

Design for Interaction

“Non-Standard” Interactive Systems

Contents

- Modes of interaction
- Physical interfaces
- Location-based and multi-user interaction

Modes of Interaction

- interaction can be categorised according to **mode**
- Examples:
 - Keyboard / keypad and GUI – PC, traditional game controller, TV remote (in fact, much of what we have looked at thus far)
 - Touch-sensitive screen – smartphones / tablets
 - Audio-based (eg. voice recognition)
 - Motion-sensitive device

Multimodal Interactivity

- Interactive experiences can be multimodal
 - Input and/or output takes place through more than one mode or channel
- Examples:
 - Multimedia apps may have multimodal output
 - Automated call handling systems can use multimodal input (voice plus key presses)
 - Video games may often involve multimodal input (keys or buttons plus motion) and output

Multimodal Input

- Multimodal interfaces offer a range of challenges
 - How to capture the different input modes
 - How to convert a particular form of input into meaningful action in the system
 - How to prioritise the different input modes
- Why use them?
 - Can offer deeper, more immersive experiences
 - Can be more intuitive to use

Handling Modes of Input

- With a standard GUI, it is usually obvious what a specific user action implies
 - Key presses will either imply data input (eg. word processing) or specified commands (keyboard shortcuts)
 - Similarly, a mouse click will have a clear meaning in a given context
- Because other interface modes are newer, such conventions may not yet exist

Physical Input Mechanisms

- A whole range of input modes can be categorised as physical
 - Typically, these modes are intended to provide naturalistic interfaces
 - Attempt to simulate realistic user actions
- Examples:
 - Touch screen technologies
 - Motion control
 - “Virtual reality”

Touch Screen Technology

- Allows pointing and selecting onscreen objects to be physically easy and intuitive
 - Eliminates need for mouse, touchpad, etc.
 - Also allows for multitouch interactions
 - Various technologies (resistive, capacitive, infrared,...)
- Most prevalent in smartphones / tablets
- Also important for industrial processes, galleries and other public displays

Motion Control

- An even greater level of physicality is offered by motion control
- Typically requires an attachment with sensors which track user movement
- Useful for applications requiring high levels of precision
 - Telemedicine
- Precursor to virtual reality technology

Example: “Wiimote”

- Senses movement and rotation in 3D
 - six degrees of freedom
- Allows users to mimic game activities (golf swing, shooting,...)
- Provides audio and vibratory (“rumble”) feedback



Other Physical Interfaces

- Many games now have specialised physical controllers
 - Guitars, dance mats,...
- More traditionally, many arcade games have incorporated such interface elements
- Other applications have a more serious aim, such as flight simulators and other job-specific training tools

Kinect

- Microsoft's Kinect system is a combination of hardware and software technologies
 - 3D scanning system using an infrared laser
 - gesture and face recognition software
 - no controller needed (the body is “controller”)
- Designed primarily as a gaming platform
- Many other applications are possible as technology develops

Kinect Hardware



Oculus Rift

- First viable “virtual reality” platform aimed at consumers
- Headset connects to PC/games console
 - 3D view responds as the user moves head
 - Enables highly immersive experiences
- Targeted initially at hardcore game players
- Challenge is to give such technology mainstream appeal

Interactivity in a Wider Context

- So far we have largely looked at the user and the interactive system in isolation
- Other factors may be relevant:
 - Location in the real world
 - Other people (especially other users)
- These lead to new categories of system:
 - Location-based interactive services
 - Systems monitoring people / their environment
 - Multi-user interactive systems

Location-Based Interactivity

- For obvious reasons, this class of interaction is associated with mobile technologies, most commonly smartphones
- Information can be provided based on user's location
 - Tracked by service provider or onboard GPS
- Alternative option is short-range communication via Bluetooth

Location-Based Services

- Many possible varieties:
 - Information – nearby shops or restaurants, transport services,...
 - Travel directions
 - Advertising of local shops and services
 - Tourist information
 - Location-based games
 - “Augmented reality” apps

Augmented Reality

- Allows integration of virtual and real data within a specific location
 - Usually enabled via a smartphone or tablet
- For example, placing of graphical overlays onto footage of a built environment
 - Consumer applications range from advertising and tourist information to gaming
 - More advanced systems are used in industry and by the military (eg. pilot HUDs)

Google Glass

- Touted as a step towards “wearable computing” devices
- Many issues affecting demand:
 - No obvious application
 - Expensive
 - Privacy issues
- Real power is in the underlying system that connects users and data to locations

Wearable Devices

- Smart watches are most obvious example
 - Tend to face similar issues to Google Glass
 - Also struggle to do things a smartphone can't
- Most successful market appears to be in the health monitoring sector
 - Options range from fitness trackers to measurement of key medical indicators
 - One of the few areas where use of intrusive technologies is clearly justifiable

Multi-User Interactive Systems

- Again, a wide array of technologies and applications exist:
 - Internet / Web-based (YouTube, Facebook, messaging networks,...)
 - Online gaming
- Multi-user interactions entail increased complexity and overheads
 - Where is information processed and stored?
 - Synchronisation of data