# USER INTERFACES

HCI & WEB DESIGN – ROSANNE BIRNEY

# OVERVIEW

- Types of user interfaces
  - highlight the main design and research issues for each of the different interfaces

# TYPES OF USER INTERFACE

- Command-based
- WIMP
- GUI
- Multimedia
- Web
- Mobile
- Touch
- Collaborative
- Information Visualisation
- Augmented reality
- Gesture-based
- Haptic
- Intelligent
- Organic
- Shareable
- Tangible
- Virtual reality
- Voice
- Wearable

# COMMAND-BASED

- Commands such as abbreviations (e.g. ls) typed in at the prompt to which the system responds (e.g. listing current files)
- Some are hard wired at keyboard, others can be assigned to keys
- Efficient, precise, and fast
- Large overhead to learning set of commands

# WIMP

- Xerox Star first WIMP (gave rise to GUIs)

- Windows
  - could be scrolled, stretched, overlapped, opened, closed, and moved around the screen using the mouse
- Icons
  - represented applications, objects, commands, and tools that were opened when clicked on
- Menus
  - offering lists of options that could be scrolled through and selected
- Pointing device
  - a mouse controlling the cursor as a point of entry to the windows, menus, and icons on the screen

# GUIS (GRAPHICAL USER INTERFACES)

- Same basic building blocks as WIMPs but more varied
  - Color, 3D, sound, animation,
  - Many types of menus, icons, windows
- New graphical elements, e.g.
  - toolbars, docks, rollovers

# MULTIMEDIA

- Combines different media within a single interface with various forms of interactivity
  - graphics, text, video, sound, and animations
- Users click on links in an image or text
  - another part of the program
  - an animation or a video clip is played
  - can return to where they were or move on to another place
- E.g. Encarta

# WEB

- Early websites were largely text-based, providing hyperlinks
- Concern was with how best to structure information at the interface to enable users to navigate and access it easily and quickly
- Nowadays, more emphasis on making pages distinctive, striking, and pleasurable

- Original and innovative web layouts:
- http://www.smashingmagazine.com/2013/08/innovative-appraoches-web-layout/

# MOBILE

- Handheld devices intended to be used while on the move
- Have become pervasive, increasingly used in all aspects of everyday and working life
- Applications running on handhelds have greatly expanded, e.g.
  - used in restaurants to take orders
  - car rentals to check in car returns
  - supermarkets for checking stock
  - in the streets for multi-user gaming
  - in education to support life-long learning

# RESEARCH AND DESIGN ISSUES

- Mobile interfaces can be tricky and cumbersome to use for those with poor manual dexterity
- Key concern is designing for small screen real estate and limited control space
    - e.g. mobile browsers allow users to view and navigate the internet, magazines etc., in a more streamlined way compared with PC web browsers

# TOUCH

- Touch screens, such as walk-up kiosks, detect the presence and location of a person's touch on the display
- Multi-touch support a range of more dynamic finger tip actions, e.g. swiping, flicking, pinching, pushing and tapping
- Now used for many kinds of displays, such as Smartphones, iPods, tablets and tabletops

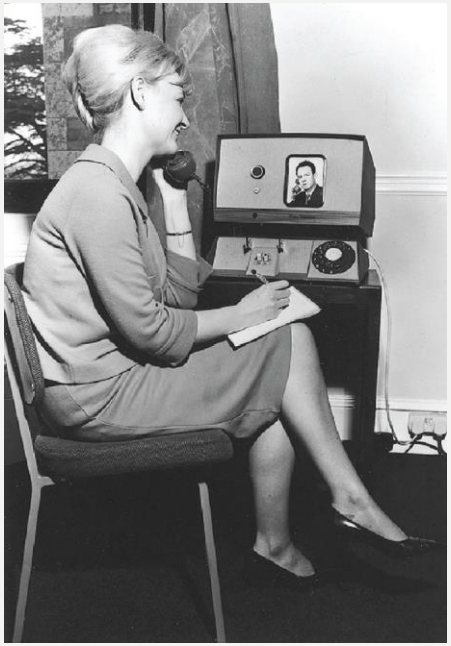
# RESEARCH AND DESIGN ISSUES

- More fluid and direct styles of interaction involving freehand and pen-based gestures
- Core design concerns include whether size, orientation, and shape of touch displays effect collaboration
  - Much faster to scroll through wheels, carousels and bars of thumbnail images or lists of options by finger flicking
  - More cumbersome, error-prone and slower to type using a virtual keyboard on a touch display than using a physical keyboard

# COLLABORATIVE

- Much research on how to support conversations when people are 'at a distance' from each other
- Many applications have been developed
  - e.g., email, videoconferencing, videophones, videoconferencing, instant messaging, chatrooms
- Do they mimic or move beyond existing ways of conversing?

# EARLY VIDEOPHONE AND VISUALPHONE



# TELEPRESENCE

- New technologies designed to allow a person to feel as if they were present in the other location
  - projecting their body movements, actions, voice and facial expressions to the other location or person
  - e.g. superimpose images of the other person on a workspace

# A TELEPRESENCE ROOM

# INFORMATION VISUALIZATION

- Computer-generated interactive graphics of complex data
- Amplify human cognition, enabling users to see patterns, trends, and anomalies in the visualization (Card *et al,* 1999)
- Aim is to enhance discovery, decision-making, and explanation of phenomena
- Techniques include:
  - 3D interactive maps that can be zoomed in and out of and which present data via webs, trees, clusters, scatterplot diagrams, and interconnected nodes

- http://www.gapminder.org/world/

# RESEARCH AND DESIGN ISSUES

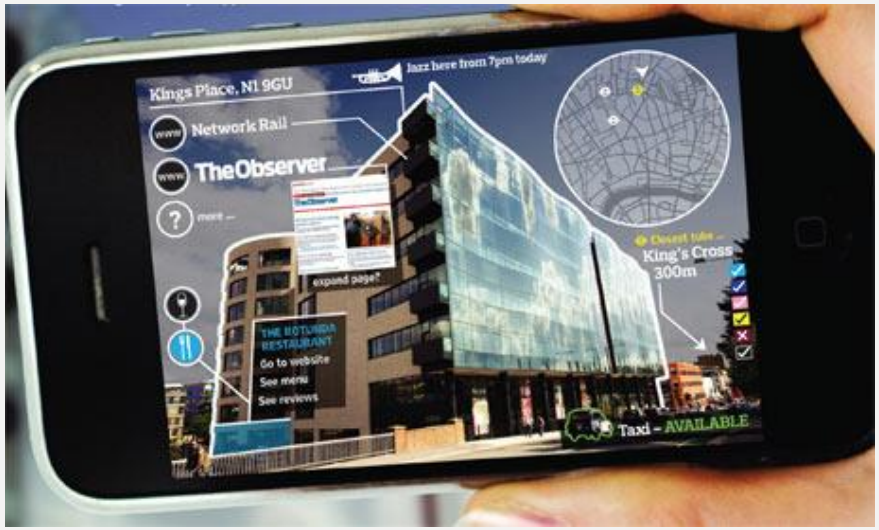
- whether to use animation and/or interactivity
- what form of coding to use, e.g. color or text labels
- whether to use a 2D or 3D representational format
- what forms of navigation, e.g. zooming or panning,
- what kinds and how much additional information to provide, e.g. rollovers or tables of text
- What navigational metaphor to use

# ASSIGNMENT TOPICS

1. Augmented reality
2. Gesture-based
3. Haptic
4. Intelligent
5. Organic
6. Shareable
7. Tangible
8. Virtual reality
9. Voice
10. Wearable

# AUGMENTED REALITY

- **Augmented reality** (AR) is a live direct or indirect view of a physical, real-world environment whose elements are "**augmented**" by computer-generated or extracted real-world sensory input such as sound, video, graphics or GPS data.



# GESTURE-BASED

- Uses camera recognition, sensor and computer vision techniques
  - can recognize people's body, arm and hand gestures in a room
  - systems include Kinect and EyeToy

# HAPTIC

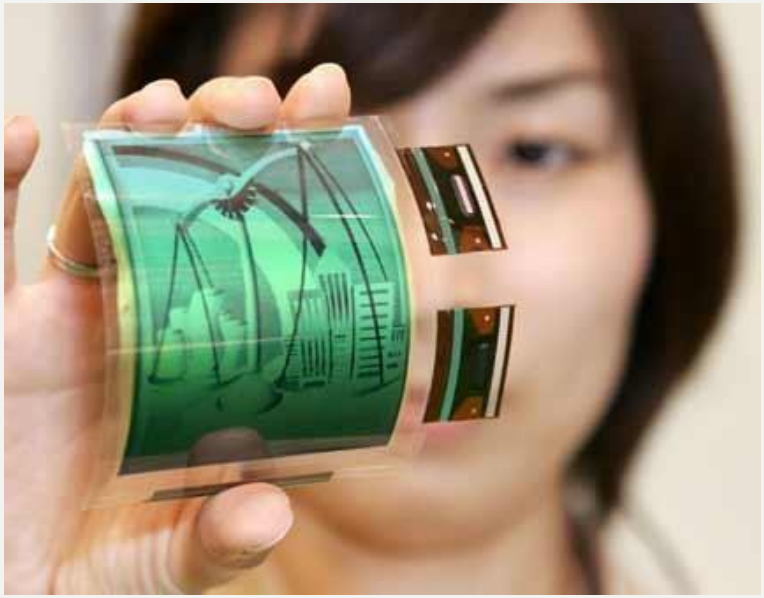
- Tactile feedback
  - applying vibration and forces to a person's body, using actuators that are embedded in their clothing or a device they are carrying, such as a cell phone
- Can enrich user experience or nudge them to correct error

# INTELLIGENT

- An **intelligent user interface** (Intelligent UI, IUI, or sometimes Interface Agent) is a user interface (UI) that involves some aspect of artificial intelligence (AI or computational intelligence).
- Examples include Alexa, Siri and Cortana.

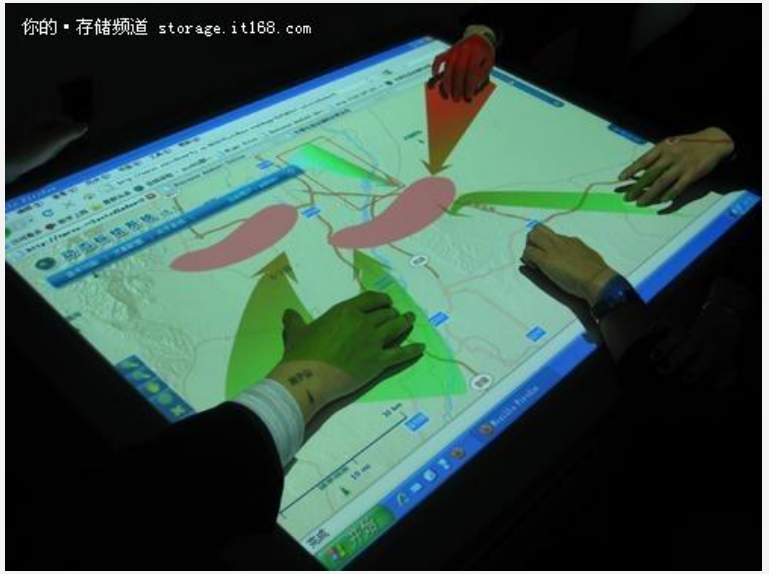
# ORGANIC

- In human–computer interaction, an **organic user interface** (**OUI**) is defined as a user interface with a non-flat display.
- OUI displays are multi-shaped and flexible.



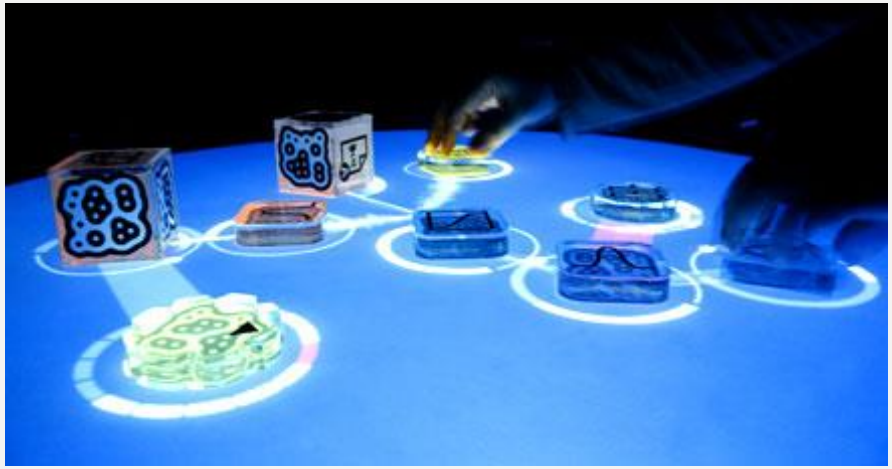
# SHAREABLE

- Shareable interfaces are designed for more than one person to use
  - provide multiple inputs and sometimes allow simultaneous input by co-located groups
  - e.g. DiamondTouch, Smart Table and Surface



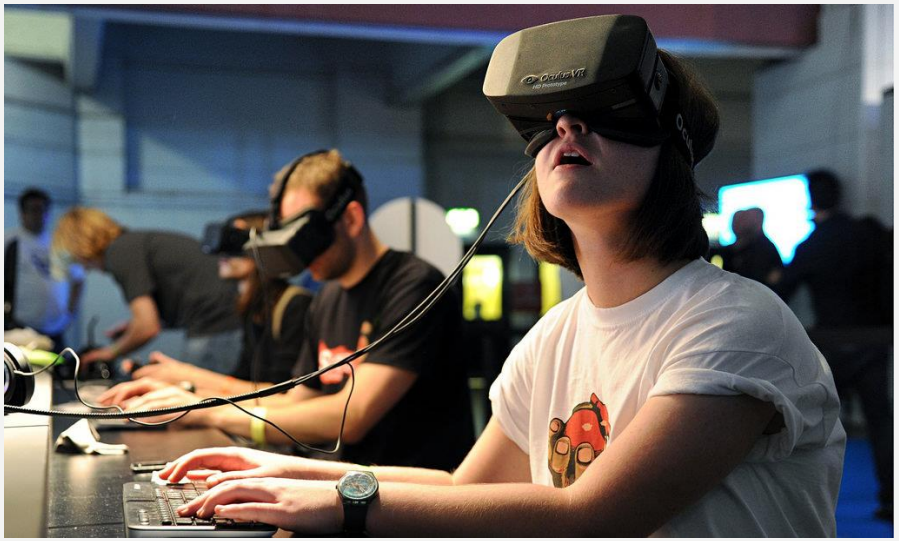
# TANGIBLE

- Type of sensor-based interaction, where physical objects, e.g., bricks, are coupled with digital representations
- When a person manipulates the physical object/s it causes a digital effect to occur, e.g. an animation
- Digital effects can take place in a number of media and places or can be embedded in the physical object



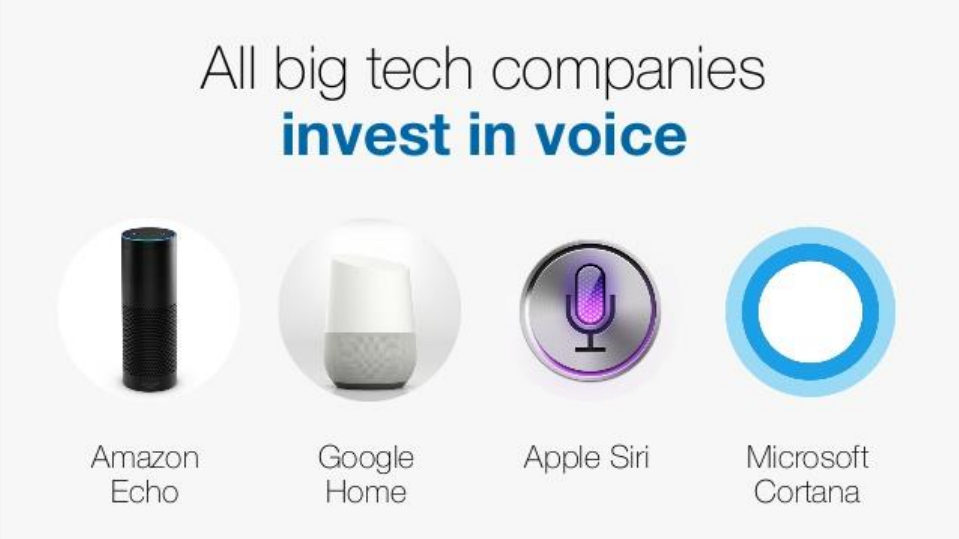
# VIRTUAL REALITY

- Computer-generated graphical simulations providing:
  - "the illusion of participation in a synthetic environment rather than external observation of such an environment" (Gigante, 1993)
- provide new kinds of experience, enabling users to interact with objects and navigate in 3D space
- Create highly engaging user experiences



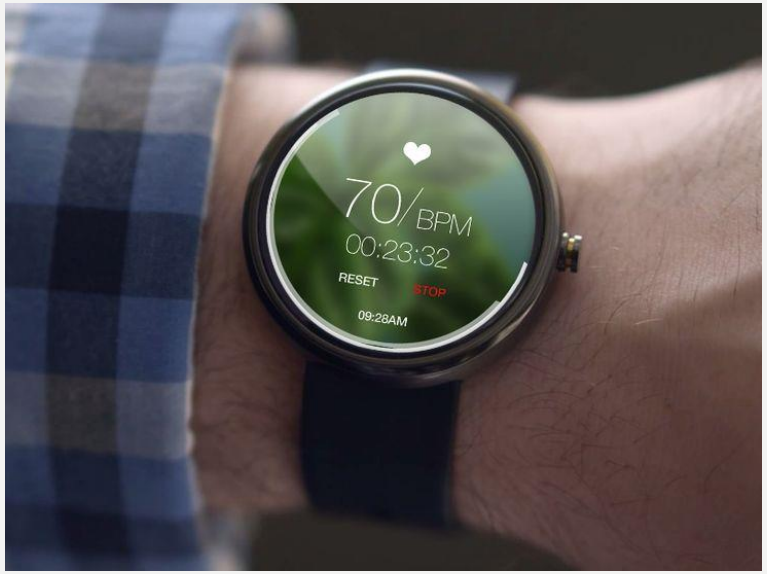
# VOICE

- Where a person talks with a system that has a spoken language application, e.g., timetable, travel planner
- Also used by people with disabilities
  - e.g. speech recognition word processors, page scanners, web readers, home control systems



# WEARABLE

- First developments were head- and eyewear-mounted cameras that enabled user to record what was seen and to access digital information
- Since, jewellery, head-mounted caps, smart fabrics, glasses, shoes, and jackets have all been used
  - provide the user with a means of interacting with digital information while on the move



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*For the assignment, consider:*

- *Applications*
- *Design considerations*
- *Benefits*
- *Challenges*