

# Intelligent Systems to Enhance Human Experience

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and

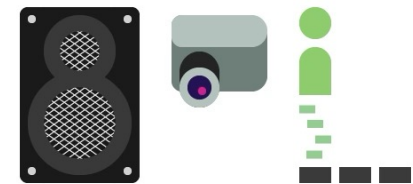
Centre for Interdisciplinary Research  
in Music Media and Technology



**ILLS**  
International Laboratory  
on Learning Systems



**McGill**



SHARED REALITY LAB



# Opportunities for Collaboration

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- Real-time video synthesis for musical interaction
- Affect transmission to enhance social interaction
- Scene understanding and guidance for blind and low-vision users
- ML-supported audio-haptic content authoring tools
- Improved GAN-based face space exploration
- EEG interpretation of auditory attention









## Shared Spaces: Uncompressed HD Video

ACM/IEEE Supercomputing, Seattle





# Mobile Musical Telepresence



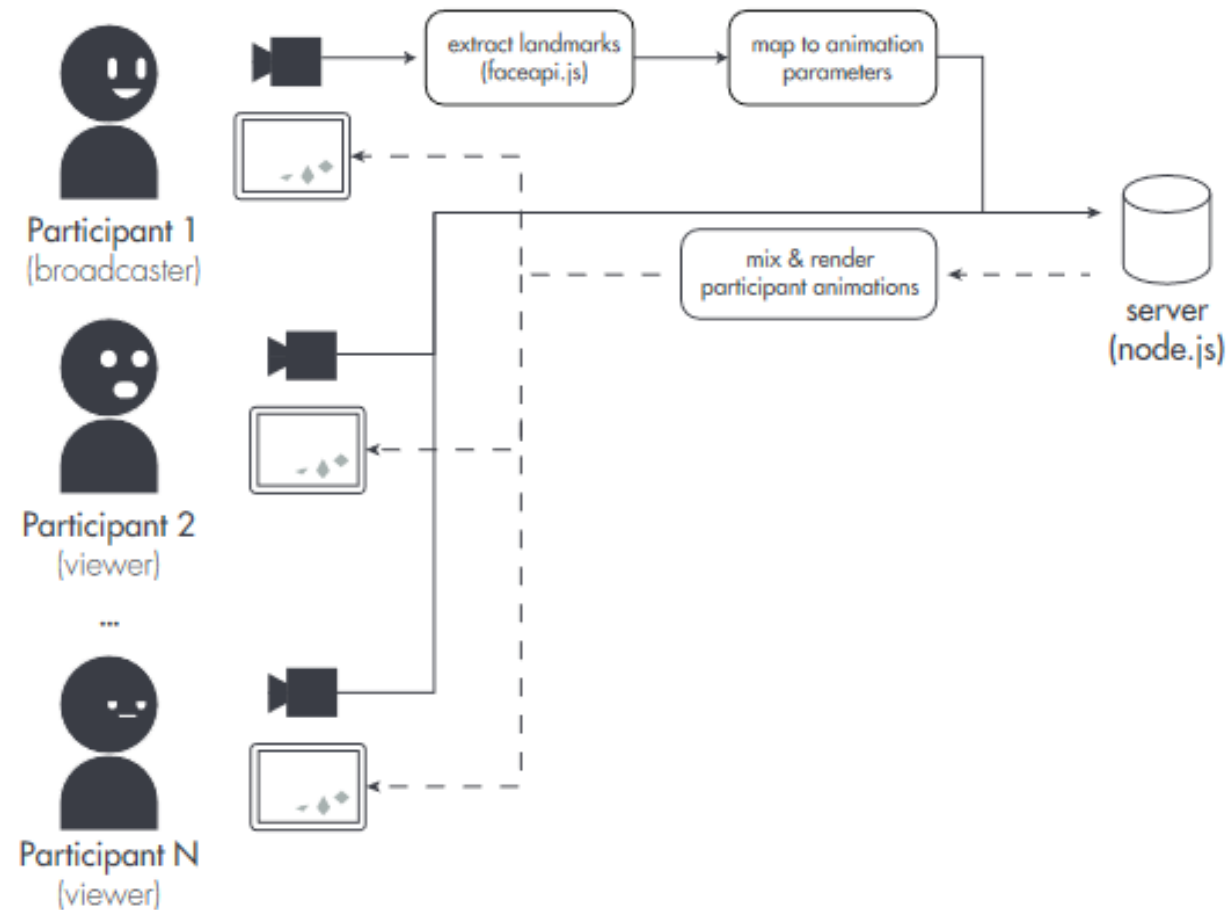
C	I	R
M	M	T

**INNOVATION.CA**

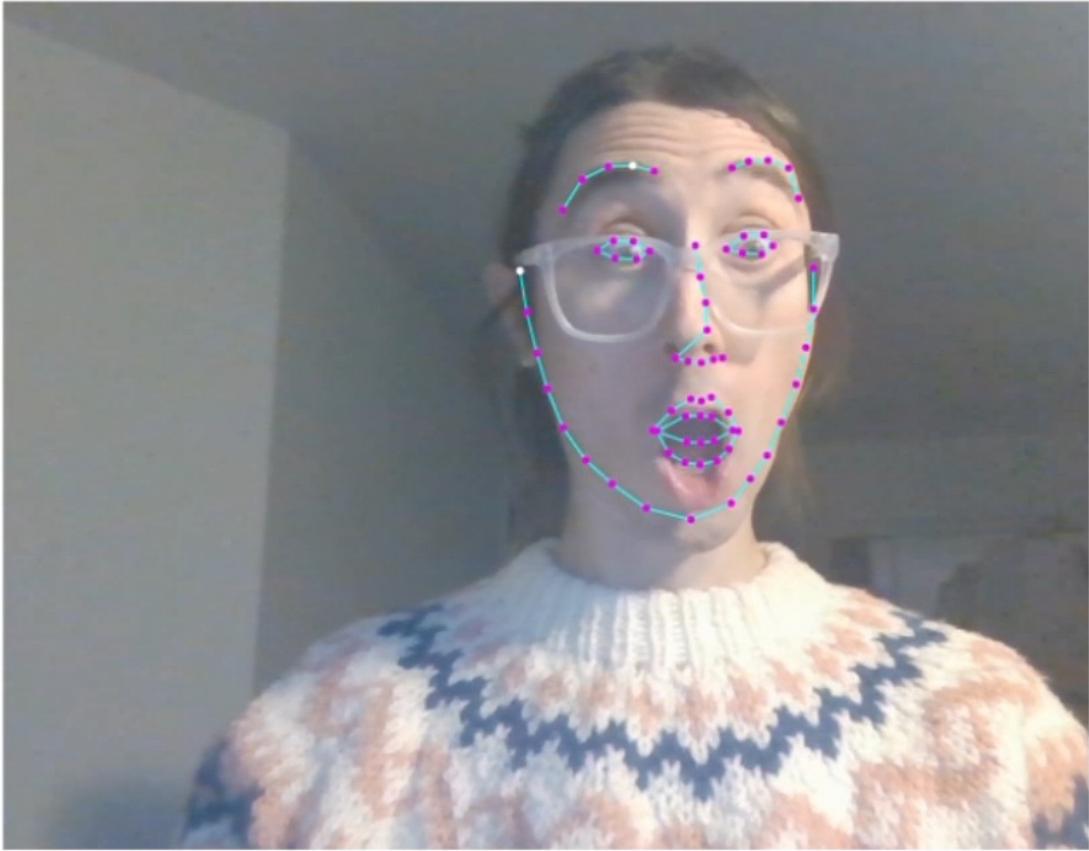
CANADA FOUNDATION  
FOR INNOVATION

FONDATION CANADIENNE  
POUR L'INNOVATION

# CoHere: A Telepresencing Module for Implicitly Conveying Group Affect







# Social Telepresence



*Examples of projection of avatar of remote viewers, one seen life-size in the middle of the sofa, possibly achieved with scrims or optically treated glass surfaces mounted above the sofa back, and a second, simpler example, in which only the face of remote viewer is projected on a cushion.*



Square Explore+Search  
 multi queries per circle  
 Google Places, hex=2:7  
 show query centres

OSM places  
 OSM polygons  
 OSM intersections  
 OSM segments  
 GTFS transit

radius= 250    Preset    zoom    world    fit    place size + -  
 query II : 45.504665,-73.1    Go    Preset  
 add mark :  
 import kml : <http://cim.mcgill.ca/~jeffbl/isasLogA>  
 show tiles,     show bboxes

low recommendations for device=    , timeOffset=-14400



# Autour



9:48



9:48



# Autour

version 1.8.0 (build 12)  
iOSPackaging = NoProvisioning

POWERED BY  FOURSQUARE

Utilise aussi des données d'OpenStreetMap® et de plus de 500 agences de transport public. /  
Also uses data from OpenStreetMap® & over 500 public transportation agencies.

**Autour is an app for the visually impaired and almost only uses audio output. There are few visual components to navigate. To hear the instructions, please make sure your volume is not muted.**







## Internet Multimodal Access to Graphical Exploration (IMAGE)

- Using speech and non-speech audio, plus haptics to provide an understanding of web graphics to blind and low-vision users





# Subway Map

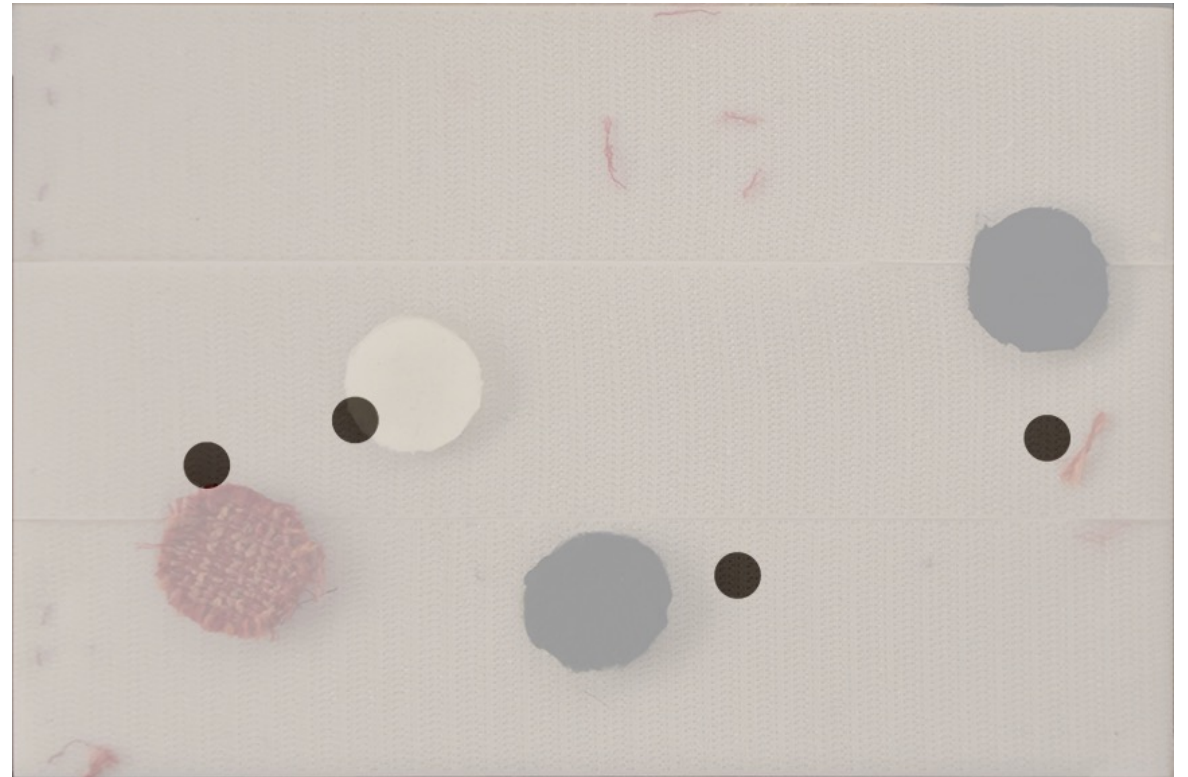




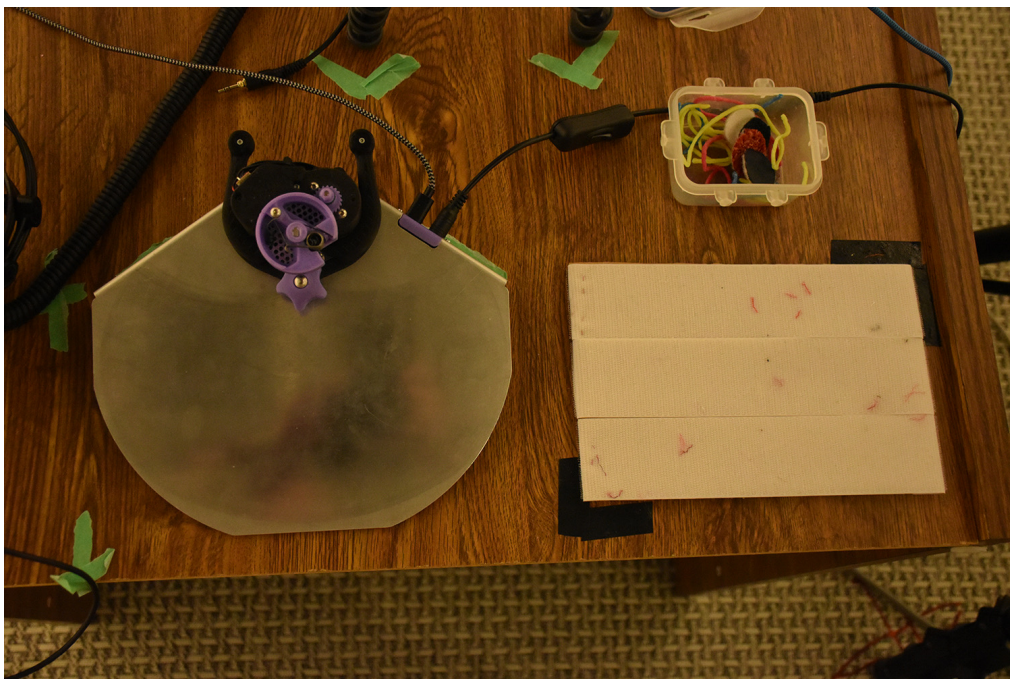
# Multimodal vs. unimodal representation



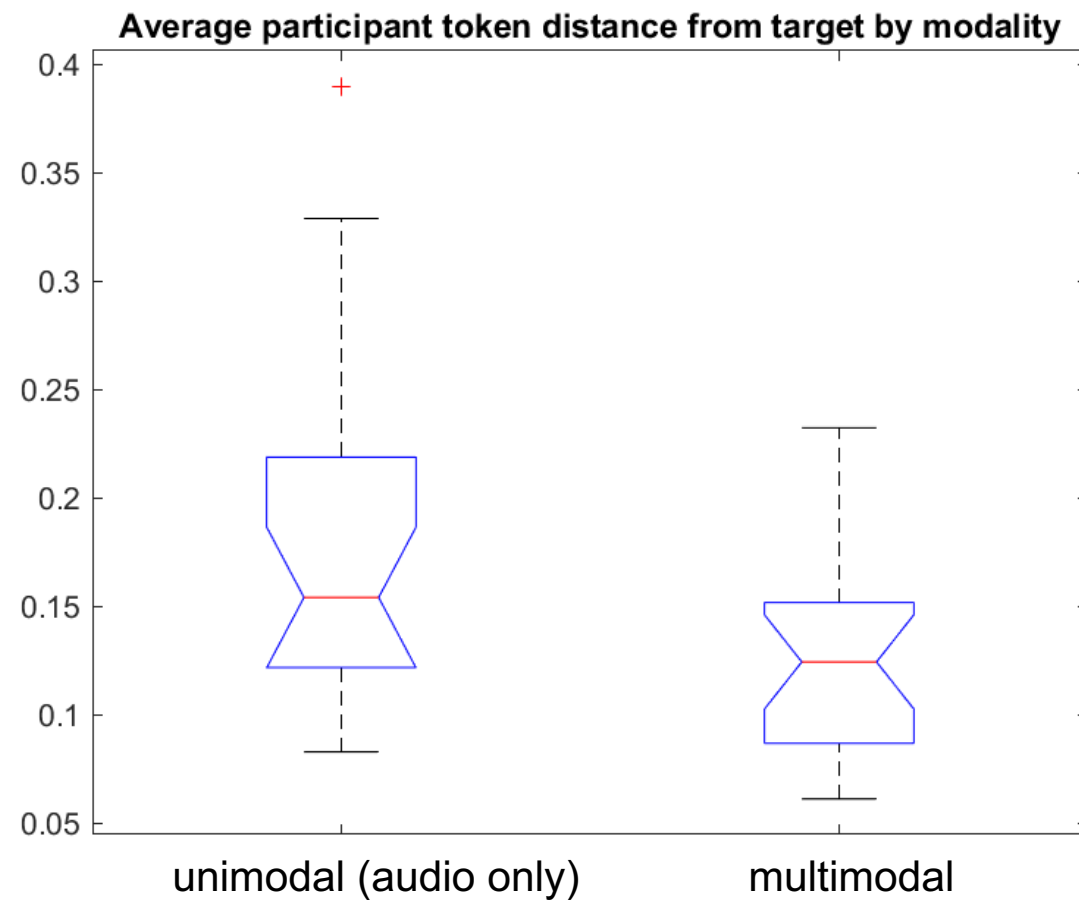
locations representing announced objects



sample token placements overlaid with centroid locations



experimental setup



# Enriching Automated Image Descriptions for People Who Are Blind or Low Vision



**DICE A11y:** Image possibly contains: a happy faced person ,wearing: long sleeve top. standing together in the snowy forest

**Picturesmart:** Caption is a person standing on top of a snow covered slope

**VoiceOver Recognition:** Blizzard, Forest, Jacket, Snow

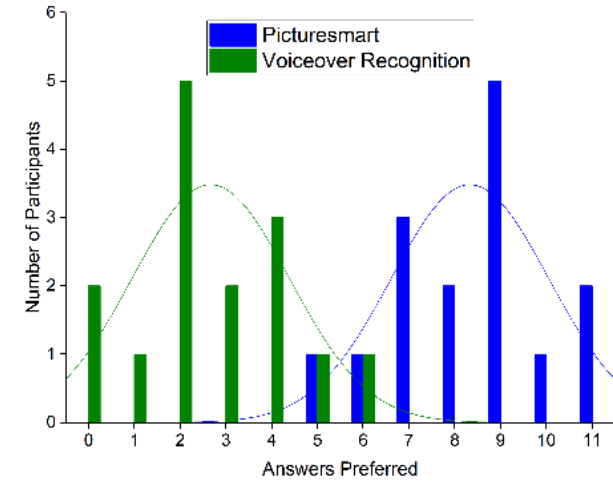
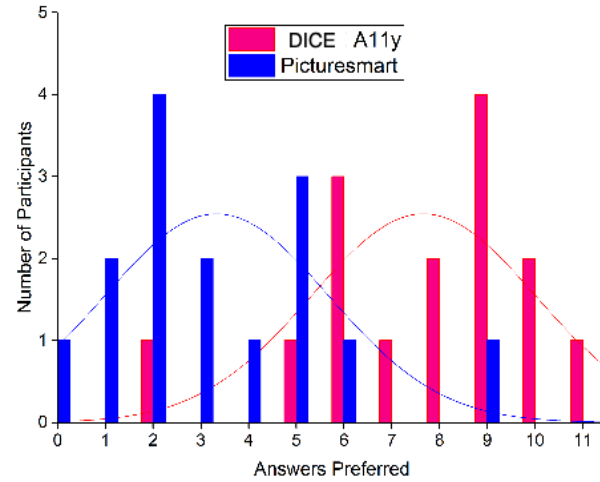
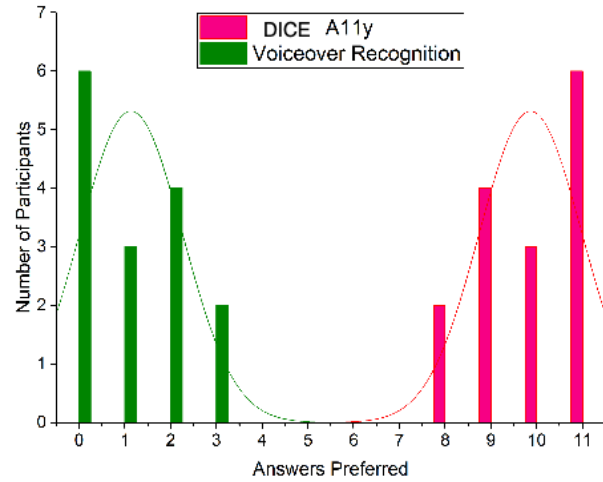


**DICE A11y** Image possibly contains: multiple people mostly being happy and wearing: long sleeve top , trousers. Interpretation: a group of three women sitting together on a couch with their laptops

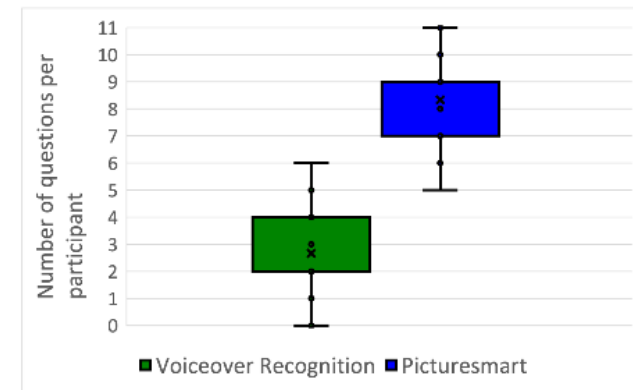
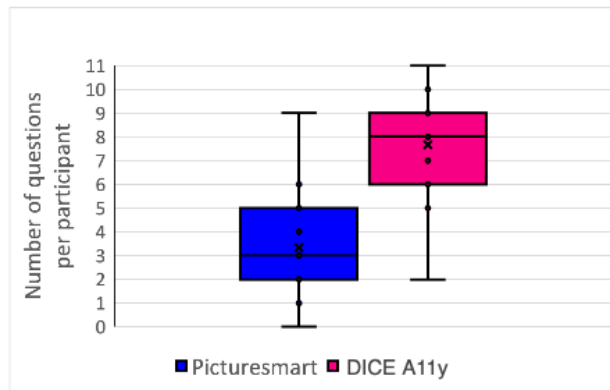
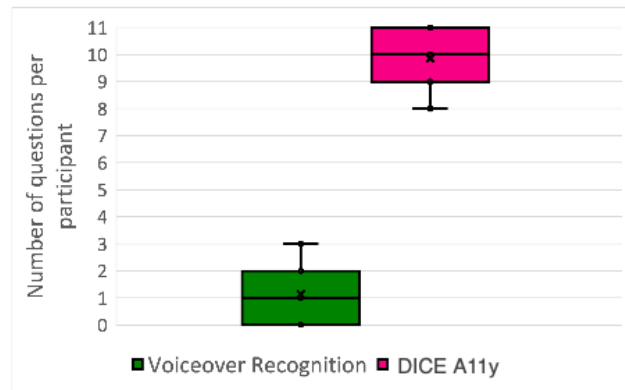
**Picturesmart:** Caption is a group of people looking at a laptop

**VoiceOver Recognition:** Adult, Jeans, Laptop





Number of times participants indicated a preference for one system over another in pairwise comparisons.



Distribution of responses over all 15 participants.

Object Classification	OCR	GPT
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milk

packet

santa clara,desde 1912,leite,semidesnatado, 1% de gordura,conteúdo 1l,leite uht semidesnatado,aviso importante este produto não deve ser usado para alimentar

... it seems like you might be looking at a packet of Santa Clara's semi-skimmed or low-fat UHT milk. The packet contains 1 liter of milk with 1% fat content. The label also includes an important notice that this product should not be used to feed children unless advised by a doctor or nutritionist, as breastfeeding is recommended to prevent infections and allergies until a certain age. ...



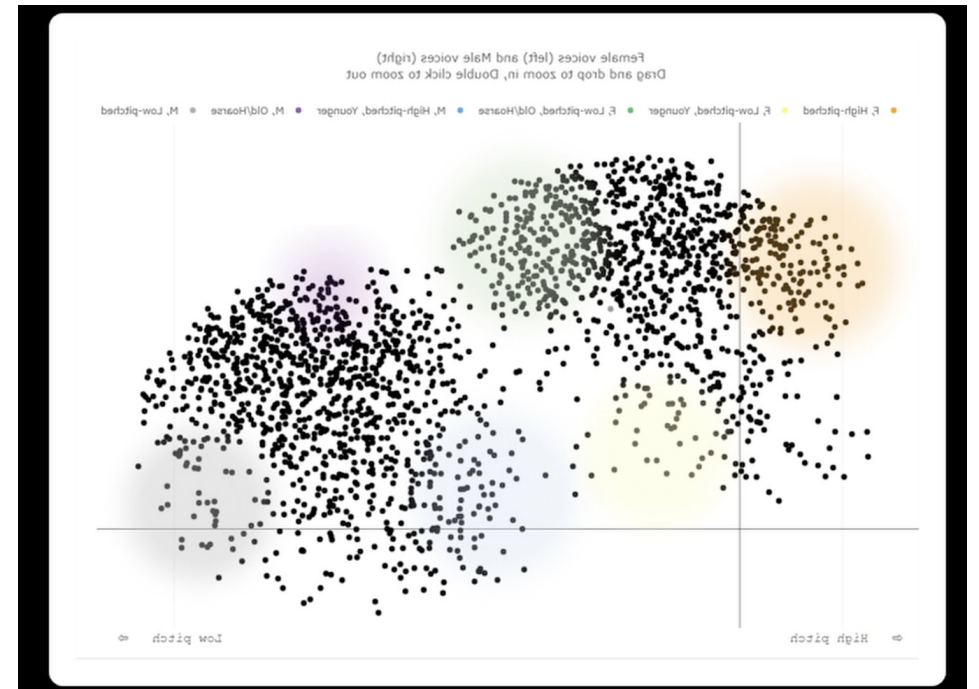
condensed milk

can opener, tin opener

ccgl,leite,condensado,sem idesnatado,6% de gordura,industria brasileira,peso liq.,395 g,imagem ilustrativa

... I don't see any mention of a can opener or tin opener. However, it seems like you might be looking at a can of CCGL's sweetened condensed milk. The label indicates that the milk is semi-skimmed and contains 6% fat. The weight of the can is 395g, and there might be an illustrative image on the label...

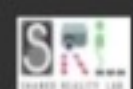
# Mixed-Reality Platform for Simulation and Synthesis of Multi-Modal Hallucinations



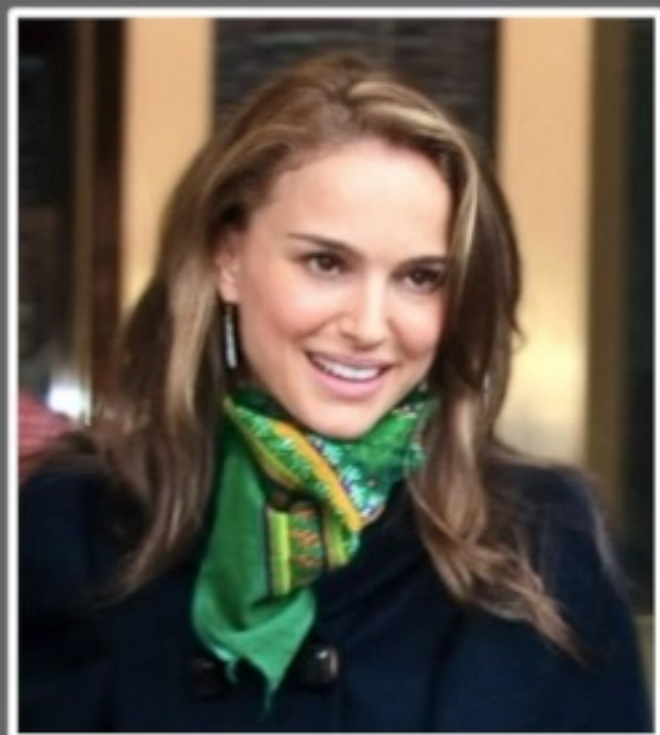
Rai, A., Ducher, C. and Cooperstock, J. R., **Improved Attribute Manipulation in the Latent Space of StyleGAN for Semantic Face Editing**. *International Conference on Machine Learning and Applications*, 2021.

Lee, H., Jiang, R., Yoo, Y., Henry, M. and Cooperstock, J. R. **The Sound of Hallucinations: Toward a more convincing emulation of internalized voices**. *Human Factors in Computing Systems (CHI)*, New Orleans, LA, April 2022. ACM





Click on the face that looks more similar to your target each time a new image is proposed to you.



Upload your target image



Current avatar



Proposed avatar

Real speed

# Motivation



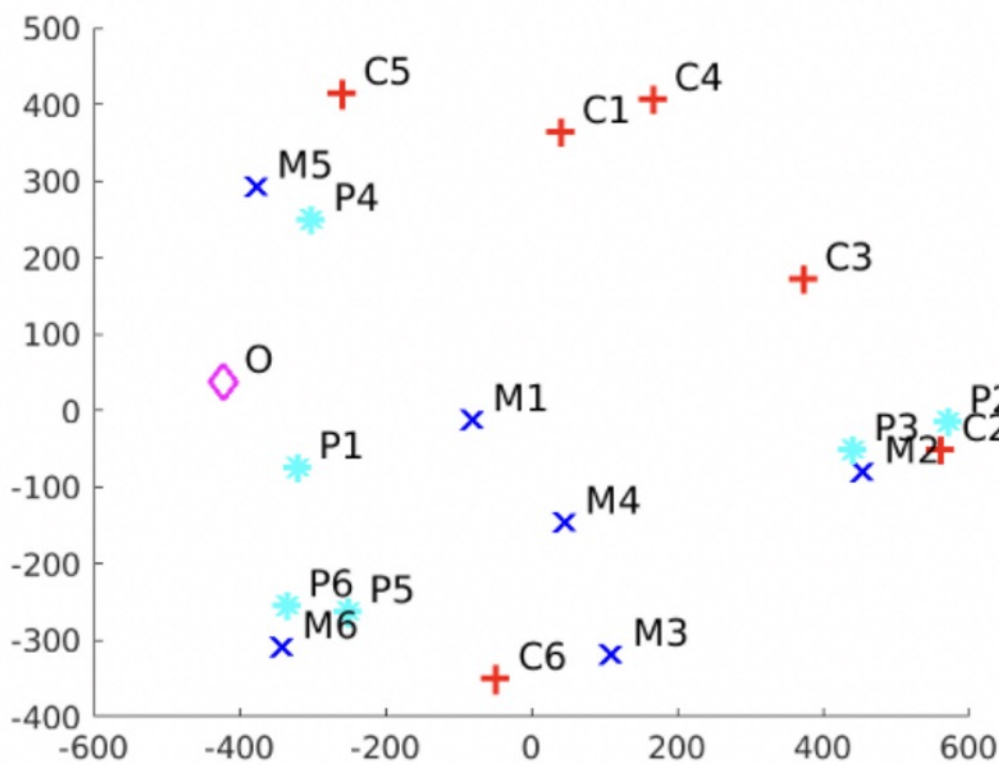
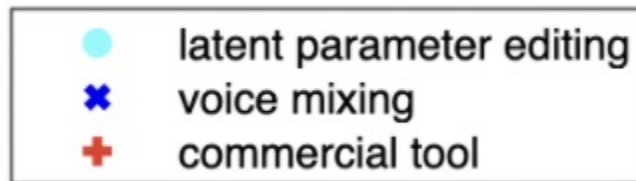
Simulating auditory hallucinations for use in psychotherapy



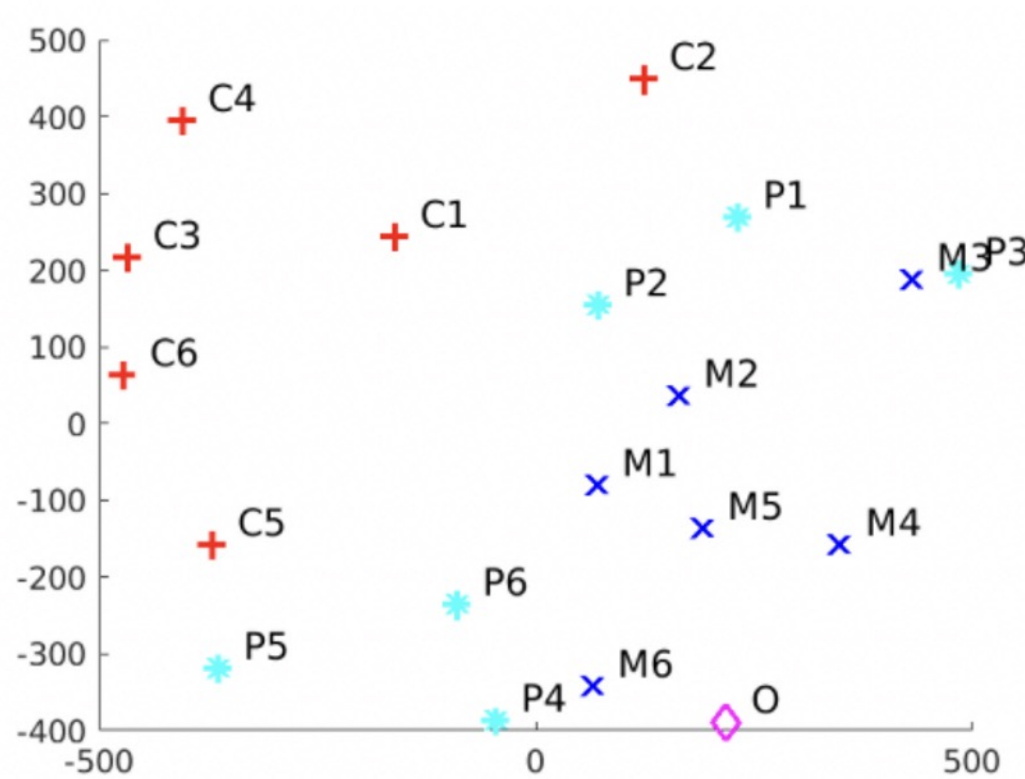
Patient



3D Virtual Avatar



MDS results for “Justin Bieber”



MDS results for Oprah Winfrey



# Soft Pneumatic Haptic Wearable to Create the Illusion of Human Touch



(a)



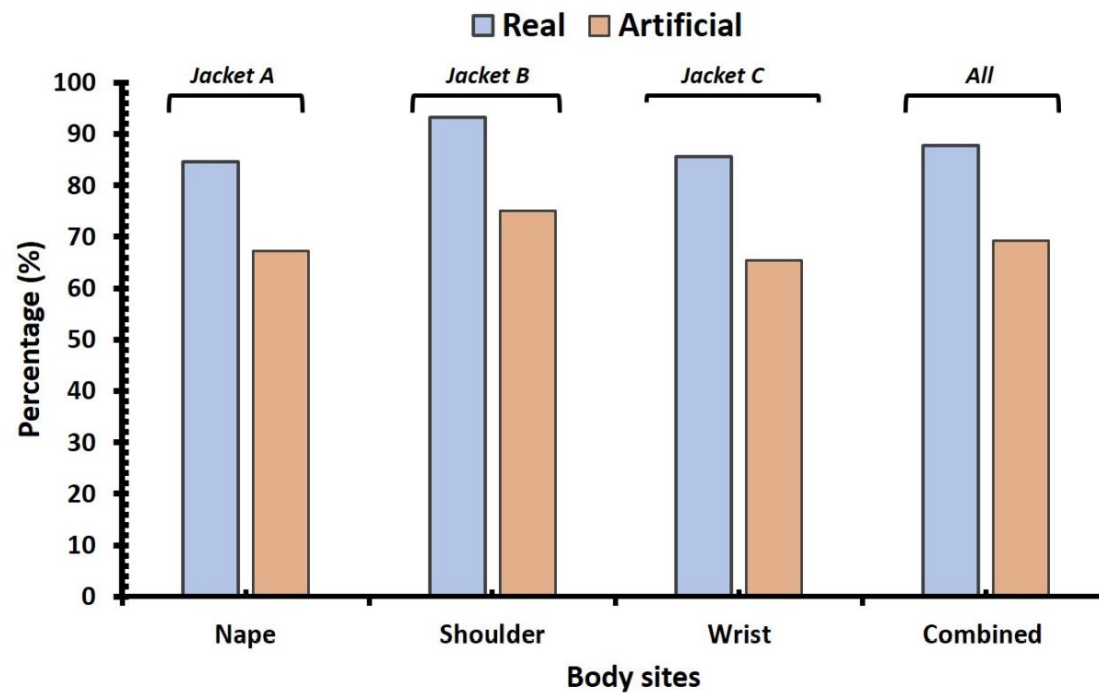
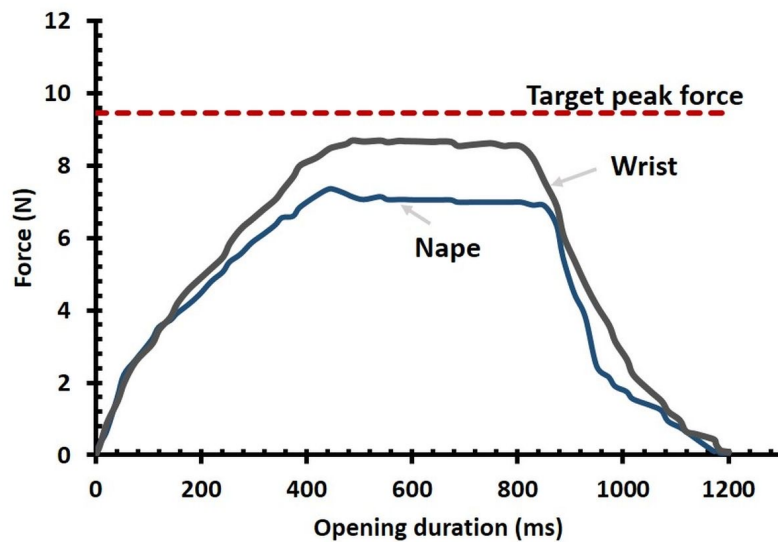
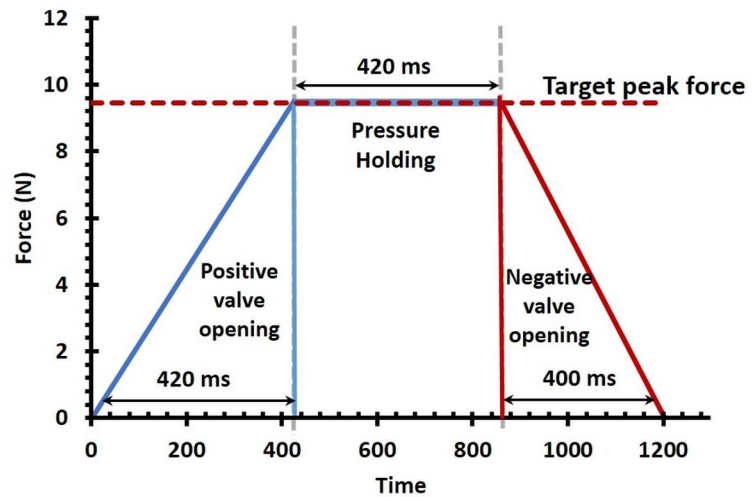
(b)



(c)

# Actuation Samples









# Ai-Digital Nurse Avatar (ADiNA)

Providing a conversational partner to seniors while tracking psychosocial state





BenQ

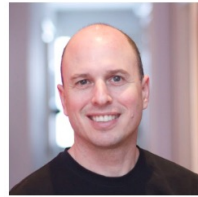
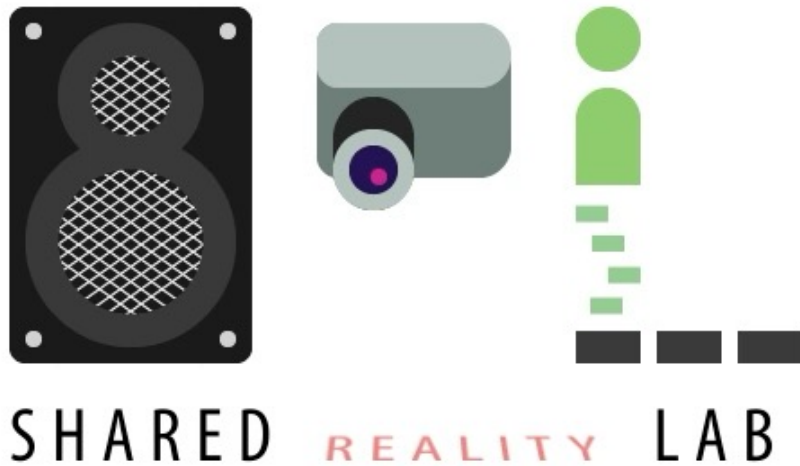




## “Bionic Ear”

Improving Intelligibility of Speech in Noisy Environments Using Cognitive Load Measurements





**Jeremy Cooperstock**

Lab director



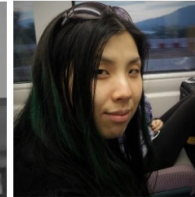
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IMAGE Project Manager



**Florian Grond**

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IMAGE project



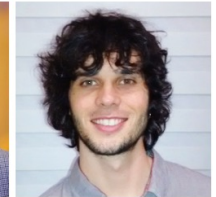
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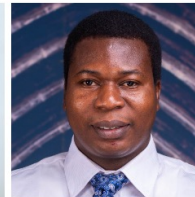
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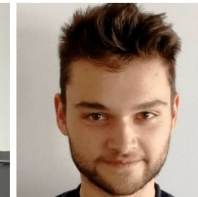
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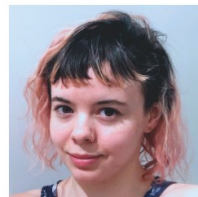
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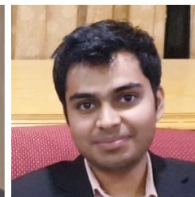
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**Sri Gannavarapu**

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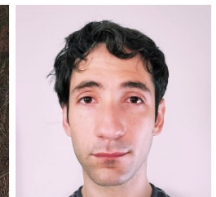
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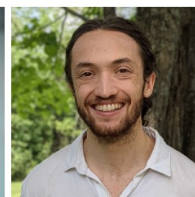
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