



Honorable Mention

Mindless Attractor: A False-Positive Resistant Intervention for Drawing Attention Using Auditory Perturbation

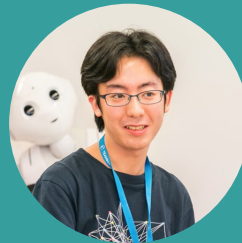
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equal contribution

Introduction



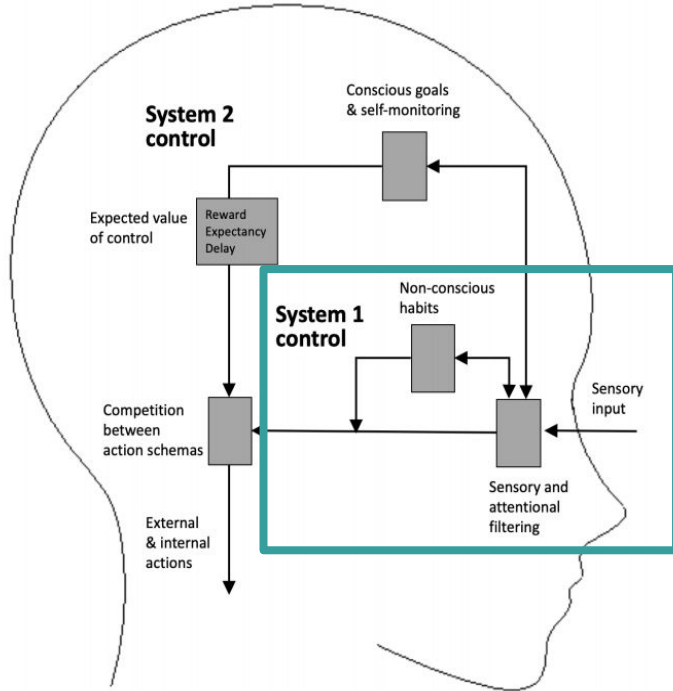
- There is a soaring demand for **video-based communication**.
 - also driven by the COVID-19 pandemic
- However, it is known that **we tend to be lose our attention**.
 - using smartphones or browsing on the Web
- Our research question is:
How should computers intervene in users to draw their attention back?

Introduction



- In the nature of human speech communication, it is known that we often unconsciously direct the attention of others **by changing pitch and volume**.
- Our idea: by **leveraging this perceptual property**, we can create **mindless interventions** to restore attention.

What's Mindless Computing [1]?



Dual Process Theory [2, 3]

- System 1: fast process (e.g., intuition)
- System 2: slow process (e.g., reasoning)

Typical persuasion relies on **System 2**, requiring users' motivation.

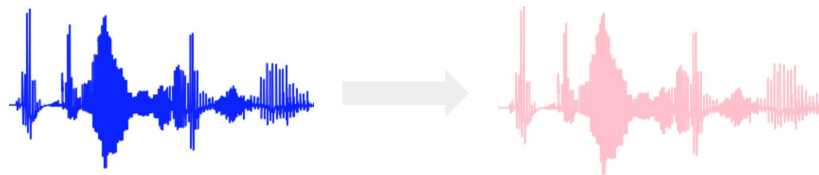
→ **Mindless Computing** is a mobile or ubiquitous, persuasive technology designed to subtly influence the behavior of the user without requiring their conscious awareness.

[1] Adams et al. Mindless computing: designing technologies to subtly influence behavior (UbiComp'15)

[2] Lyngs et al. Self-Control in Cyberspace: Applying Dual Systems Theory to a Review of Digital Self-Control Tools (CHI'19)

[3] Kahneman. Thinking, Fast and Slow (2011)

Proposed System: Mindless Attractor



Perturb audio parameters (pitch and volume)
when users' attention is detected to be diverted.

- We considered video-based lecture as an example of video-based communication.
- We identified several design requirements:
 - Avoid interruption due to interventions.
 - Use a modality that users will not neglect.
 - Function without external devices.

Implementation



The input is 16 kHz signal.

The perturbation is activated
by 1/16 sec (1000 samples).

It continues up to 3 sec.

Among the basic parameters of speech (volume, speed, and pitch), we thought that changing the speed was not suitable for real-time processing, so **we perturbed the volume and pitch.**

- **Pitch shift**
 - lower the pitch or raise the pitch
- **Volume change**
 - halve the volume or double the volume

→ yielded four patterns of the perturbation
(There was no significant among their effect.)



Hypotheses and Results

H1: Mindless Attractor is an effective means to refocus the attention of users in video-based learning situations without consuming their conscious awareness.

→ supported through an experiment emulating a video-based lecture

H2: Mindless Attractor is not only an effective means to refocus users' attention but is also preferred by users when combined with a machine learning-based sensing module, while the alerting approach is not accepted.

→ supported through an experiment emulating a video-based lecture with a ML-based sensing module

Summary

- We proposed *Mindless Attractor*, a system for video-based learning that draws attention in a *mindless* manner by perturbing the pitch and volume of audible speech.
- We verified the benefit of **its robustness to false positives** when **combined with ML-based sensing**.
 - In the human-AI symbiosis, this mindless intervention will be a new direction for designing systems that intervene in users with the help of machine learning.

