



University of Stuttgart
Institute for Visualization and Interactive Systems

Embodied Notifications: Implicit Notifications through Electrical Muscle Stimulation

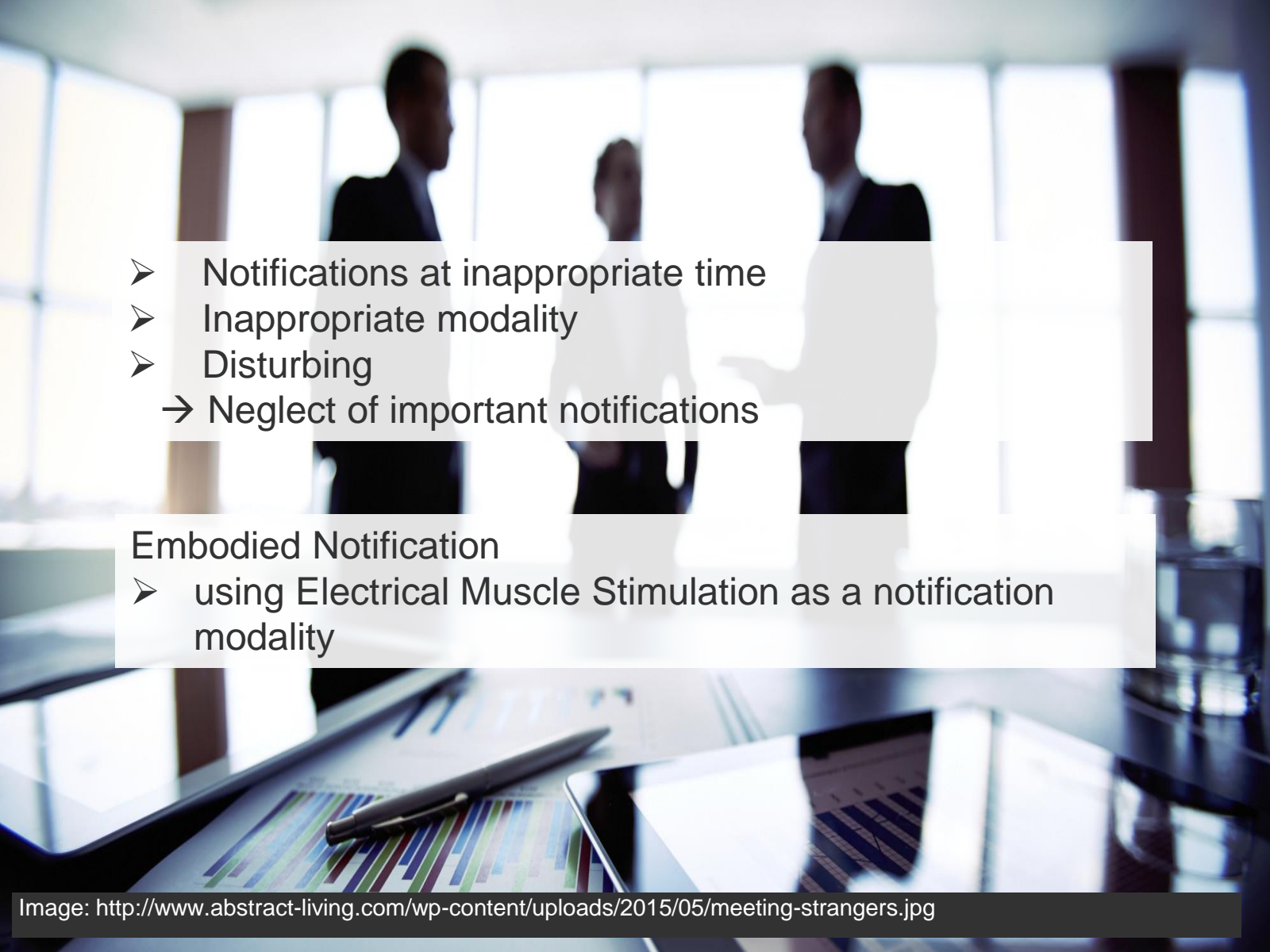
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hci lab.org



Images: <https://i0.wp.com/knowridge.com/wp-content/uploads/2016/07/Google-glass.jpg>
<https://static0.fitbit.com/simple.b-cssdisabled-png.h91e5e9d581ef9ffb9a826ef5a1933cdd.pack>

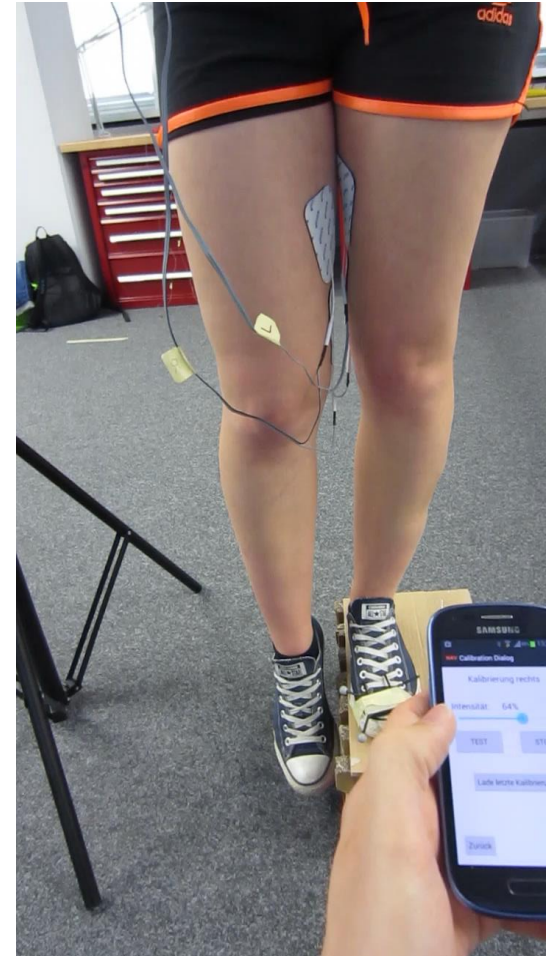
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- A blurred photograph of three business professionals in a meeting room. Two men and one woman are standing near a large window, looking at each other. The scene is out of focus, emphasizing the text overlay.
- Notifications at inappropriate time
 - Inappropriate modality
 - Disturbing
 - Neglect of important notifications

Embodied Notification

- using Electrical Muscle Stimulation as a notification modality

Electrical Muscle Stimulation

- EMS capable of
 - Actuating muscles
 - Providing feedback
- Actuation requires specific
 - Location on the body
 - Signal strength



Embodied Notifications

- Embodiment
 - Feedback through the user's body
 - No need of a mediator (e.g. smartphone) for notification perception
- Implicit
 - Feedback vs. directed actuation
 - Support the user to achieve certain task
 - Reduces cognitive load

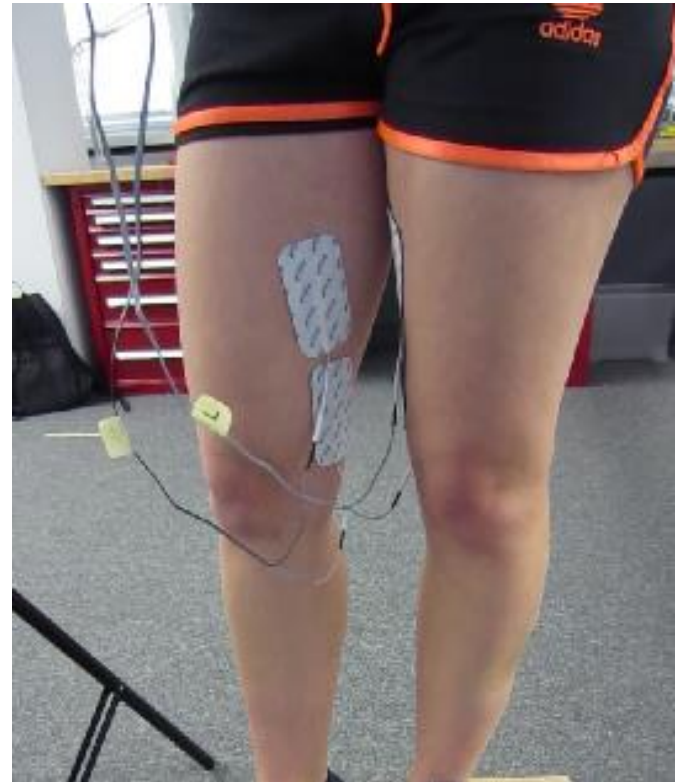
Reconsidering Work on EMS

- Increasing body of work on EMS in HCI
- Actuating muscles for navigating users
- Communicating affordance through actuation

Application Scenarios

Navigation

- Actuating muscles instead of presenting turn-by-turn notification
- Turning leg outwards to change walking direction



Navigation



No Need for Reminders

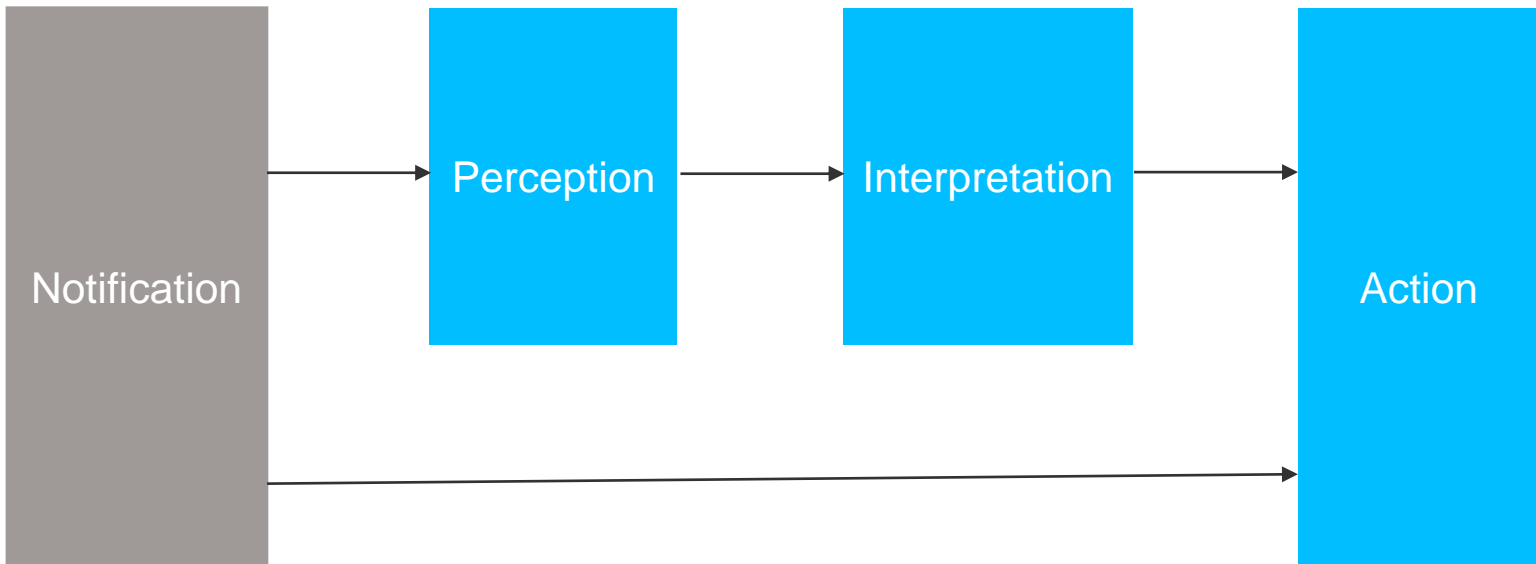
- Being aware of events
 - Taking an umbrella
 - Picking up the phone
 - Being aware of appointments



Discussion and Conclusion

Discussion and Conclusion

- Embodied notification
 - Actuating user instead of grabbing attention
 - Reduces cognitive load by skipping perception and interpretation



Design Challenges

- User being in control vs. automatic actuation
- Feedback vs. Actuation

- Not appropriate on all situations
 - Actuating hand while steering a car vs. while walking at home

Take-Home Message

- Reconsidering notifications
- Actuating user instead of grabbing attention
- Reduces cognitive load by skipping perception and interpretation

Embodied Notifications: Implicit Notifications through Electrical Muscle Stimulation

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