

Introduction

- Interactive systems - most systems interact with users in some way, be it mouse input, typing, or viewing output on a monitor
 - Includes indirect interaction e.g. smart building lights turn on when you enter a room
- **Human Computer Interaction (HCI):** concerned with:
 - Design, evaluation and implementation of interactive systems and phenomena surrounding them
- **Goal:**
 - **Useful**(functional), **Usable**(intuitive), **Used**(attractive/engaging)
 - **Computer System ergonomics basically**
- **Incorporates:**
 - Psychology, Engineering, Social Sciences, all of computer science, and design theory
- **Usability**
 - If a user can't use it, it is broken - "broken by design", high chance of human error
 - To the average user, the interface is the system - must be designed with the capabilities/limitations of the user in mind
 - **Bad experiences:** don't know what to do/how to do, not possible, work loss, repeated errors, steep learning curve, frustrating
 - **Interaction Design**
 - Account for: **who, what, where**
 - Optimize interactions - "support the way people communicate and interact in their everyday and working lives"
 - **Goals:**
 - Effective, efficient, safe, good utility, easy to learn, memorable
- **Factors affecting design**
 - **Human Factors:** physical (motor skills, sight, hearing), cognitive capabilities (memory, attention span), Social/cultural differences
 - **Environmental:** Lighting, ambient noise, conditions (e.g. time pressure)
- **Users**
 - In early days - easy: users were all programmers, conducting similar tasks
 - In the modern era - more difficult: different roles, tasks, education, usage rates
 - **Understand their needs:**
 - Account for strengths/weaknesses, consider what might help people currently, listen to what people want, use established methods
 - **Fitts' List (1951)**
 - **Humans > Machines @:**
 - Detecting small amounts of visual/acoustic energy, perceiving patterns of light/sound, improvising, storing information long term and accessing relevant info, inductive reasoning, judgement
 - **Machines > Humans @:**

- Responding to signals, controlled output, repetition, brief info retention and deletion, deductive reasoning, complex tasks
- **That was 1951** - now we know they aren't comparable, but complementary
- **Sheridan's levels of automation**
 - 1. Human takes all decision and action
 - 2. Computer offers a complete set of decision/action alternatives
 - 3. Computer narrows the selection down to a few
 - 4. Computer suggests one alternative
 - 5. Computer executes the suggestion if the human approves
 - 6. Computer offers human time to veto before auto-execution
 - 7. Computer executes automatically and informs human
 - 8. Computer informs human only if asked
 - 9. Computer informs human only if the computer decides to
 - 10. Computer is fully autonomous - ignores the human
- **Problems with automation**
 - Increased probability of system error, less skilled operators for low-level tasks
 - Operators become bored or complacent - lose situation awareness
 - Automation increases operator workload - understanding of automation, and system
- **Interaction as dialogue**
 - Human System Interaction regularly takes the form of dialogue
 - Messages between user and system can be: control, data
 - On the system side: prompt, data, status, error, help
- **Users are goal oriented**
 - Want to solve a specific problem/accomplish a task/feedback from the interface must address this
 - **Tasks are complex** - rarely do they solely relate to computer - decomposed into sub-tasks e.g. to produce a letter , must format address
- **Principles of UI design:**
 - Support the user's tasks, know the user, be consistent, offer clear feedback, allow for easy rollback, speak their language, reduce the load on the user
- **Measures of success:**
 - What are measurable factors:
 - Ease of learning (amount of time and training), Productivity metrics, Error rates (detection, and recovery), Satisfaction (hard to measure - interviews, questionnaires)
 - **Fiscal measures?** Increased market share, reduced number of modifications, reduced need for customer support