HCI Lecture 3

Interfaces

Todays' plan

- Admin
  - The Gooey GUIs
  - Project stuff
- Recap last 2 weeks
- Lecture
  1. Users & stakeholders (Ch. 2.)
  2. Conceptual models (Ch. 3.)
  3. Interaction types (Ch. 3)
  4. Interaction styles – interfaces (Ch. 7.)
  5. Usability Heuristics

- Guest speaker – Erin Clark

Projects

- Well on way with team meetings
- Optional? Essential?
- **User surveys** – research participation agreement
  - open questions, listen don’t lead
- Uploading work
- Worksheet 01- 06 -> Assignment 1
- **Scope**
- Assignment 1 template.docx - updated
- **Analysis and justification more important**
- **IP** (GPL/MIT or other…)
- **Ignition**
- **Meeting minutes** (toggl, MS Word tracking - optional)

Continued…

- 10 hours including lect and tute
- **Teams** – 3-4 students
- **Difficulties with topic**?
  - research
  - workshop alternative ideas / get help
  - pivot
- **Teammates**?
- **Consults** – email to book 20 min consult – online or in-person OK.
  - This week:
    - Tues 11am for consult
    - Will pop into tutes if I am free

Tips: visual layout for Assignment 1 Report

- You may like to use a **Canva** template (suggestion only)
- If you have previous experience – Adobe InDesign etc.
- Use lots of **big clear screenshots**

  -(label as Image 1, Image 2 etc.)
- **Annotate images**

  - use arrows and boxes to highlight areas you are analysing

  - textboxes
- Images **inline with text**.
- Different and innovative layouts.

https://visme.co/blog/annual-report-design/

References

Websites for professional web developers and web designers:

- **Smashing Magazines** https://www.smashingmagazine.com/
- **Web Designer Depot** https://www.webdesignerdepot.com/

Book reference:

- Jill Butler ; Kritina Holden ; William Lidwell, 2010, **Universal Principles of Design, Revised and Updated.**

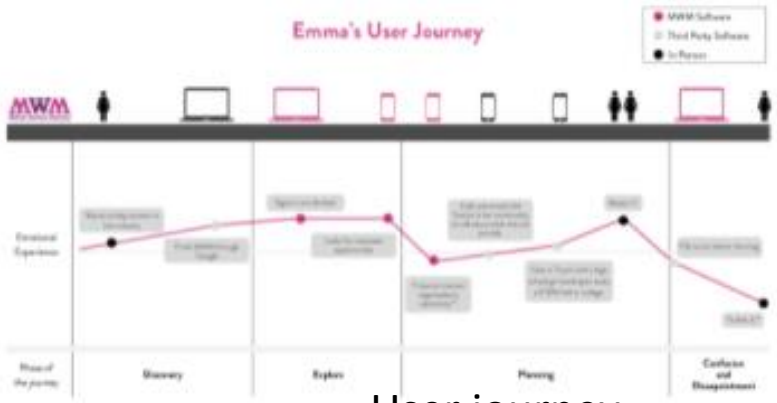
Use Chicago 17th B
https://libguides.library.curtin.edu.au/uniskills/referencing/

Recap: Interaction Design (UI/UX)

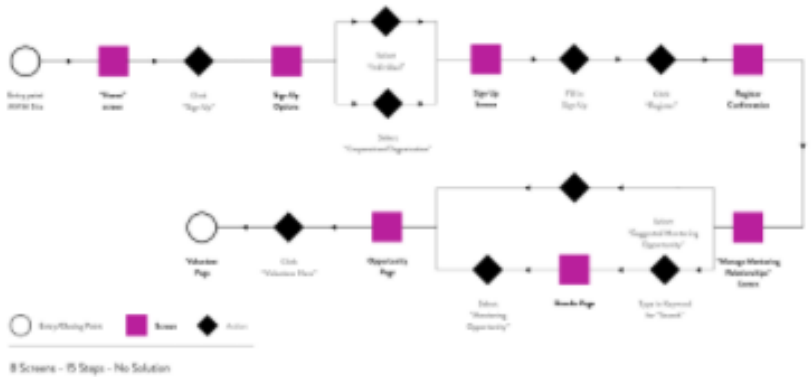
- **UI:** interface (keyboard, mouse, touchscreen, gesture, voice)
- **UX:** experience - feelings
  - user, user goals, and product (who, what, where, why, how)
  - emotion, expectation, desires, limitation, psychology, environment etc. (Perryer, 2020)
- **Multidisciplinary**
- **Usability goals**
  - effectiveness, efficiency, safety, utility, learnability, memorability – *Sharp, Preece, Rogers*
  - learnability, efficiency, memorability, errors, satisfaction - *Nielsen*
- **User experience goals**
- **Design principles**
  - visibility, feedback, constraints, consistency, affordance
- Accessibility/inclusivity

Recap: Design Thinking

- Double diamond
- Personas
- User surveys
- User stories –
  - *“As Fred, I want to automate my use of appliances. so I can be more enerav efficient in my home.”*
- User flows
- Competitor analysis
- Pain points
- Agile and NNG definitions vary



User journey



User flow

https://blog.prototypr.io/women-and-women-first-womens-mentorship-mobile-app-uxdi-a1c74bb16ec6

Involve users and stakeholders

- Expectation management
- Ownership
- Communication
- User acceptance
- Diversity in experience - creativity
- Training
- Users don’t know what they want – A/B testing
- Prototype, feedback and iterate.
- **Testing:** Empirical measurement using quantifiable and measurable usability criteria.

Conceptual models

- Interface designed to be similar to a physical entity:
  - Desktop model
  - Shopping cart model
    - Proceed to checkout
    - Cash register
  - Web portals
  - Card metaphor (flash cards – chunks of info flicked and sorted)
- Analogy to make the unfamiliar familiar
- Learning is easier

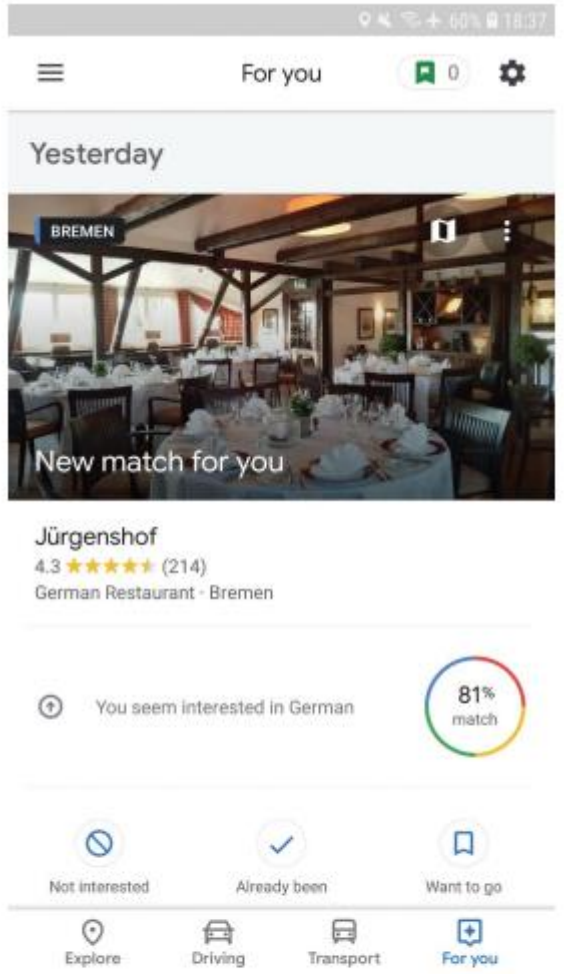


Figure 3.5 Google Now card for restaurant recommendation in Germany

Source: Johannes Shonning

Chapter 3: Conceptualizing Interaction Design, Interaction Design (5th ed.) by Sharp, Rogers, Preece

Interaction types

1. **Instructing -** issuing commands and selecting options
   - repetitive actions, spell check, file management.
   - word processors, vending machines.
2. **Conversing** - finding information
   - chat bot
3. **Manipulating** - interacting with physical/virtual objects
   - dragging, selecting, zooming
4. **Exploring** - moving through virtual or physical world
   - VR
5. **Responding -** system initiated interaction
   - alert, notification, frustrating, wrong
   - sports watch, phone
   - Team S5 that is doing COVID tracking on a map – alerts to use alt. path

Chapter 3: Conceptualizing Interaction Design, Interaction Design (5th ed.) by Sharp, Rogers, Preece

Interaction styles

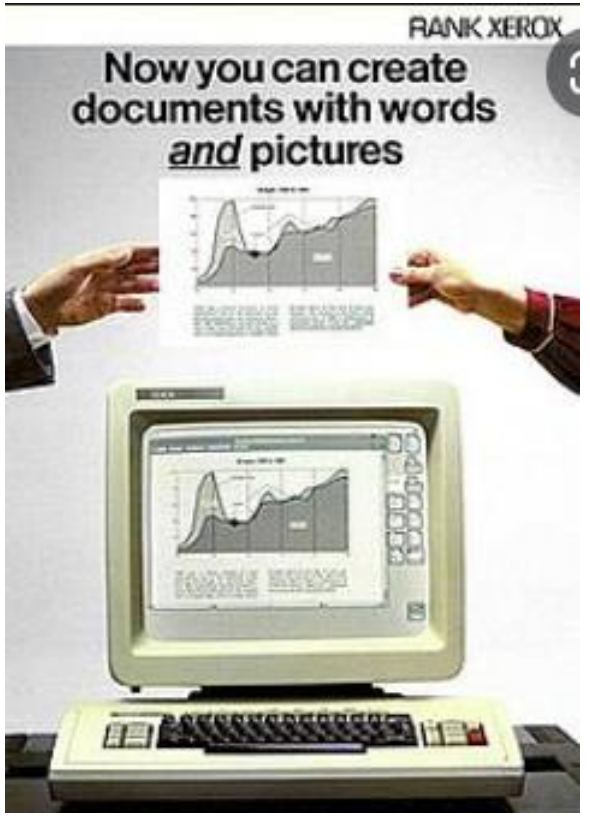
1. CLI
2. GUI
3. Multimedia
   - educational apps - graphics, text, video, sound, animation
4. Virtual Reality
5. Web
6. Mobile
7. Appliance
   - Washing machines, toasters, remotes – buttons, dials, scroll controls
8. Voice
9. Pen
10. Touch

Interaction styles

11. Gesture
12. Haptic
13. Multimodal
    - Touch, sight, sound, speech
14. Shareable
    - Collaborative display e.g. FigJam, smart-board
15. Tangible
16. AR
17. Wearables
18. Robots and drones
    - Pet and social robots
19. Brain-computer interaction
20. Smart devices
    - smart watch, smart phone, smart home

GUI as we know it

- CLI / monochrome monitors
- Xerox Star developed at Palo Alto Research Centre
- First Windows, Icons, Menu, Pointer (WIMP) known as GUI these days.
  - Idea taken by Apple Macintosh 1984



“How Steve Jobs got the ideas of GUI from XEROX”

https://www.youtube.com/watch?v=J33pVRdxWbw

Virtual Reality

https://www.digitalprojection.com/emea/dp-case-studies/satellite-mls-powers-curtin-university-hive/

- CAVE (1992)
- Immersive virtual world, head-tracking

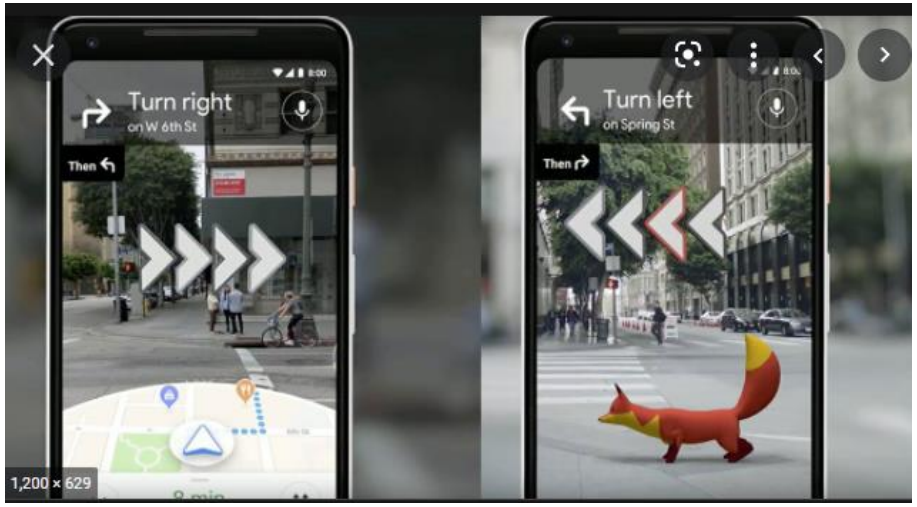
- Research and training
  - Educational tools (mining training, flying simulators)
  - Digital twins
  - Physiotherapy and rehabilitation tools
  - Experiences
  - Fear therapy
  - Empathy
  - Architecture, design
  - Curtin HIVE

- Iterating form factors fast – onboard cameras, no ne
  unteathered
- Barrier to entry – cost
- Quality of experience – sickness, field of view, perception of reality
- Development: Unity/Unreal
- **History of VR**: https://virtualspeech.com/blog/history-of-vr

Augmented Reality

- Phones
  - Pokemon Go
- HUDs
- QR codes
  - information relevant to location in art galleries
- Hololens 1 and 2
  - Expensive
  - Gesture recognition
  - Unbalanced, heavy
  - Small FoV 30 x 30 deg
  - Manufacturing, medical
- ARKit and ARCore

https://edition.cnn.com/2021/01/12/tech/panasonic-augmented-reality-head-up-display/index.html

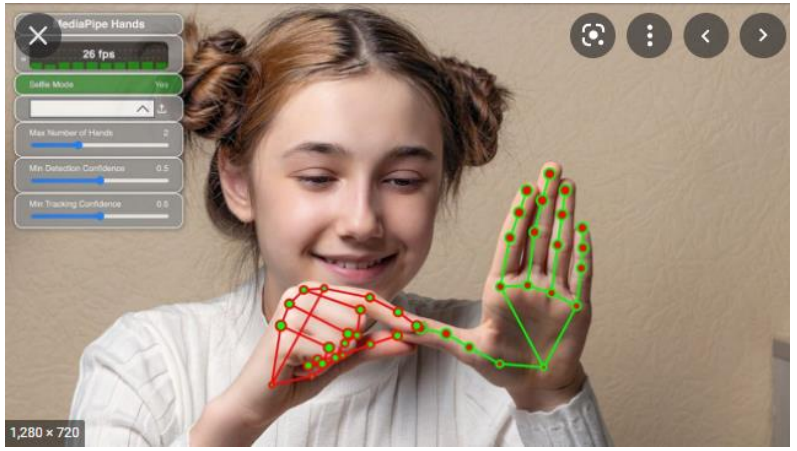


https://viewpointvancouver.ca/2019/03/15/augmented-reality-makes-google-wayfinding-a-walk-in-the-park/

https://www.ft.com/content/ab453fe0-368c-11e9-bd3a-8b2a211d90d5

Pose and Gesture recognition

- Computer vision
- VR – gesture recognition control, MS Kinect
- AR – AR headset watching someone do physio of hand rehab
- Media pipe:
  - https://google.github.io/mediapipe/
  - https://mediapipe.dev/



https://codepen.io/mediapipe/pen/RwGWYJv

- Google Soli radar: https://atap.google.com/soli/
  - No camera
  - Low energy
  - Pixel 4 and Nest Hub
- Non-verbal communication
  - Accessibility
  - Surgical settings - handsfree

https://www.wired.com/story/google-soli-atap-research-2022/

Other

- Voice
  - Assistants (VUI)
  - Speech recognition – speech to text
  - Turn-taking is not realistic
  - Too believable

Worth reading – designing a voice user interface:
https://www.toptal.com/designers/ui/designing-a-vui

Haptic feedback

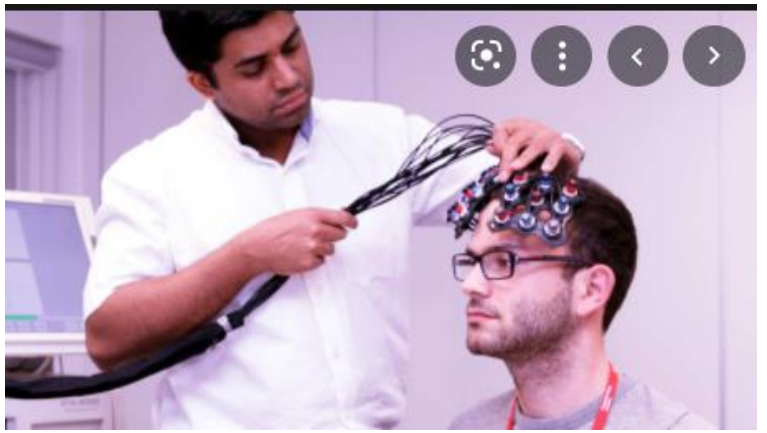
- Smartphone, smartwatch
- Exoskeleton
- Simulated environments
  - steering a boat into jetty

https://relab.ethz.ch/research/current-research-projects/robotic-hand-orthosis-for-therapy-and-assistance-in-activities-of-daily-living.html

Wearables

https://www.theverge.com/2022/1/21/22893133/apple-fitbit-heart-rate-sensor-skin-tone-obesity

- Physiological biofeedback sensors
  - Eye tracker, heart monitor, sleep monitor, skin conductance, O2 monitor
- Smart watches
- IMU – accelerometer
- Brain-computer interface – brainwaves and cursor



http://www.imperial.ac.uk/hamlyn-centre/research/robotics/brain-computer-interface/

Questions

What are the interfaces of the future?

- Radar?
- Computer vision?
- Metaverse?

Now that smart interfaces are context-aware and can monitor people – What are the ethical considerations?

Data?

Virtual crime?

Abuse?

UI/UX for web/mobile apps

Norman Nielsen Group (1998)

- **Norman Nielsen Group** https://www.nngroup.com/
- **Don Norman** – father of UX
  - Coined term UX
  - Professor, researcher in design, usability, cognitive science, user-centric design
  - Apple – “User Experience Architect” in early 90s
  - *“The Design of Everyday Things”*
  - Internet interactions – patents
- **Jakob Nielsen**
  - Creator of usability heuristics

10 Usability Heuristics for User Interface Design (Jakob Nielsen)

1. Visibility of system status
2. Match between the system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather than recall
7. Flexibility and efficiency
8. Aesthetic and minimalistic design
9. Help users recognise, diagnose and recover from errors
10. Help and documentation

https://www.nngroup.com/articles/ten-usability-heuristics/

Workshop 02

1. **Pain points** – **patterns**? Organise into groups (affinity mapping) - converging
2. Define your **problem statement: How might we…..<>**
3. **Ideate solutions and group themes** (affinity mapping)

- **Software engineering methodologies**
  - Choose tools and frameworks
  - Start employing them