

Lecture 7:

Introduction to Humans

From you, to you!

I am officially old.

A kid saw this and said : "Oh, you 3D printed the save icon." 😭😭



This is brutal

Graphic design has rules, and they work.

And you will read this last

You will read this first

And then you will read this

Then this one

Logistics

- Make-up quiz
 - Tomorrow at 11-11:45 AM
 - Show of hands?
 - Venue: Tentatively, RM 101.

Recap

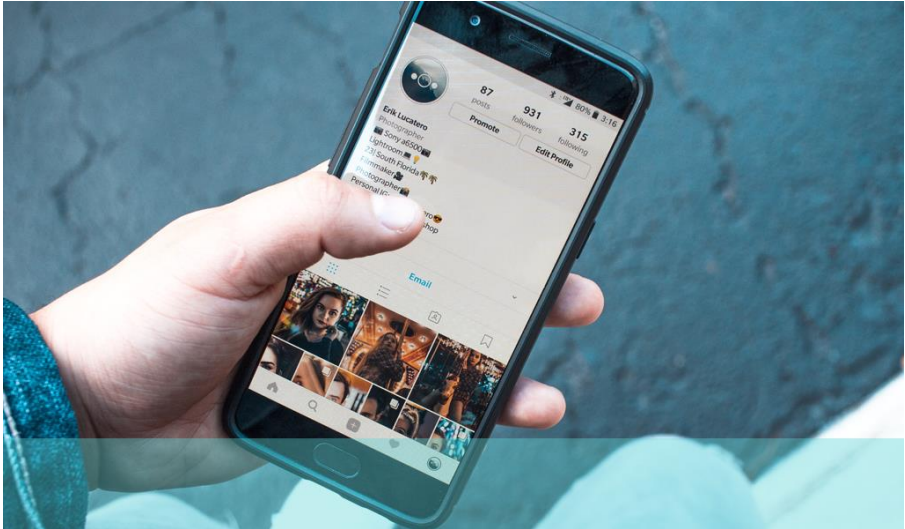
- Human-Computer Interaction
 - As Input-Process-Output sequences
- Model Human Processor
 - Perception → with its own perceptual processing and memory
 - Largely, vision, hearing, touch
 - How perception works, elements of each sense, Gestalt principles
- Today:
 - Revisiting visual perception rules, in practice
 - Output (from humans)
 - Motor movements, Gaze, Emotions, Audio, Other signals
 - Processing (if time permits)

Visual perception in action

- Why would students go to IITK DOAA website?
 - <https://www.iitk.ac.in/doaa/>
- Why would someone go into election commission's website?
 - <https://voters.eci.gov.in/>
- Homework – how would you fix it?
 - Sketch an alternate layout / interface using Gestalt principles, colors, etc.
 - Paper prototype / Figma / Powerpoint, anything else works.
 - Will be posted over the weekend, due in a week (7th Feb).

Outputs (from Humans, input to Computer)

- Motor control
 - Largely, moving hands and fingers (mouse, keyboard, joystick)
 - Categorized into Gross & Fine
- Gross motor skills: moving large muscles/groups
 - Motion trackers, Posture recognition, etc.
- Fine motor skills: Precise movements
 - Typing, moving to specific link on screen, ...



Motor skills: things to remember

- Gross motor skills:
 - 6mo – 5 years (to fully run, jump, etc. with balance)
- Fine motor skills:
 - 5-6mo (grabbing) – 7years (writing) + more (e.g., play instruments)
 - Typical source of errors, in computer use
- Dimensions:
 - Accuracy (hit the target), Dexterity (precise location), Reaction time (fast?), Muscle flexibility, handedness, variability in body sizes
- Susceptible to degeneration in older adults, or loss due to injuries

What this means for HCI: Touch & Point

- Account for human motor skills/limitation during UI design
- Make it easy to point/select items
 - Icon sizes, don't put icons too close, provide large enough surface areas (atleast for most common options)
- Recognize typos happen, over-scroll/under-scroll happen
 - Better, help avoid them, or fix them.
- Fat fingers: 7-10mm for content on touch devices
- Range of motion for fingers / joints
- Avoid moving content (click before it disappears!)

More touch and point

- Use of hands for VR controllers / gloves
- Use of natural gestures
 - Actually grab, instead of using point and click or so.
 - Gloves vs. controllers
- Handedness
 - Left vs. right (also for other screens/mouse).

What this means to HCI: Motion-based IxD

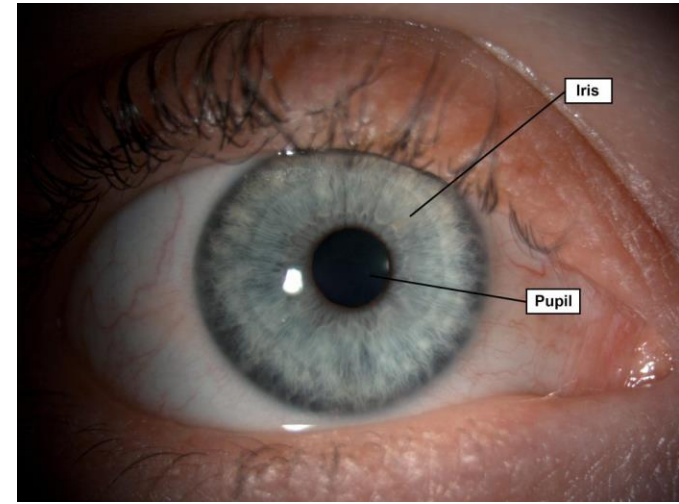
- Appropriate “computer” games / activities to develop such skills
- Rehabilitation (aided by sensors/computer vision)
- Account for different body shapes, sizes
- Account for disabilities (screen sizes for people with disabilities, slow/fast movements)
- Relying solely on motion is bad
 - Rooms turn off, when someone is still... and sensor resolution is poor..

Audio as input to computers


- Frequency, Loudness, Distinguishable timbre
- Noise from environment
- Accents, languages
- Speech problems: cant enunciate some vowels/consonants
- Privacy
- <https://www.youtube.com/watch?v=gDXld61ebQc>

Gaze as Inputs to Computers

- When looking at content:
 - There are observations changes in face and/or eye
 - Of great importance in human-human interaction (non-verbal cues)
- Pupil dilation → Focus
- Position of eyeball → Angle of vision / focus
- Look up / closed → Likely, thinking
- Enlargement of eyes → wonder, surprise, etc.



[See all](#)

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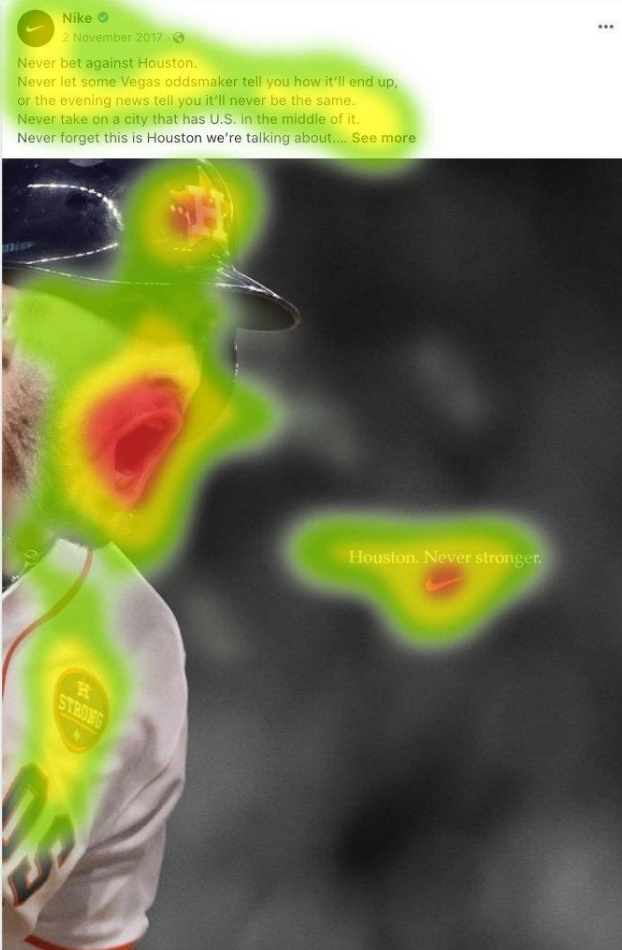
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 Oscaroscarjr, Levin roek Mahlare and 33K others

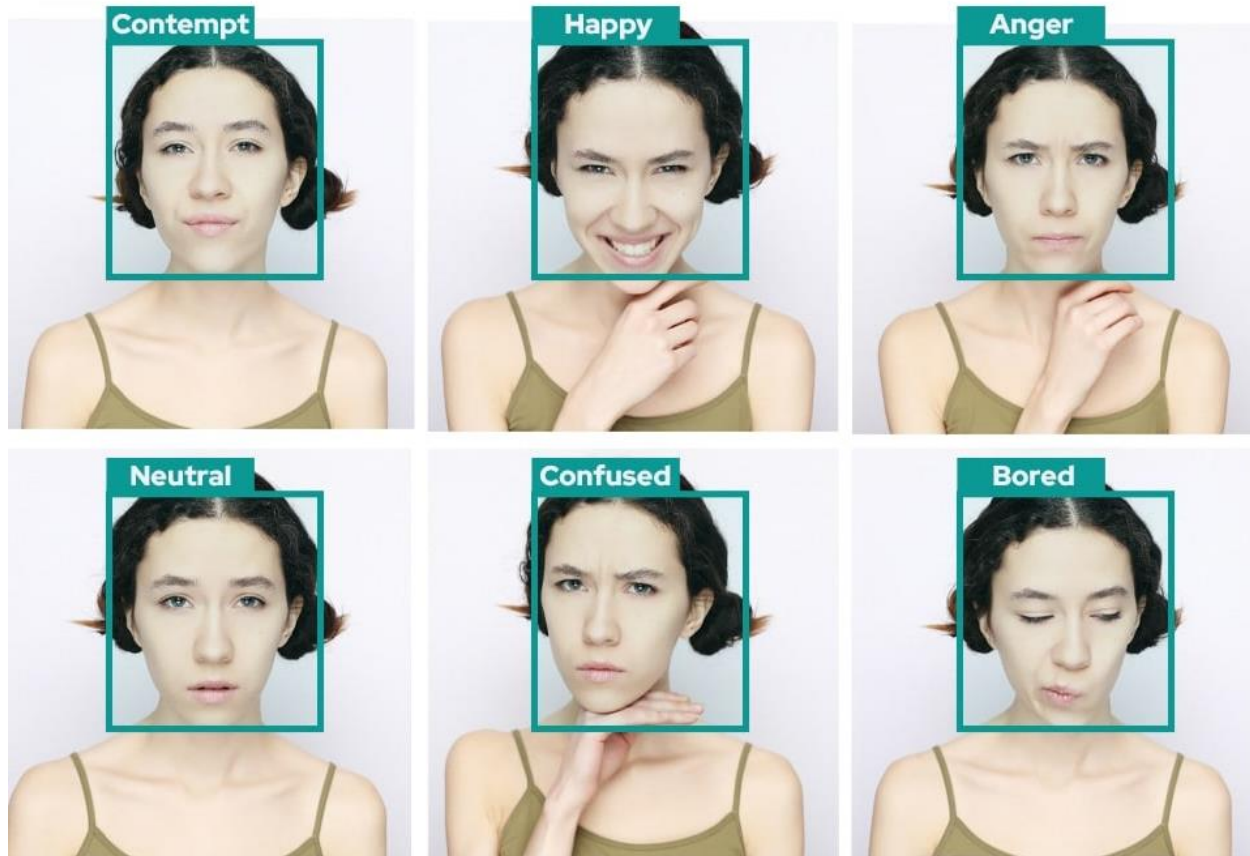
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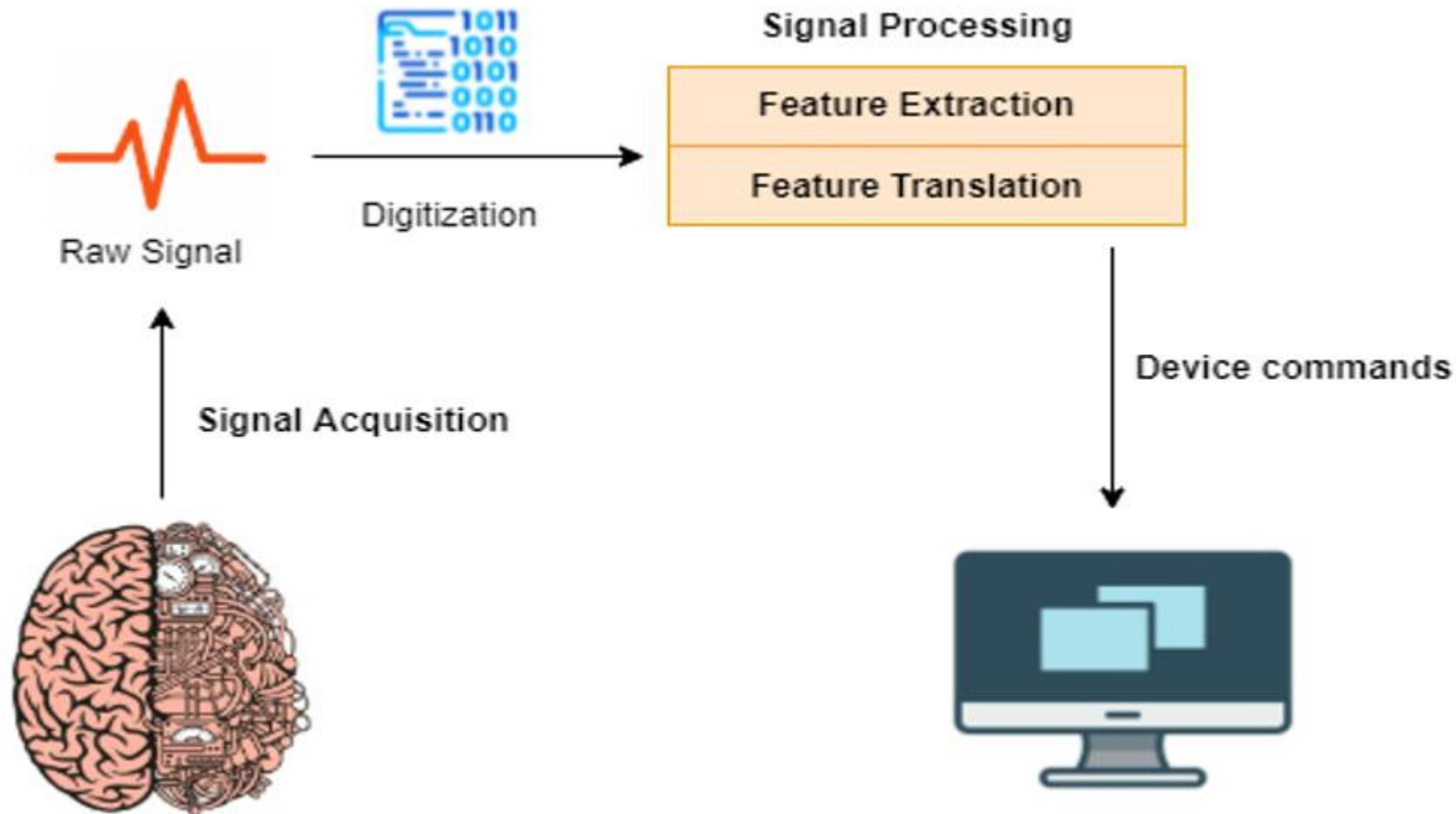
Facial emotions as Inputs to Computers



Bio-markers as inputs to computers

- Bio-marker is some “marker” (measurement, signal) indicative of the state of a person at a point in time
- E.g., Sweat, Sleep tracker (EOG/EMG), Heart rate
- Others:
 - Pedometer (partly, have to do with motor abilities)
 - Speedometers (needs additional spatial awareness)
- All kinds of health trackers, wearables

Brain signals as inputs to computers (BCI)



BCI in action

- <https://www.youtube.com/watch?v=YMSUVkggOMc>

Summary

- Various modes of outputs from humans (as inputs to computers)
 - Motor control → touch & point, joysticks, VR controllers, ...
 - Movements as inputs
 - Audio
 - Gaze & emotions
 - Biomarkers
 - Brain signals
- Can we use these to do “multi-modal” interactions
 - E.g., Can you get me that? [and point / look].

Reading

- Continue reading Dix, Chapter on Humans
- Next week:
 - Processing in the brain
- Reminder again:
 - Homework will be available, due next Friday
 - Redesign ECI homepage to draw attention to the right things, for people.