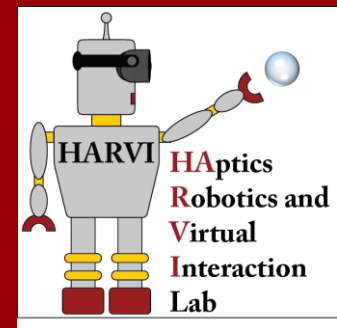


HAPTICS FOR COMMUNICATION IN A SOCIALY DISTANCED WORLD

Heather Culbertson, PhD

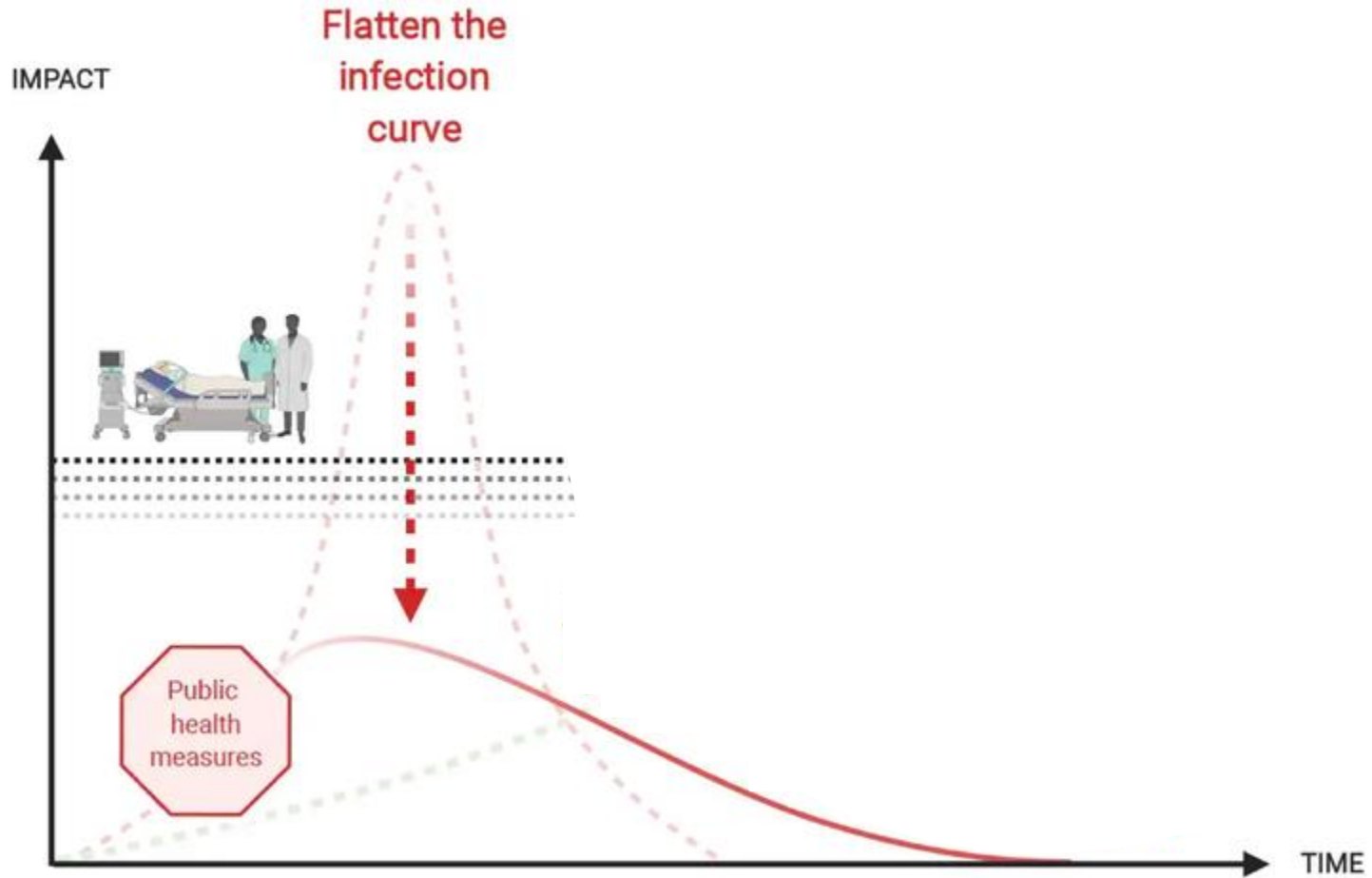
University of Southern California
Departments of Computer Science
and Aerospace & Mechanical Engineering



SOCIAL DISTANCING

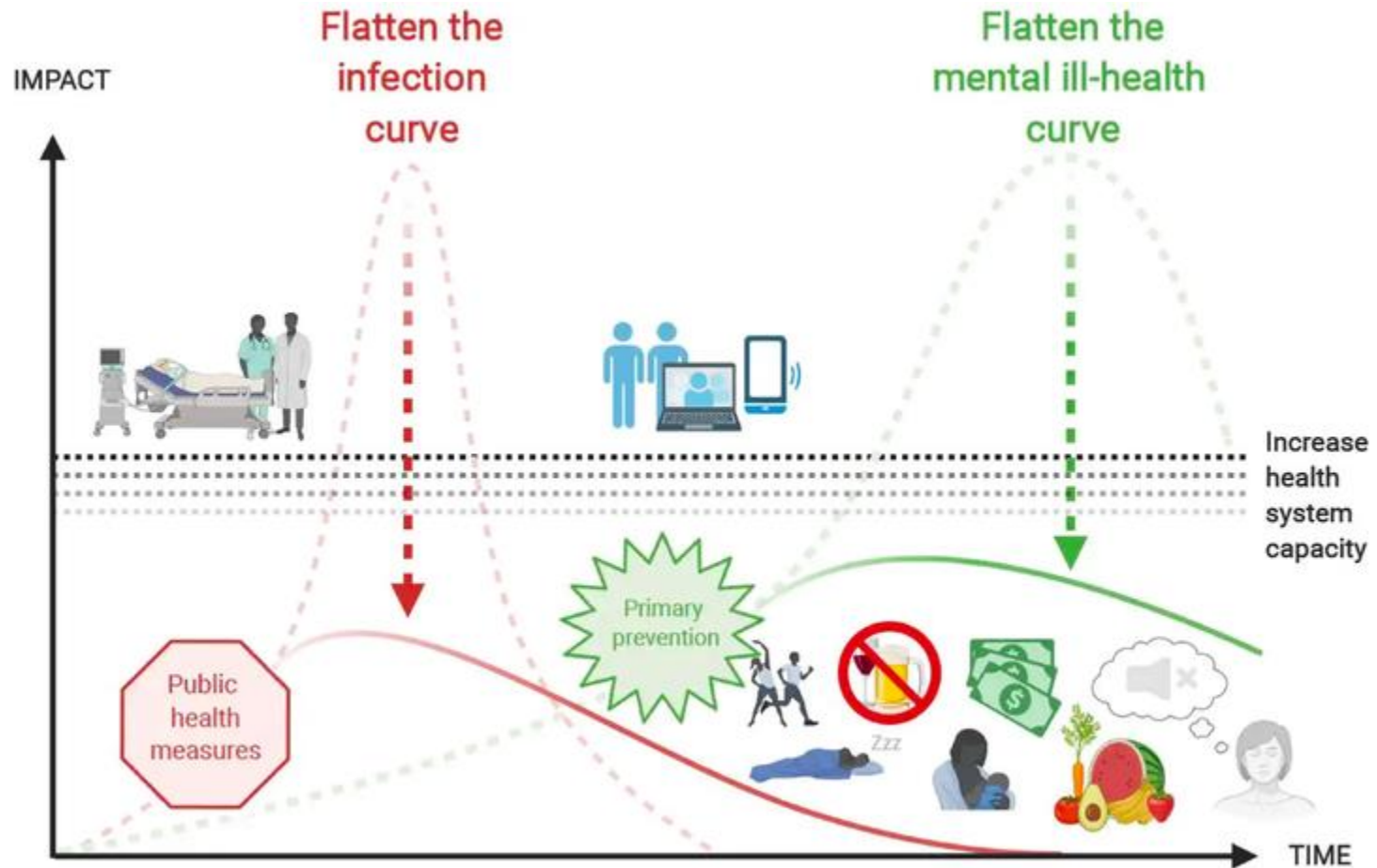


FLATTENING THE CURVE



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)

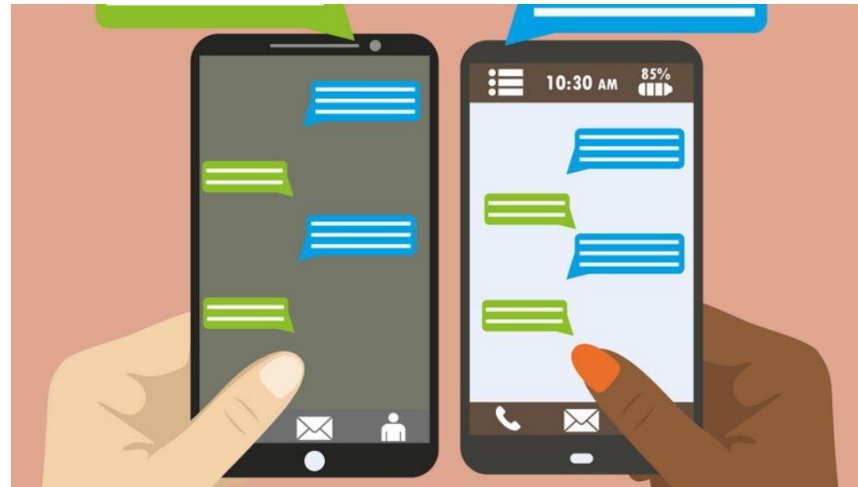
DISTANT SOCIALIZING



parade.com

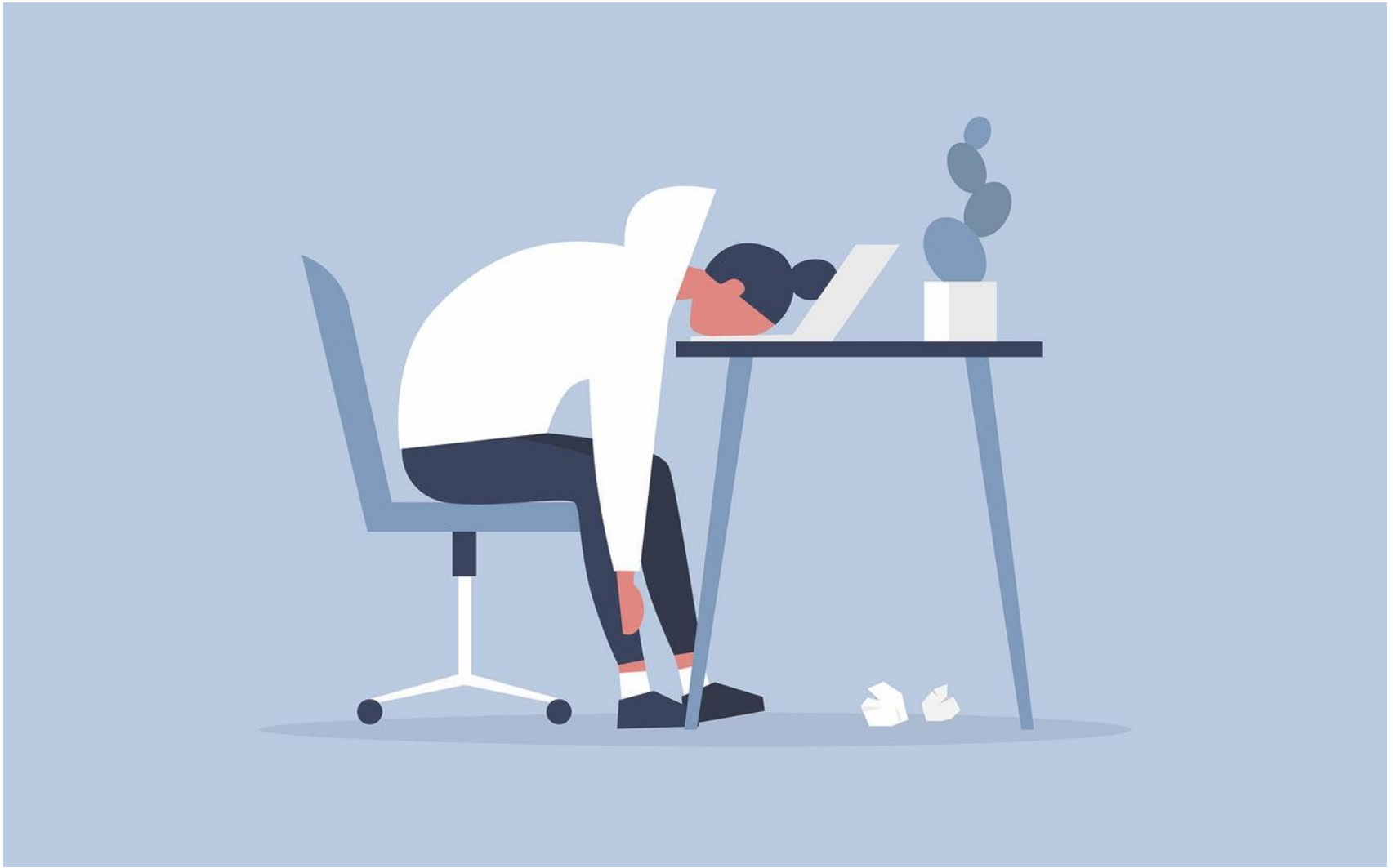


bt.com



komando.com

ZOOM FATIGUE



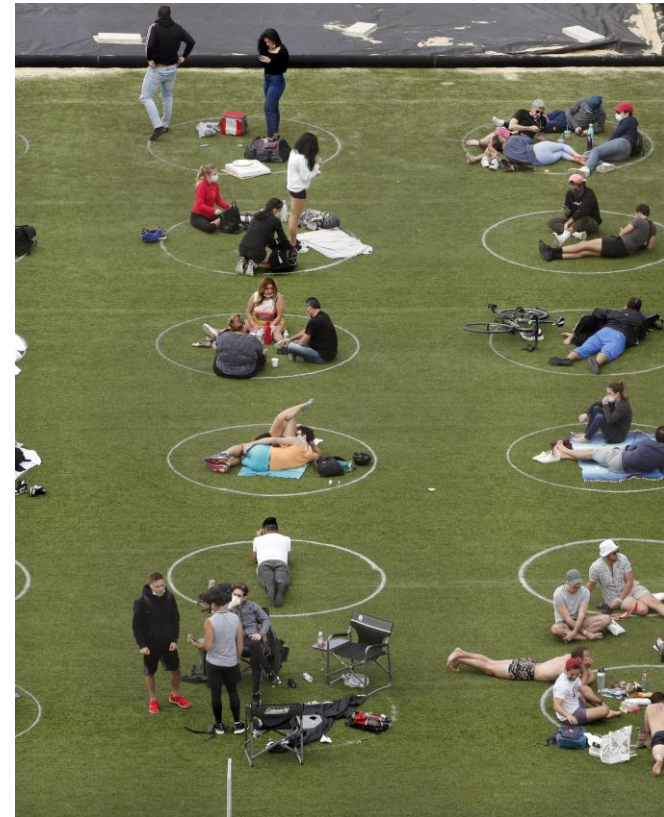
HOW TO SAFELY SOCIALIZE?



insider.com



freakonomics.com



mprnews.org

TOUCH STARVATION



ctvnews.ca



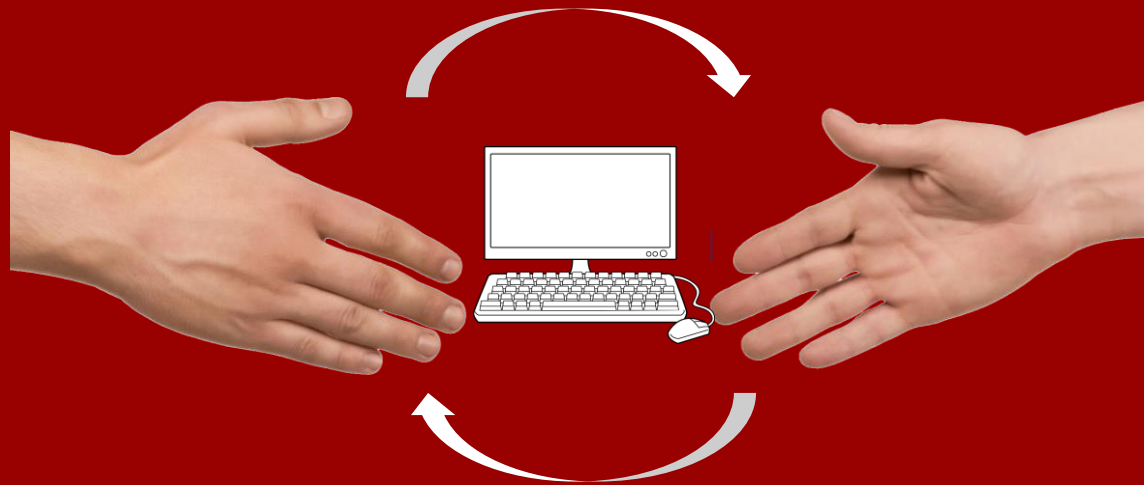
BRIEF

**BRAZIL NURSING HOME
INSTALLS 'HUG CURTAIN'
AMID PANDEMIC**



mom.com

HAPTICS: A NEW WAY TO DISTANTLY SOCIALIZE

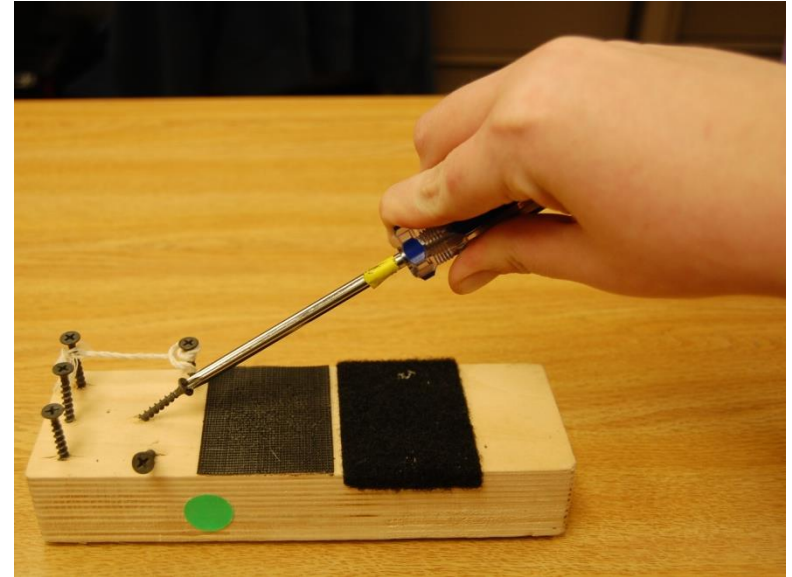


WHAT IS haptics?

Adj. Of or relating to the sense of touch.

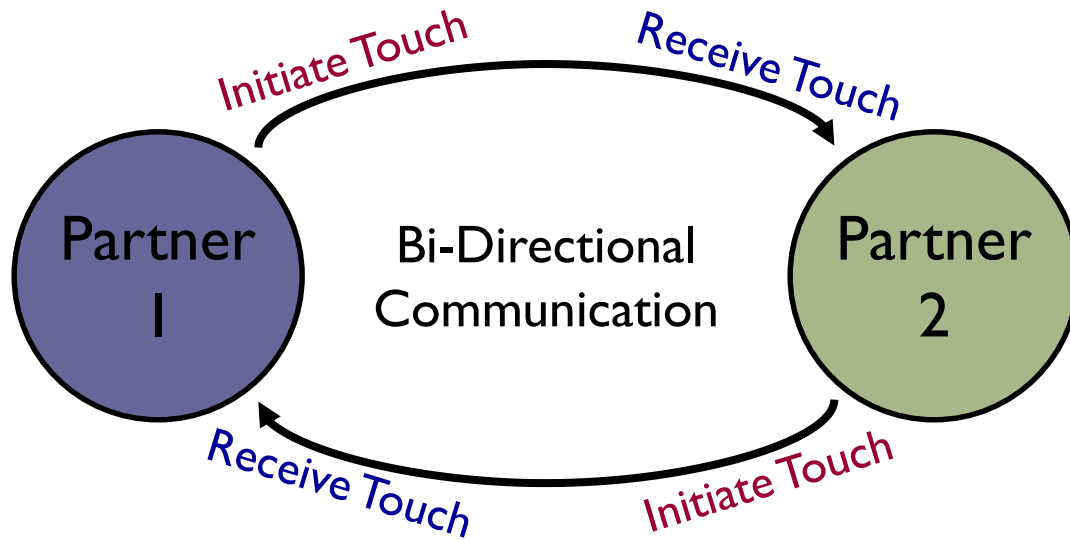
[Greek *haptikos*, from *haptesthai*, to grasp, touch.]







SOCIAL TOUCH



FACTORS AFFECTING SOCIAL TOUCH

Touch
Meaning



Gender



Age



Culture



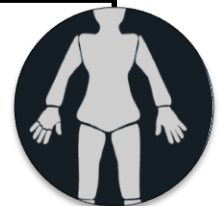
Gesture



Context



Relationship



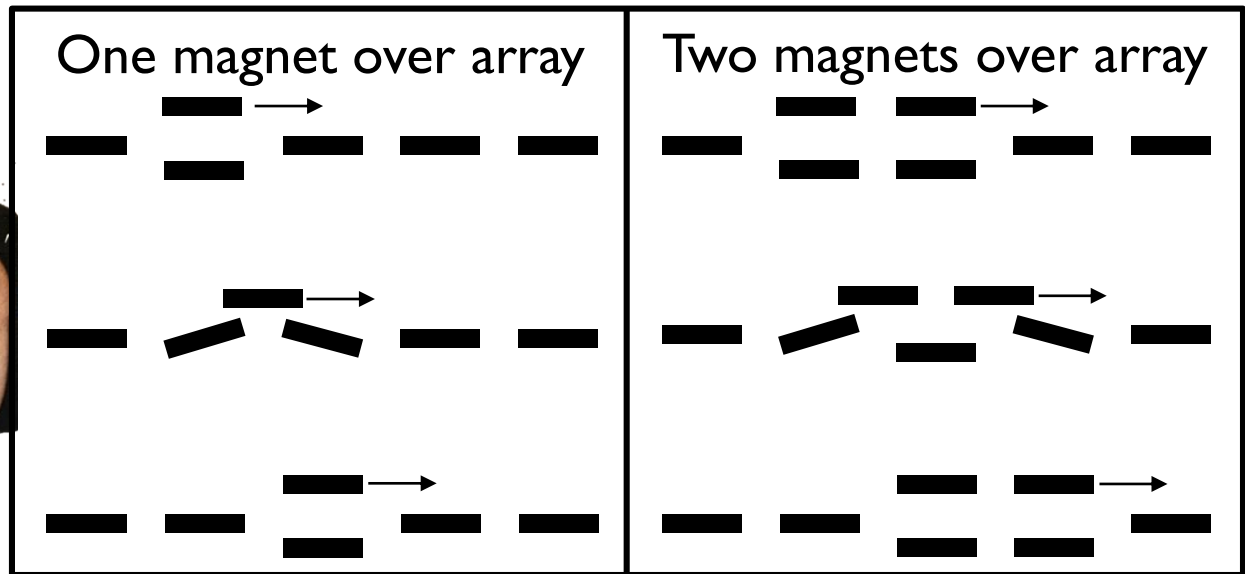
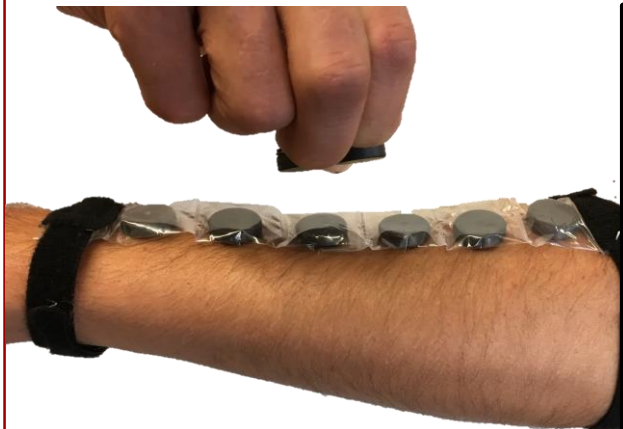
Location

CONVEYING EMOTION



- Love
- Sympathy
- Sadness

HAPTIC SKETCHING



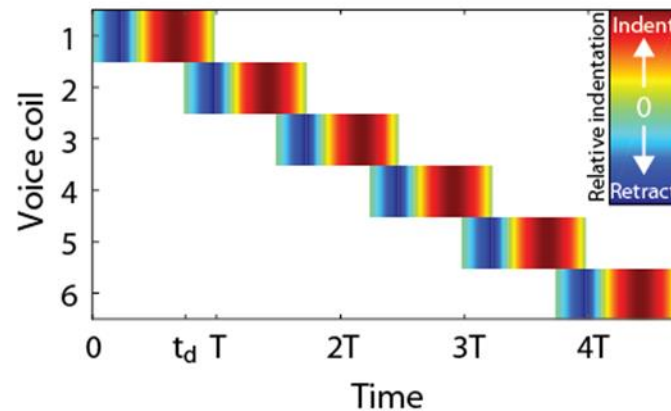
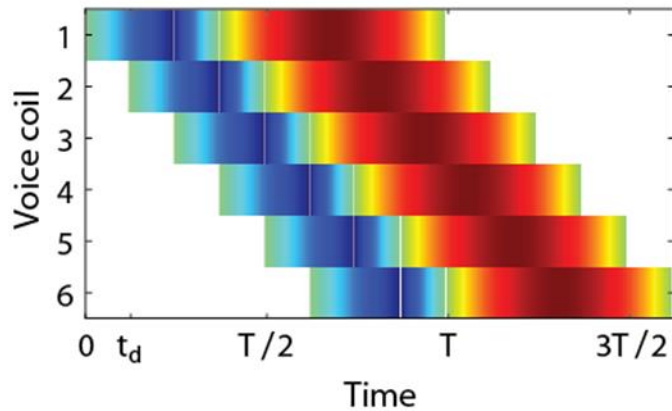
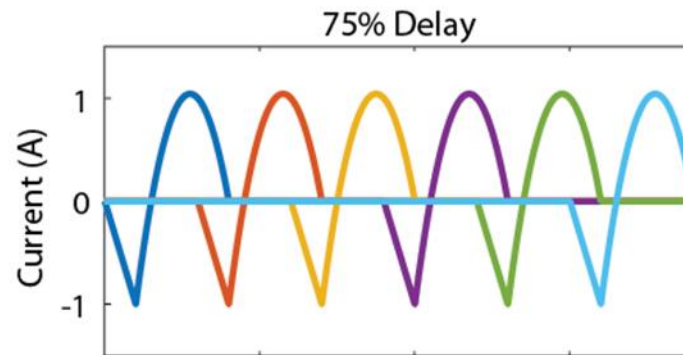
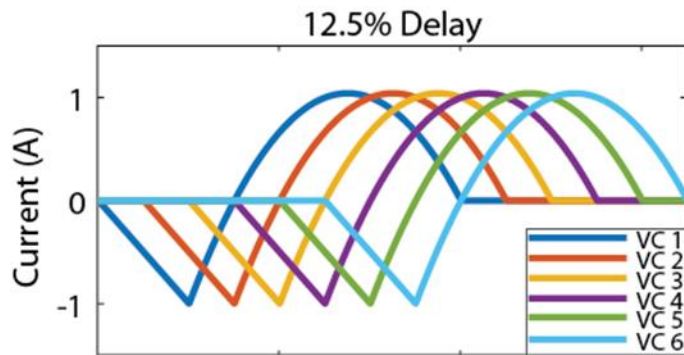
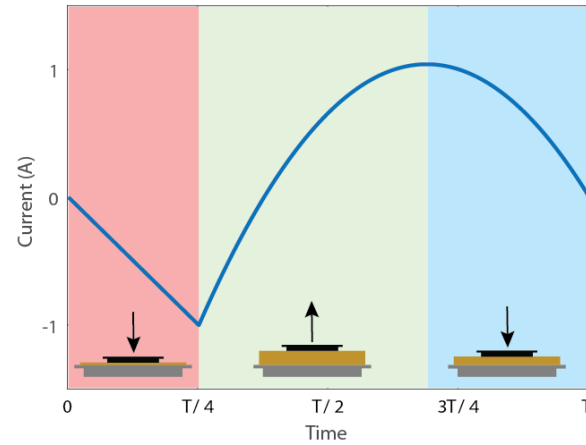
VOICE COIL ARRAY

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





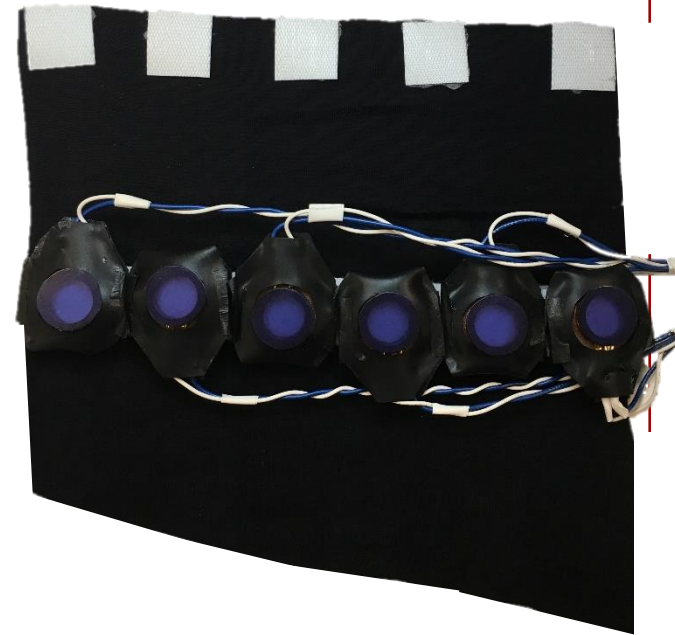
SEQUENTIAL ACTIVATION



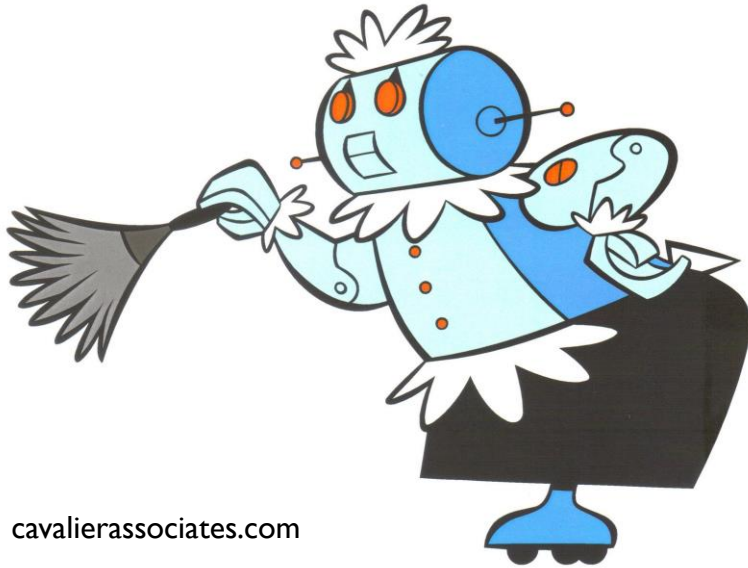
Long pulses with short delays create the most continuous and pleasant sensation



WEARABLE SYSTEM



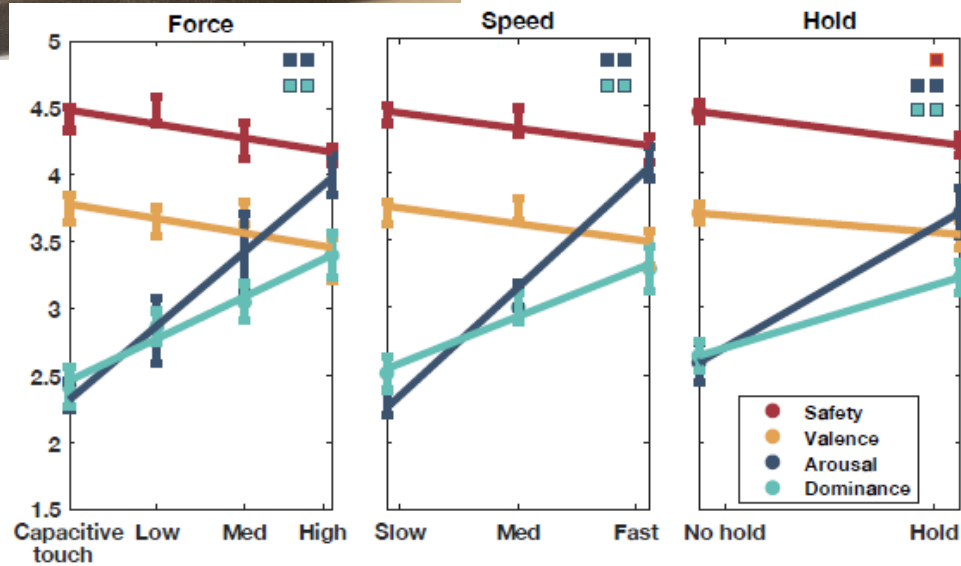
ROBOT SOCIAL TOUCH



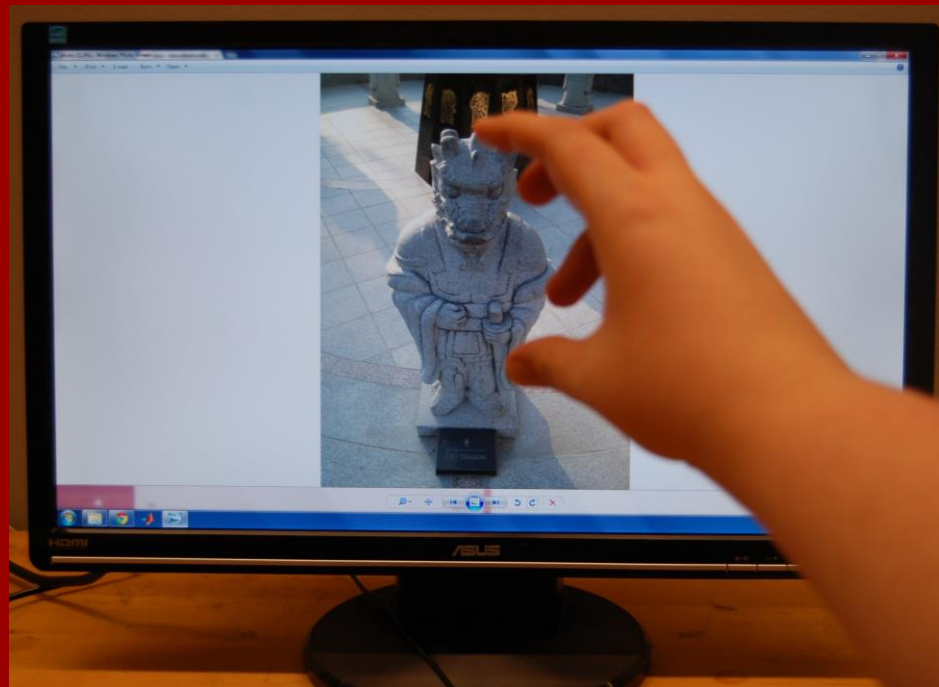
cavalierassociates.com



ROBOT SOCIAL TOUCH



DATA-DRIVEN HAPTICS FOR FEELING THE INTERNET



HAPTOGRAPHY =



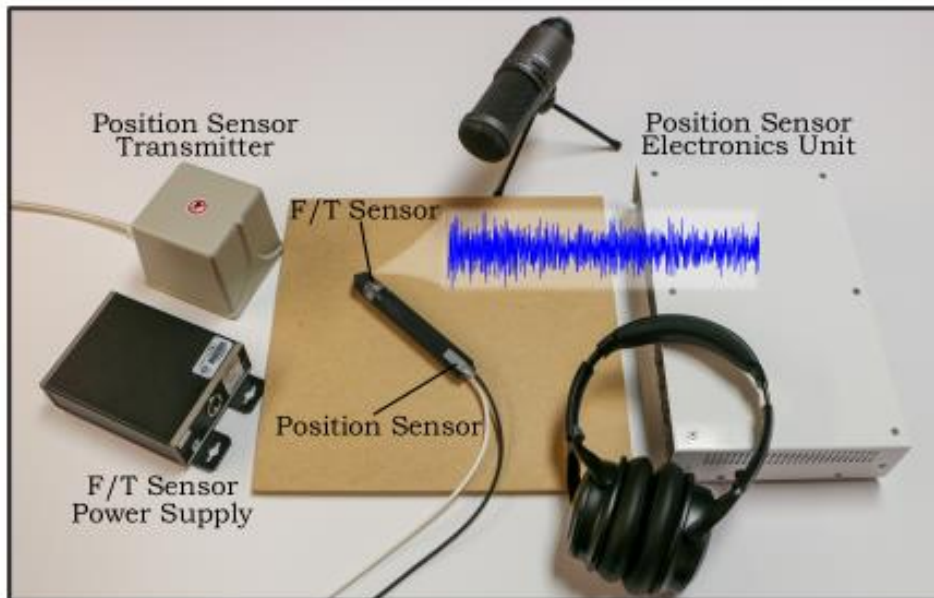
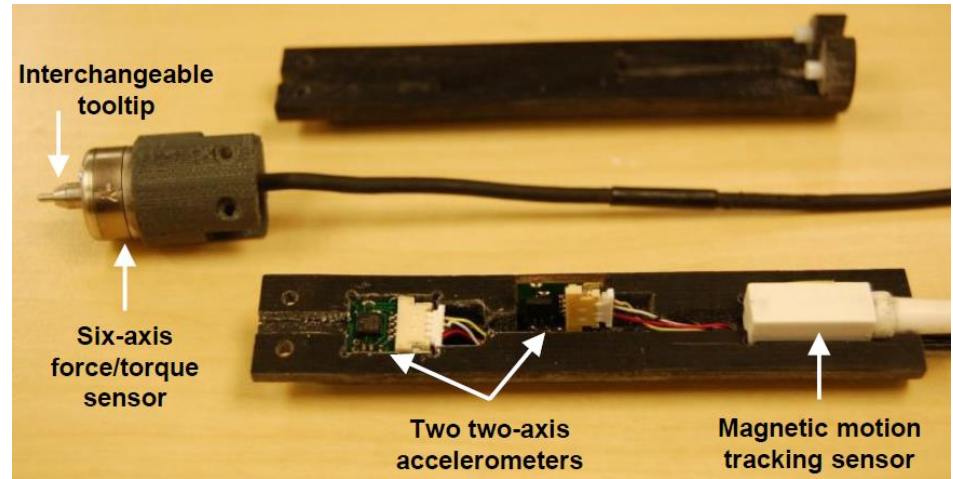
Haptic

+

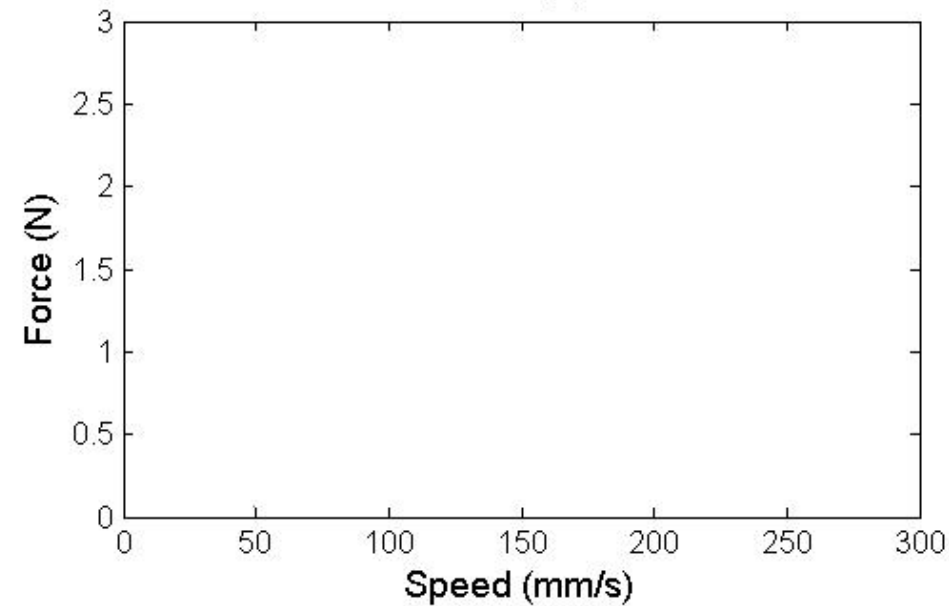
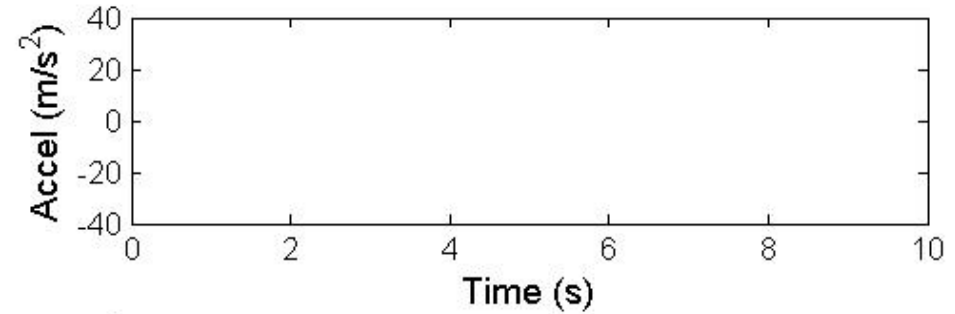


Photography

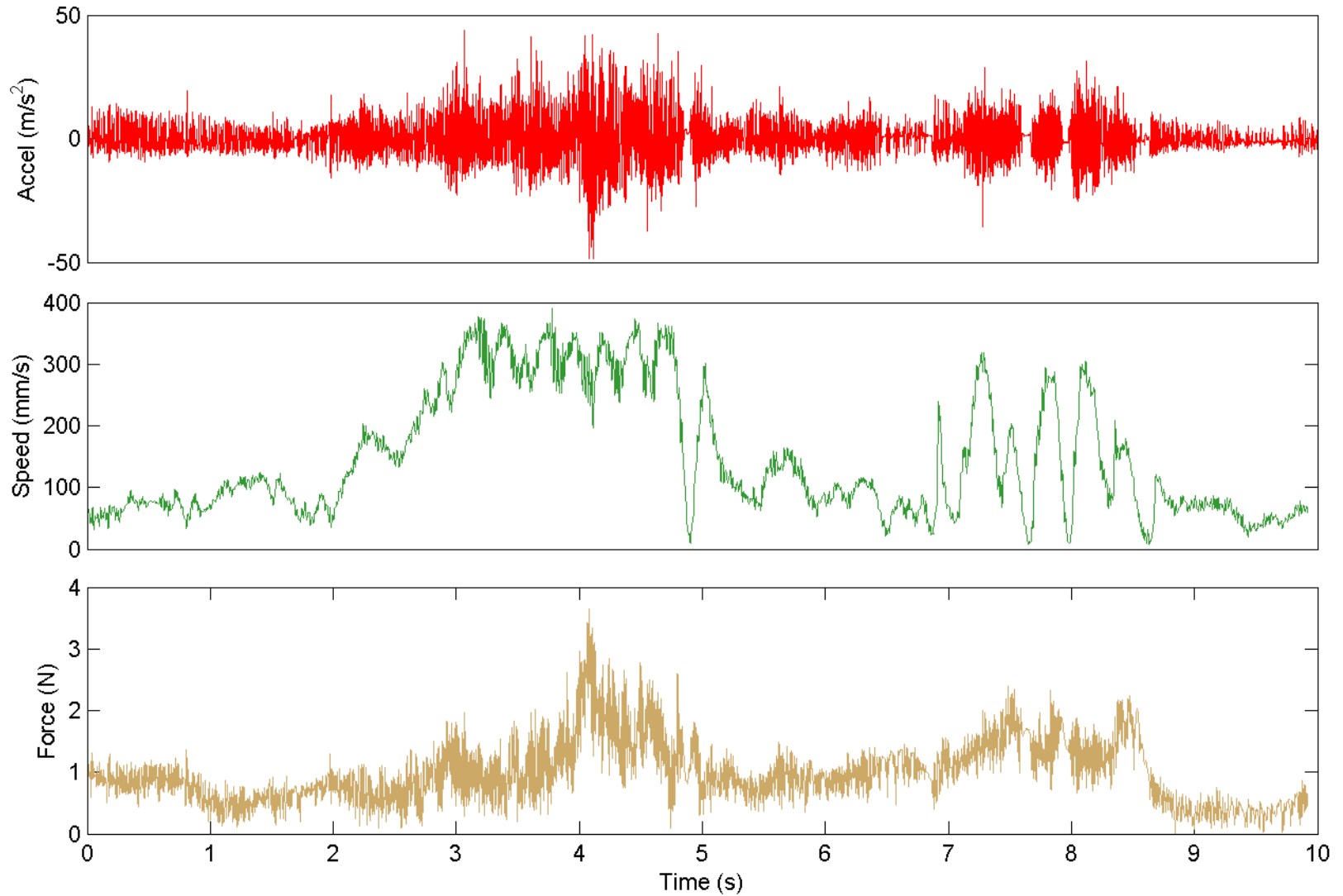
HAPTIC RECORDING DEVICE



HAPTIC TEXTURE RECORDING PROCEDURE

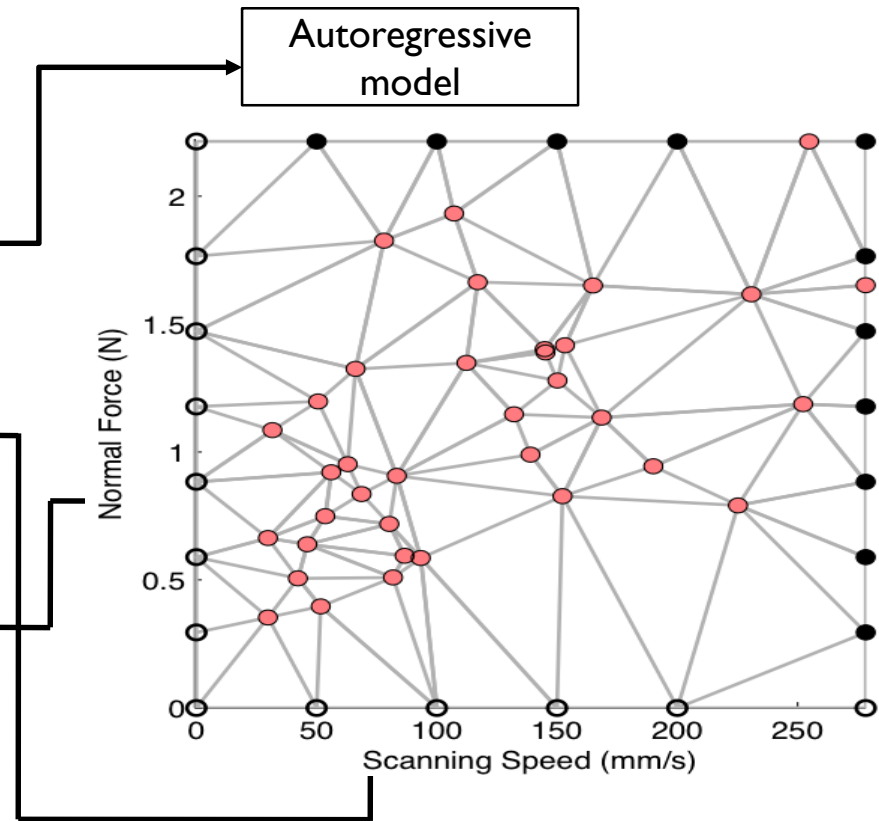
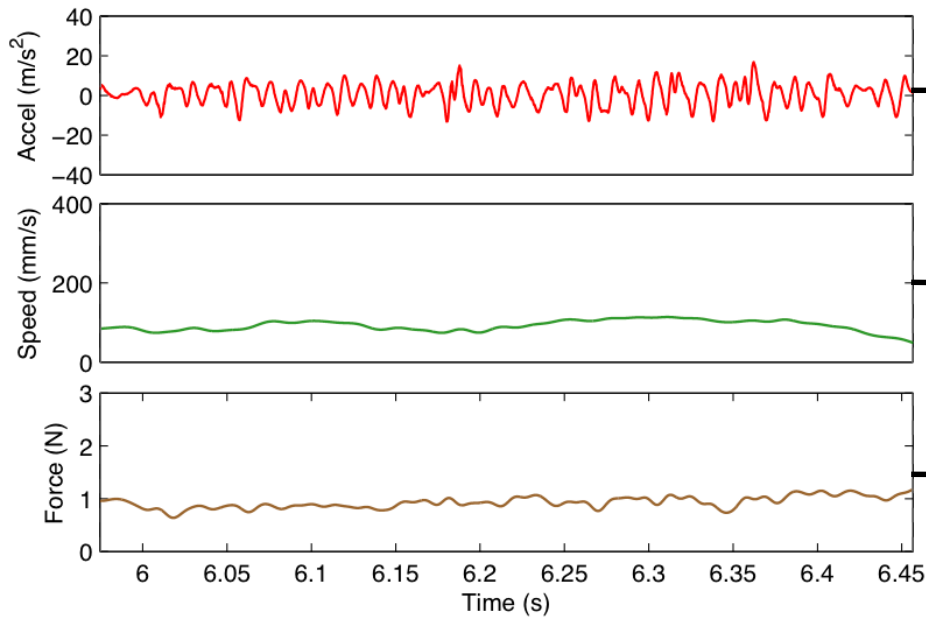


RECORDED DATA



TEXTURE MODELING

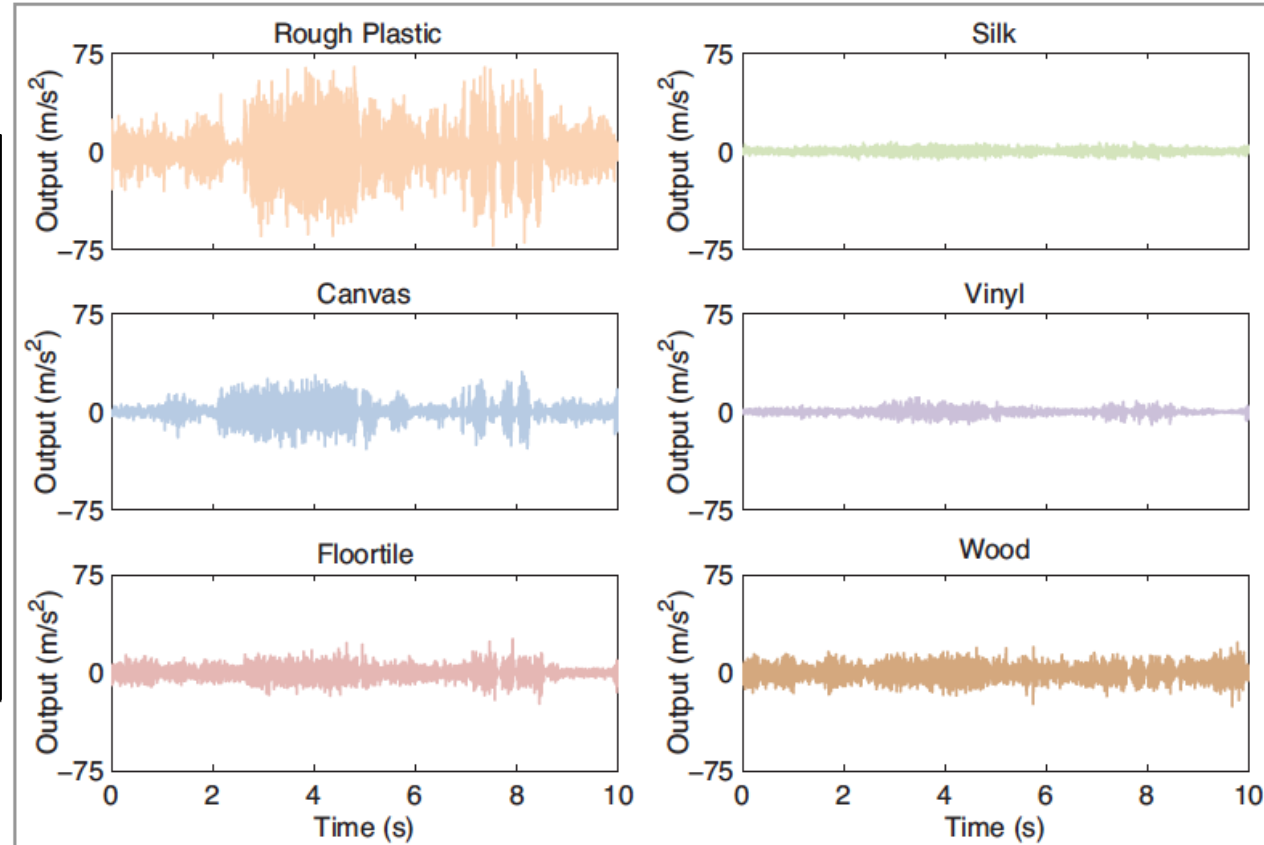
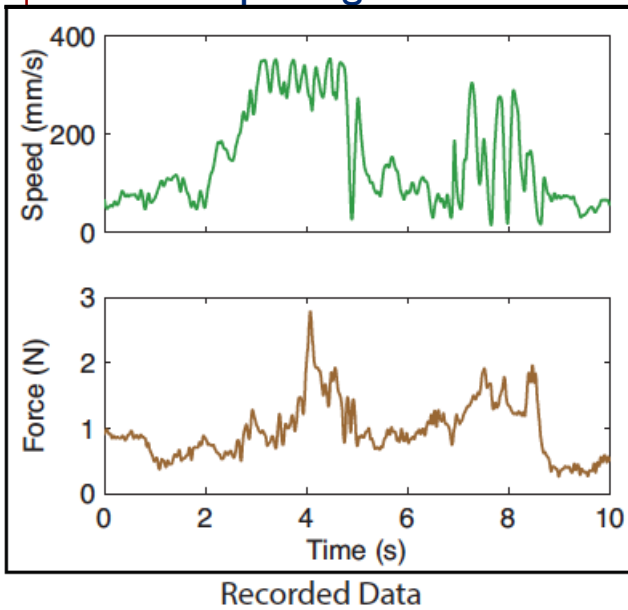
$$H(z) = \frac{1}{1 - \sum_{k=1}^p A_k z^{-k}}$$



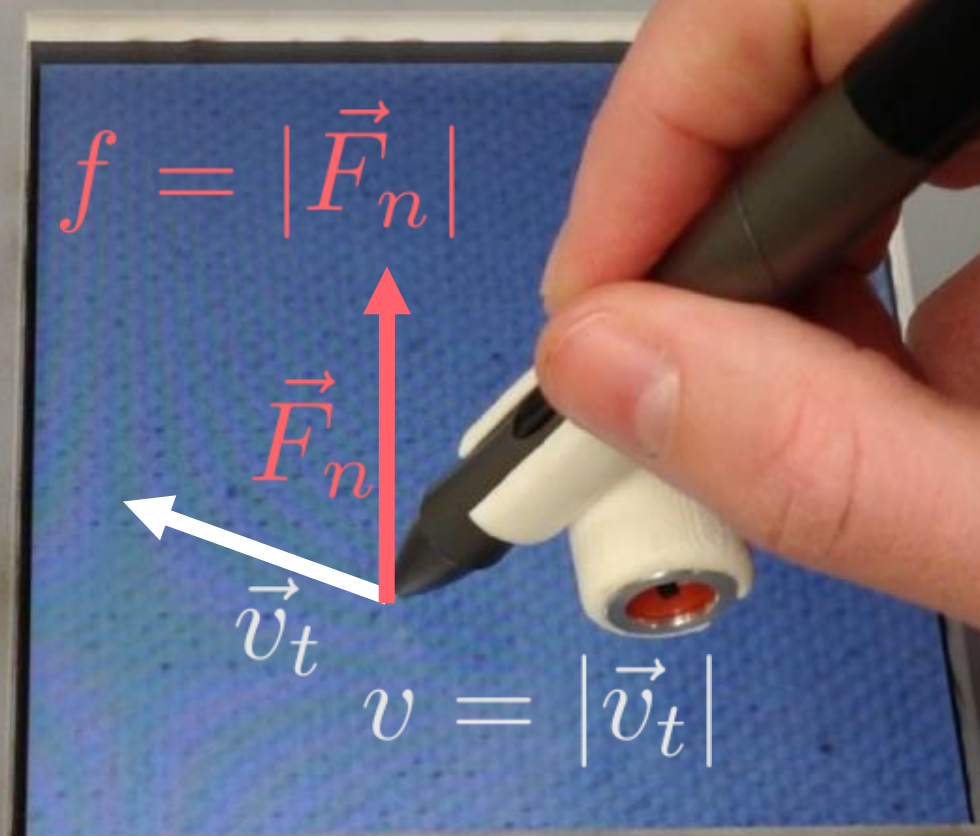
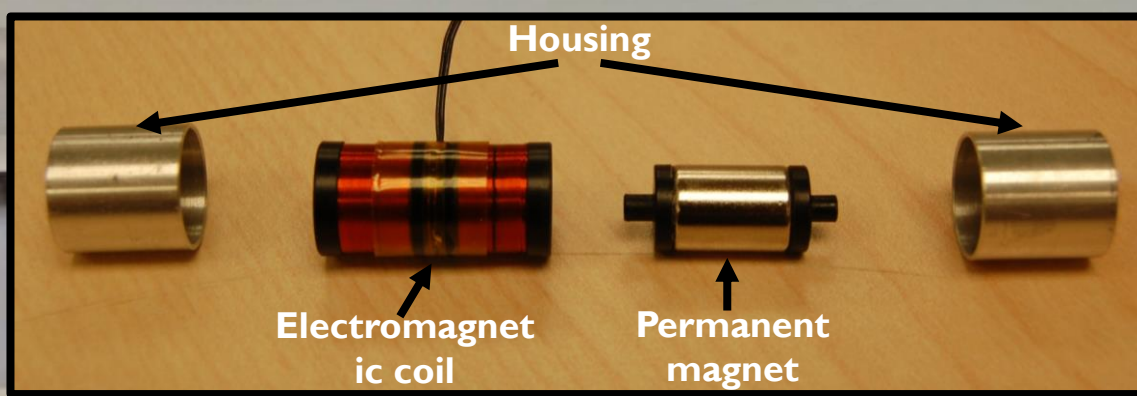
SYNTHESIZING A NEW TEXTURE OUTPUT

Six Synthetic Texture Signals

Input Signals



Synthesized Signals



VIRTUAL MUSEUM

