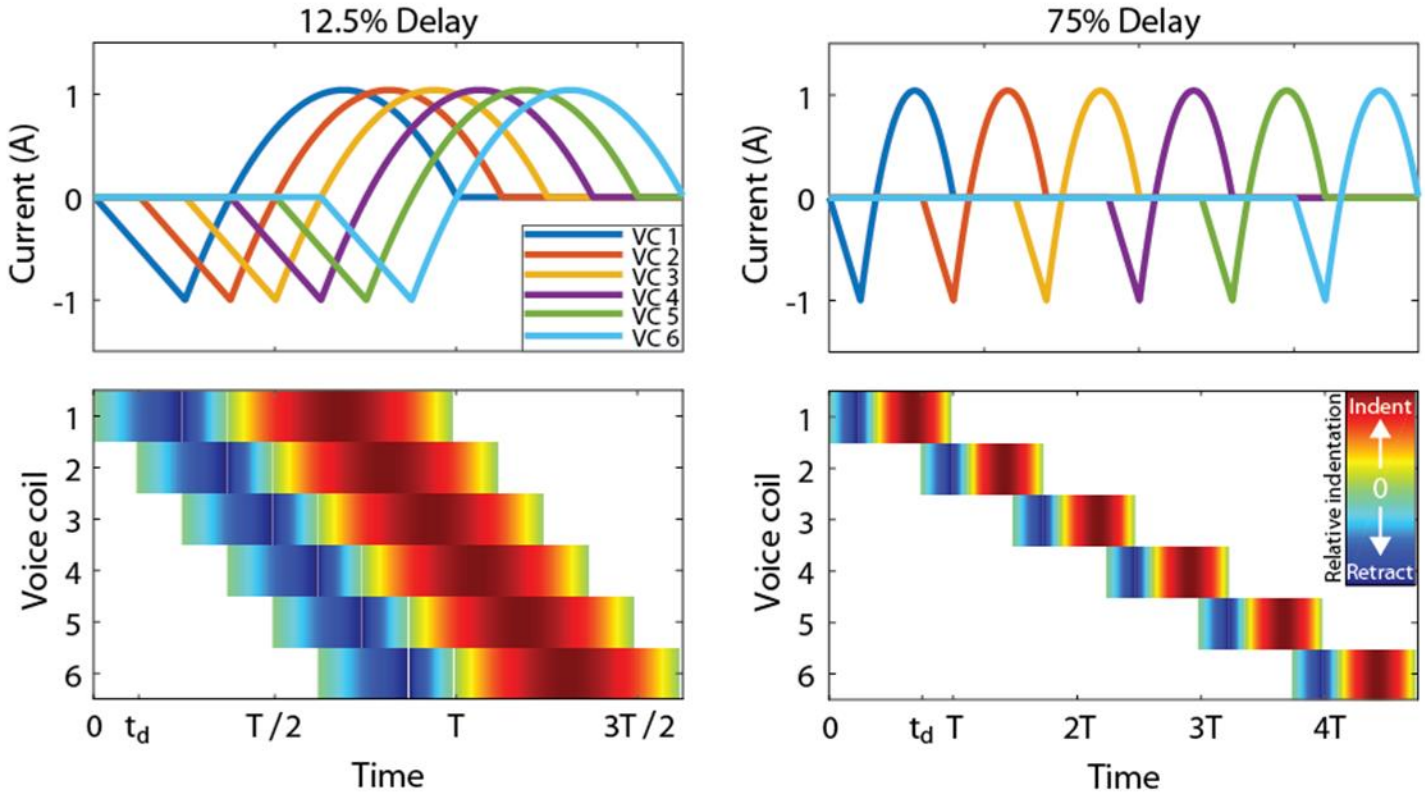
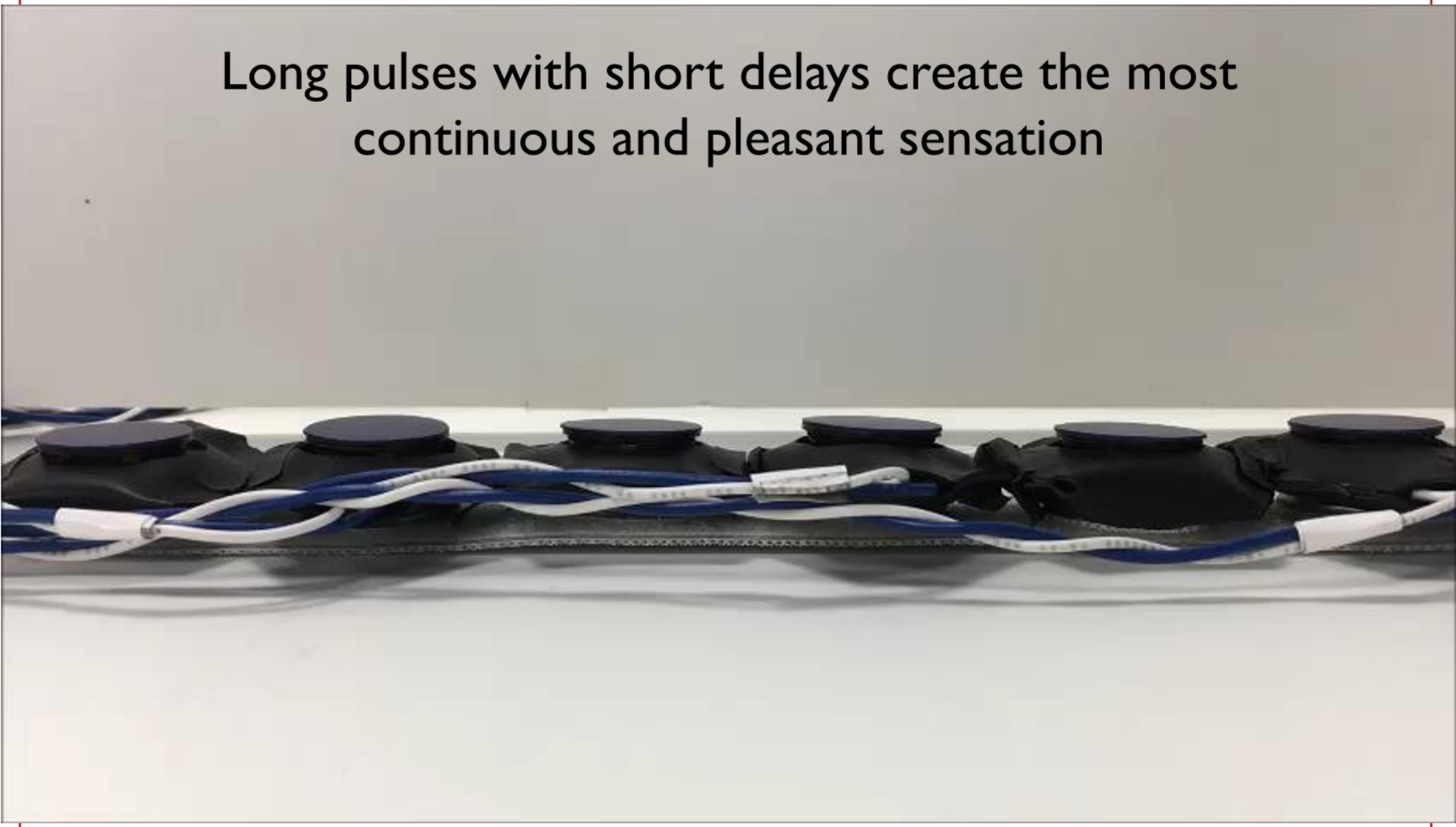
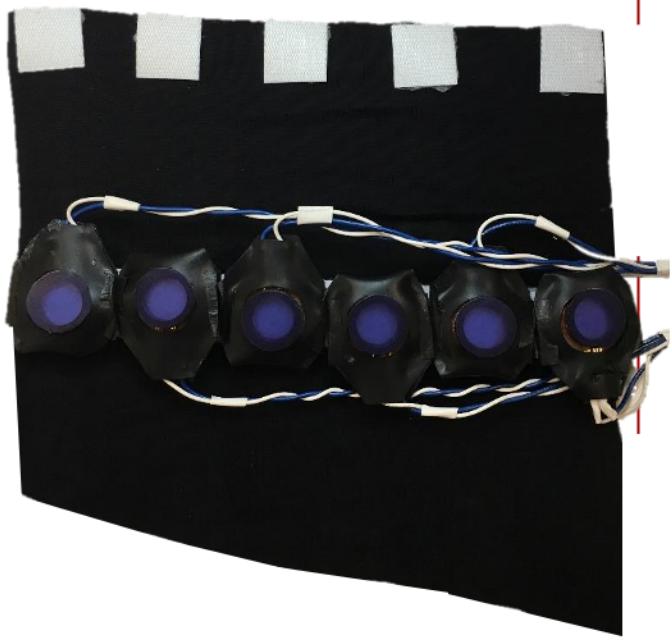
SEQUENTIAL ACTIVATION



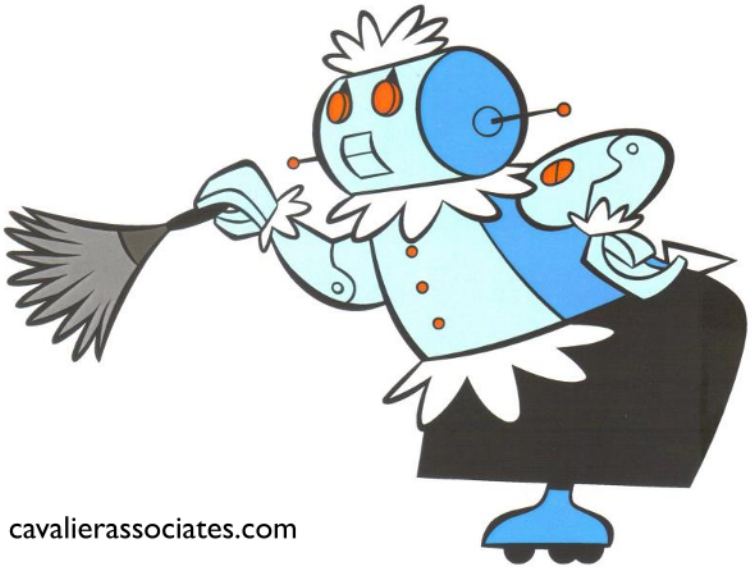



Long pulses with short delays create the most
continuous and pleasant sensation

WEARABLE SYSTEM

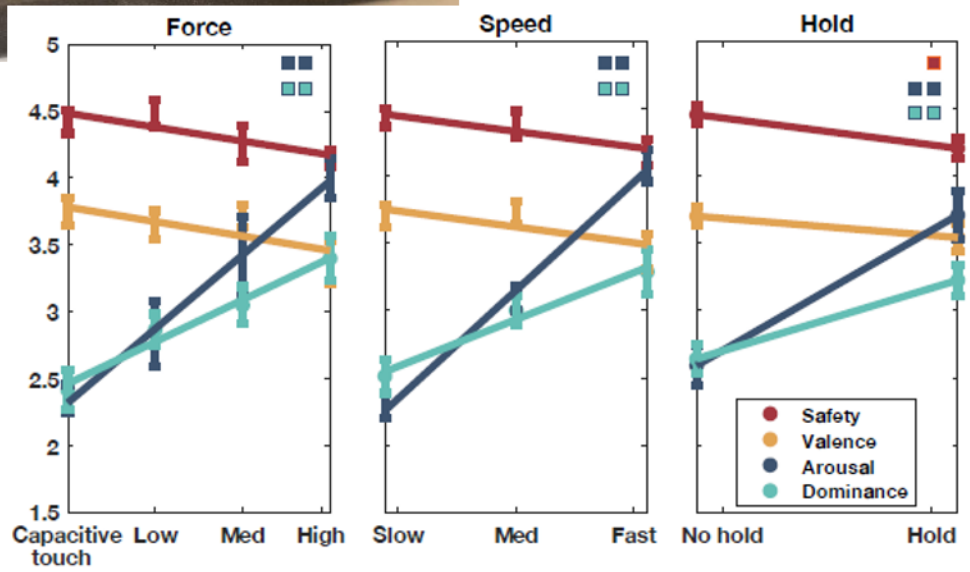


ROBOT SOCIAL TOUCH



cavalierassociates.com

ROBOT SOCIAL TOUCH



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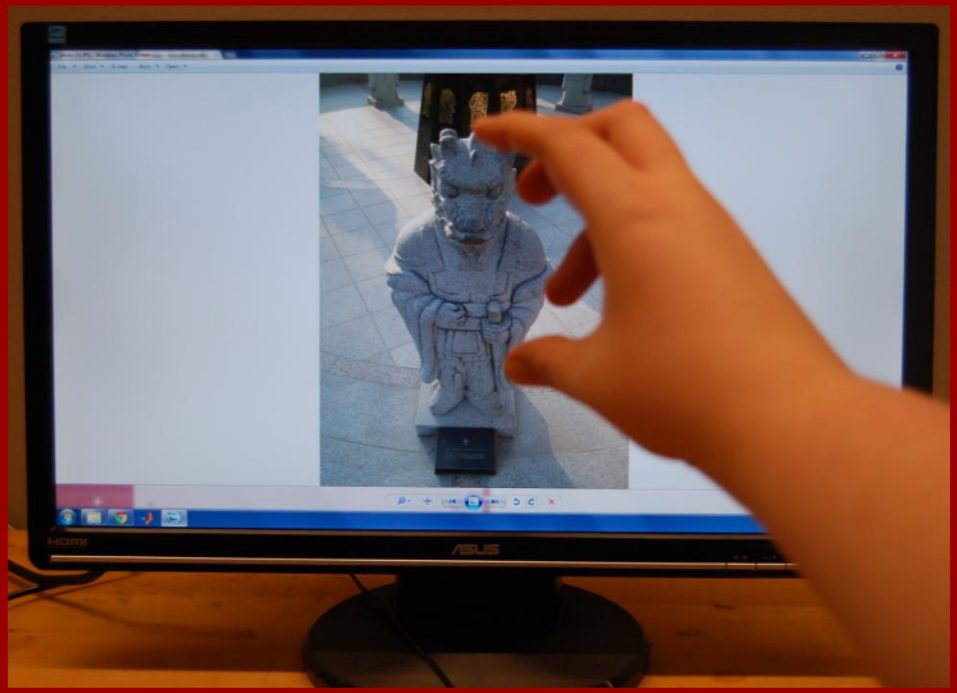
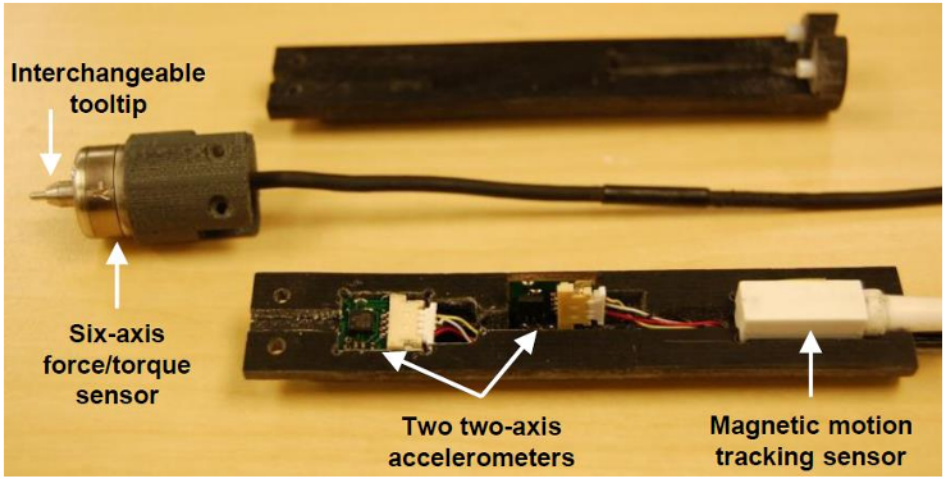
DATA-DRIVEN HAPTICS FOR FEELING THE INTERNET

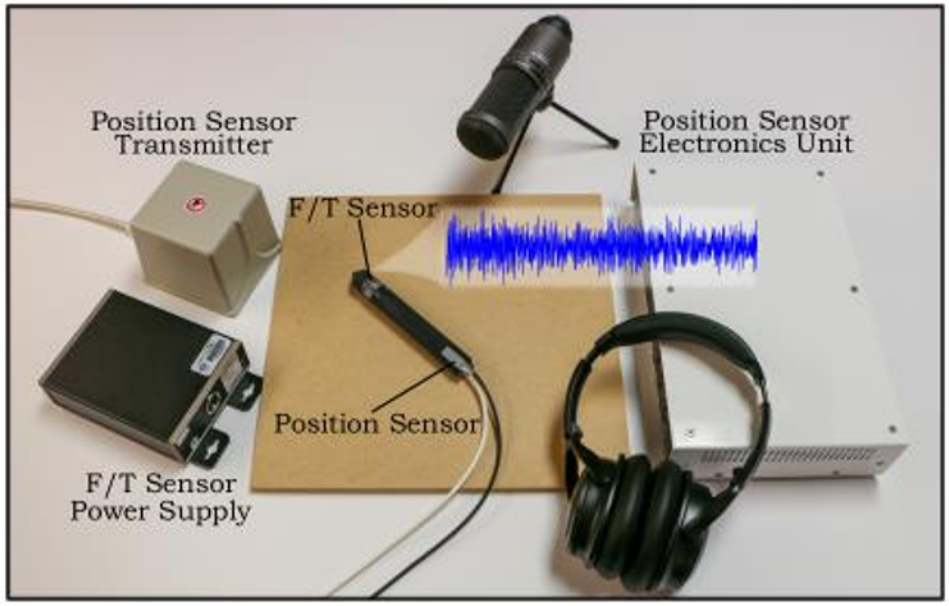


HAPTOGRAPHY =

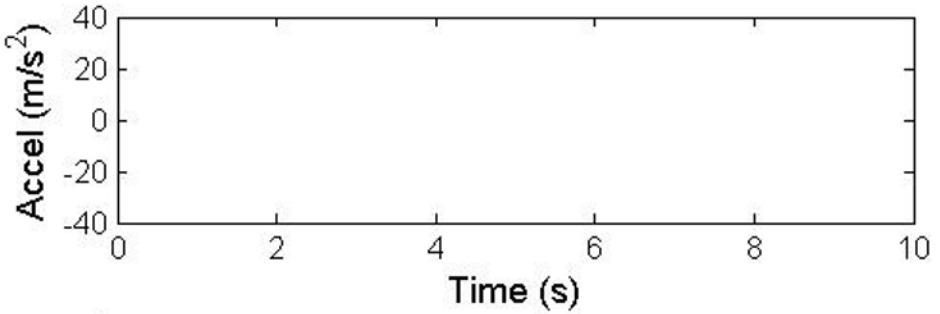
Haptic + Photography

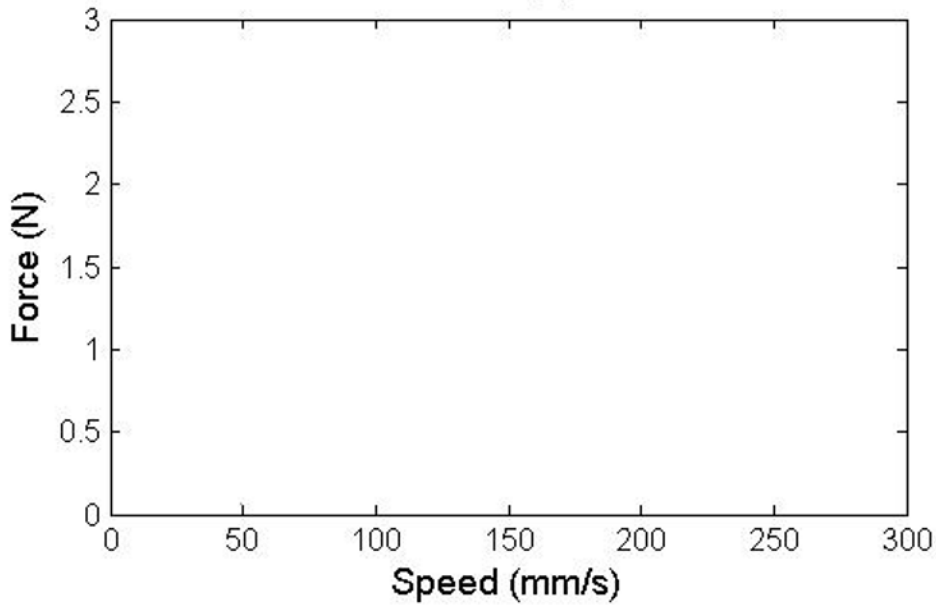
HAPTIC RECORDING DEVICE



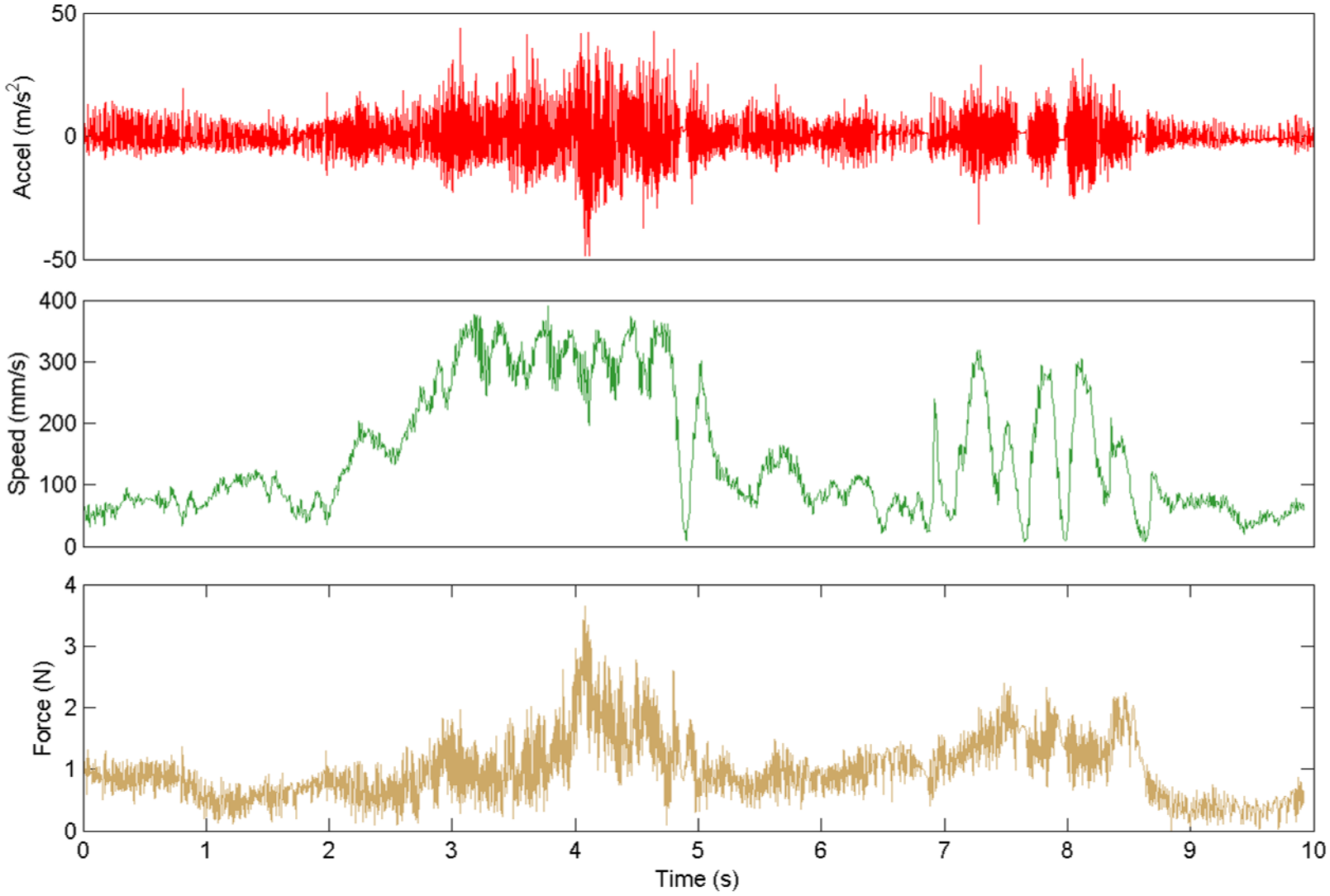


HAPTIC TEXTURE RECORDING PROCEDURE





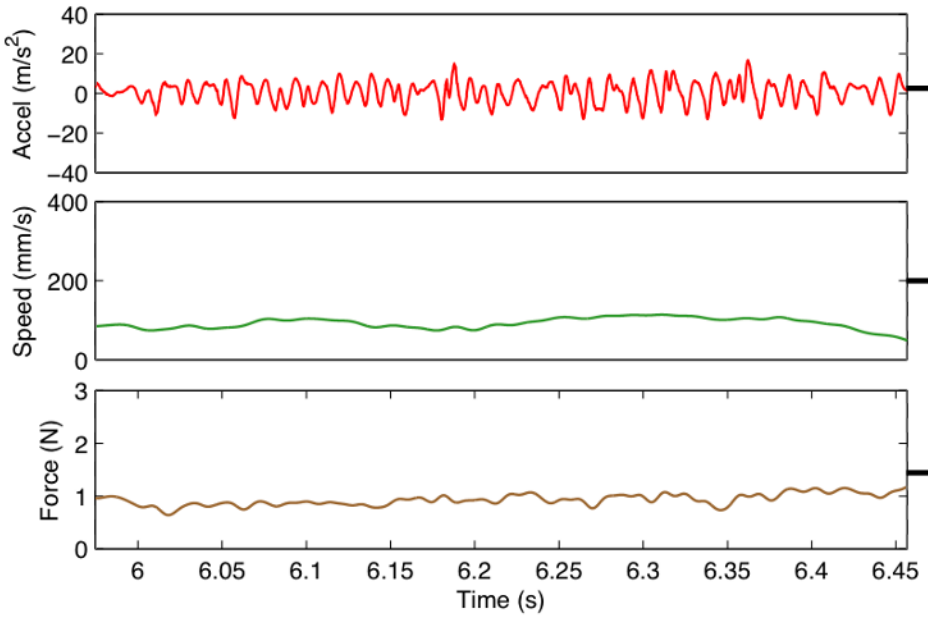
RECORDED DATA

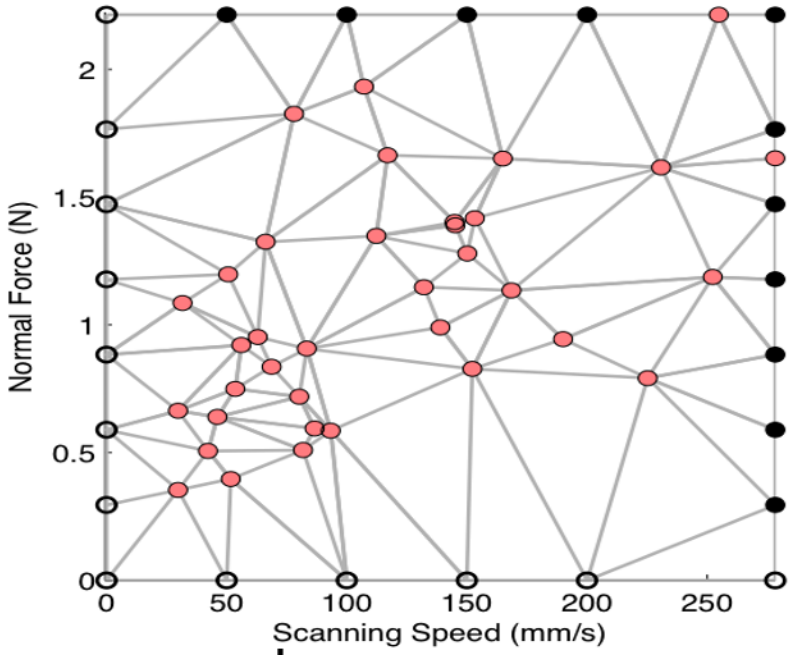


TEXTURE MODELING

$$H(z) = \frac{1}{1 - \sum_{k=1}^{p} A_k z^{-k}}$$

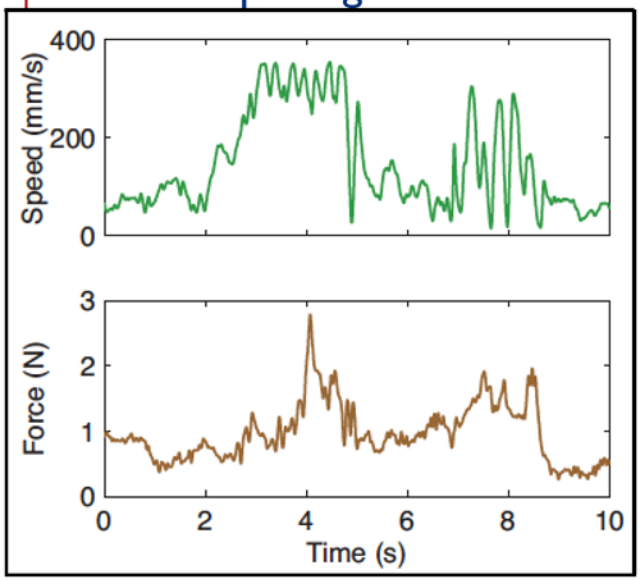
Autoregressive model





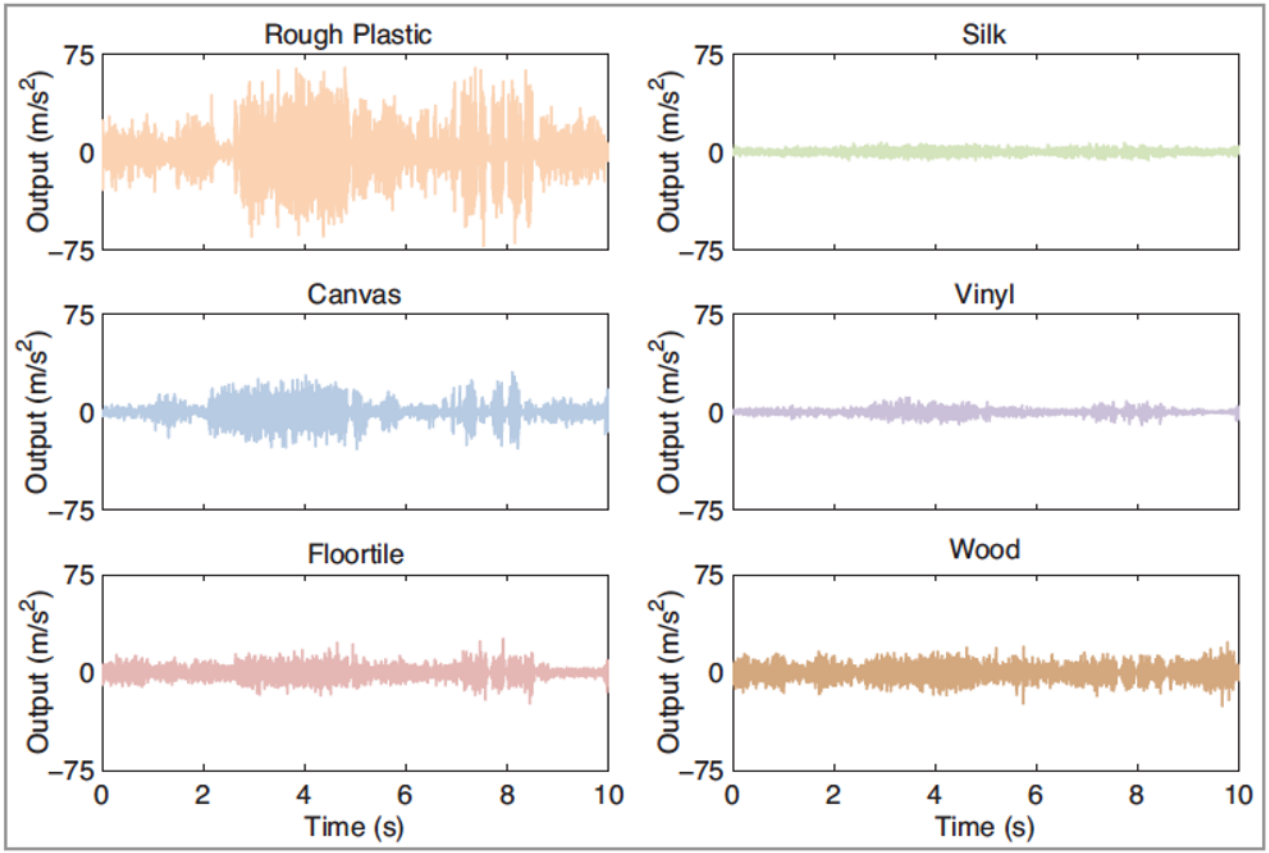
SYNTHESIZING A NEW TEXTURE OUTPUT

Input Signals

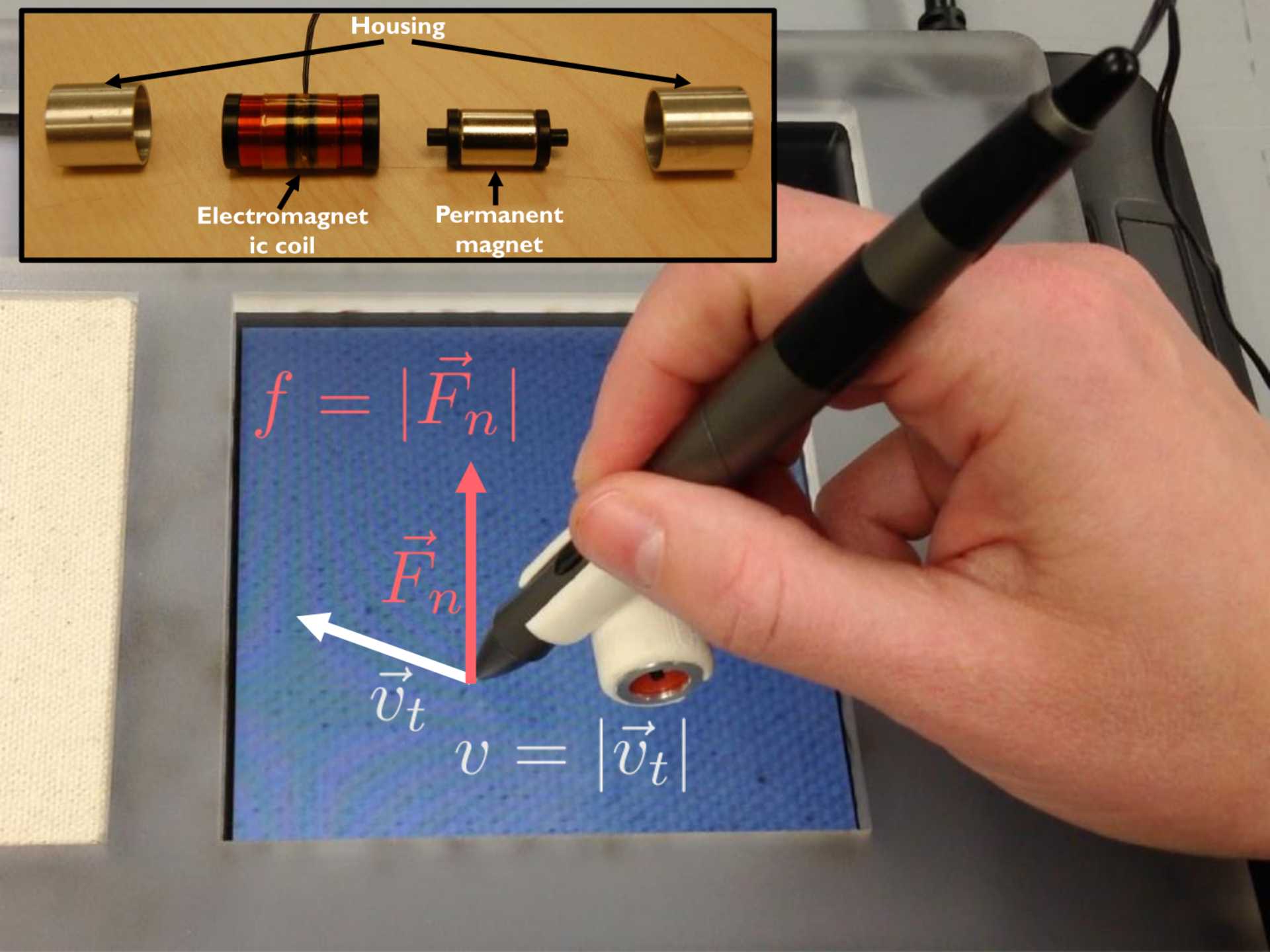


Recorded Data

Six Synthetic Texture Signals



Synthesized Signals


Housing
Electromagnet ic coil
Permanent magnet
$f = |\vec{F}_n|$
$\vec{F}_n$
$\vec{v}_t$
$v = |\vec{v}_t|$

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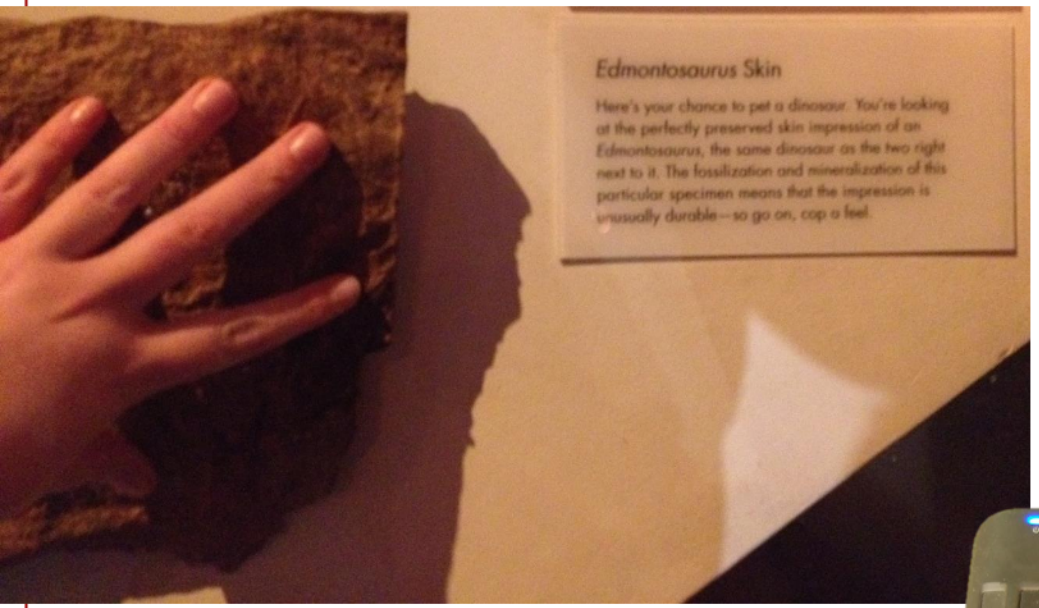
VIRTUAL MUSEUM



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HaRVI Lab

HARVI HAptics Robotics and Virtual Interaction Lab

https://sites.usc.edu/culbertson/

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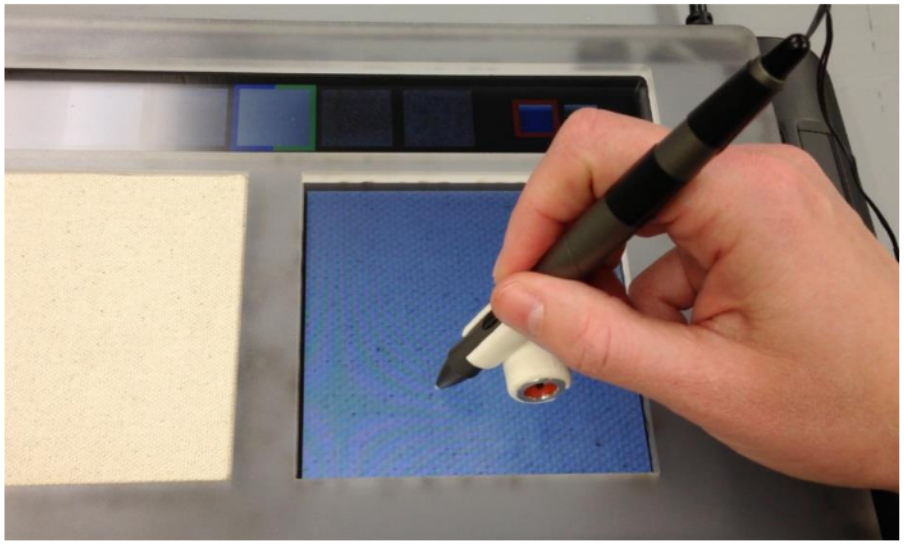

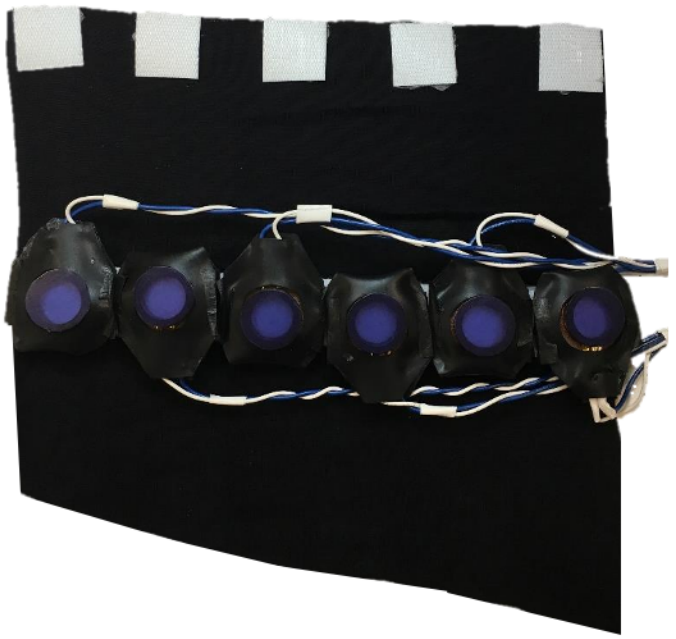

HARVI HAptics Robotics and Virtual Interaction Lab