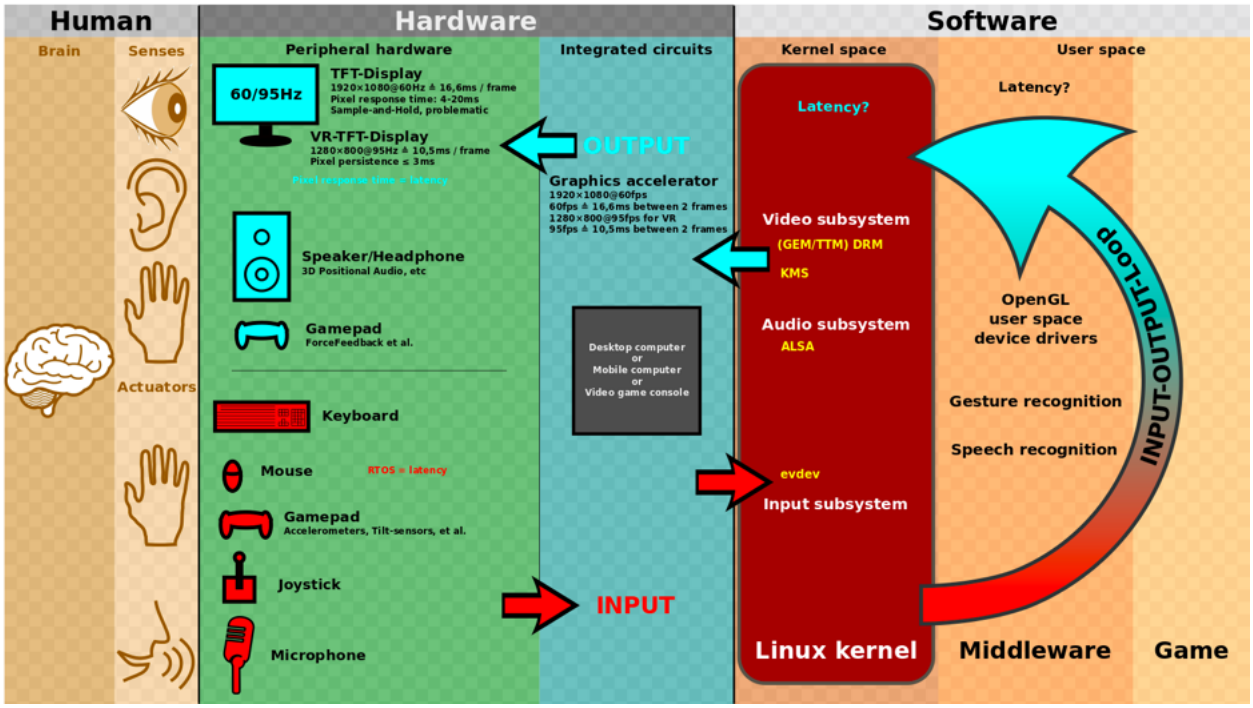
Human Computer Interaction

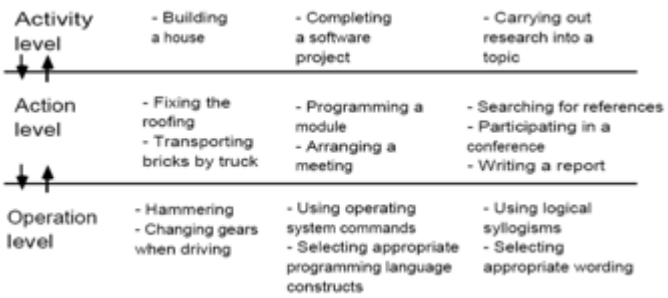


Definitions:

- Effects the individual:
  - Subject – the person interacting with the computer
  - Tool – the mediating device by which the action is executed
  - Object – the intended activity
- Effects the community:
  - Rules – sets of conditions that help to determine how and why individuals may act. The result of social conditioning.
  - Division of labor – provides for the distribution of actions and operations among a community of workers

The activity is musical instrument classification.

- The first of the actions is recording a sound clip.
  - The operation for this needs to be identified
    - What are the conditions? Buttons?
- The second of the actions is reading the results of the classification
  - The operation for this needs to be identified
    - What are the conditions? LCD?
- The person is motivated through the need to clear up confusion about a sound clip.



The appropriate user should be a person who would like to identify a musical instrument based on a sound clip.

How would a person interact with this device?

- They would need to record the sound clip that is to be classified
  - How do they tell the computer that they want to start the recording?
  - How do they tell the computer that they want to end the recording?
- They would need to look at the LCD to get the results of the classification
  - How would the computer display the results of the classification?
  - How long will the message last on the screen?

Lights to indicate powering on.

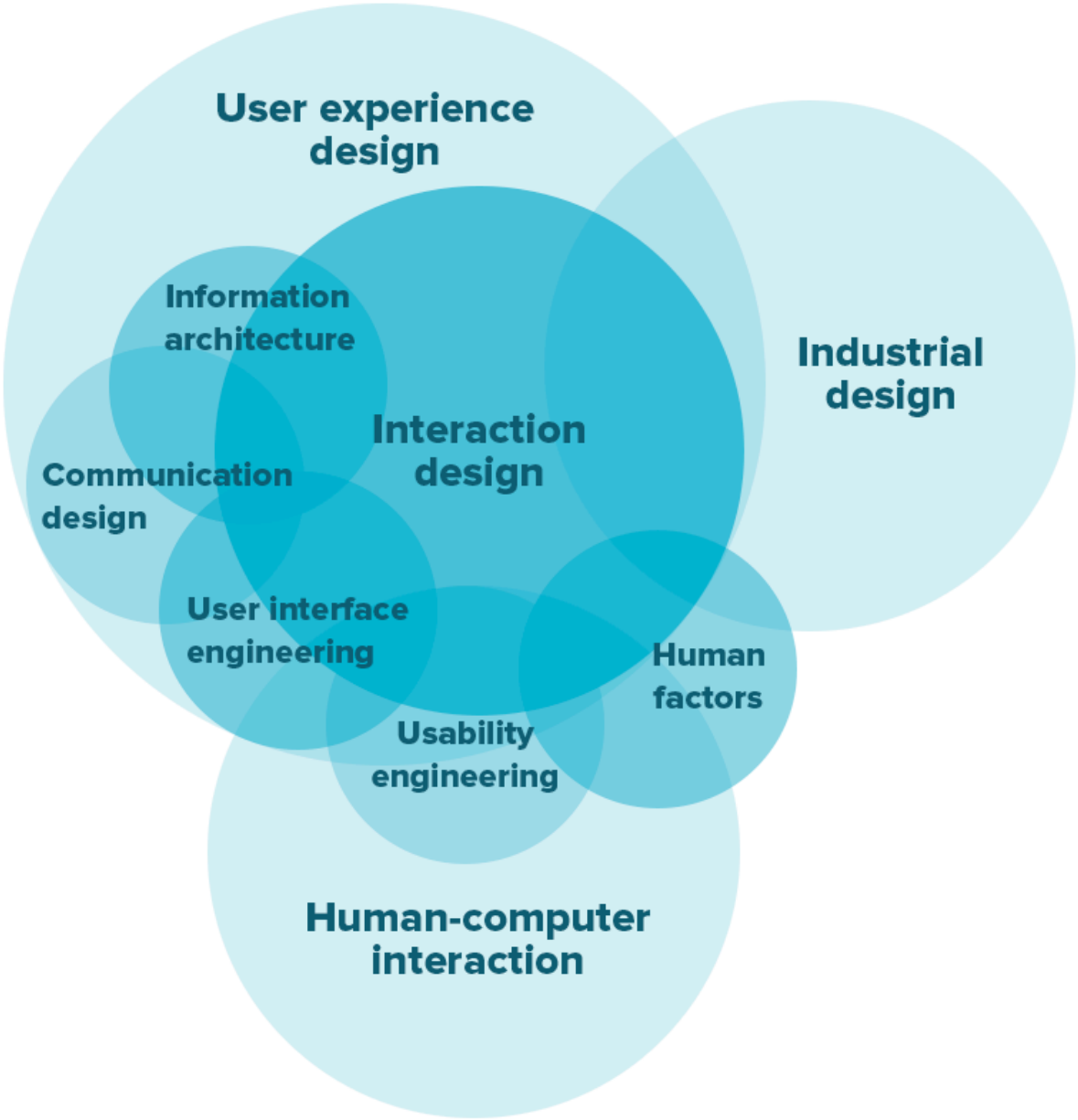
LCD test sequence to indicate powering on. (red to green)

- Indicates that all the components are working
- Prompts the user to interact with the other components
- Press button once to start, press again to stop

Button -> Record Sound Clip Function

- Audio Subsystem
  - Recording music
    - Consider a safe amount of memory
      - Circular linked list style buffer
      - Make sure the file saved correctly
    - Consider time length of recording (hard upper limit)
      - File name has a time stamp
      - Memory limitations
  - Saving to file
  - Processing Sound Clip
  - Predicting Musical instrument
  - Results
- Power Subsystem
  - Execute the test script at startup
  - Shutdown after a specific amount of time (while loop)
- Display Subsystem

- Notification that all components
- If LCD is not working, LCD blinks three times and then the BBB shutdown.
- Error message displayed to LCD if unable to do predictions
- Error message displayed to LCD if the file size is too big
- Debug menu



Fitts' Law - Shorten the distance between actions and place common elements in the same area. This would apply to our LCD, Button(s), and SMD-RGB.

Hick's Law - simple solutions bring more satisfaction. This applies to our menu choices. Don't overburden the user with too many options. Record and Predict is all we might need.

Tesler's Law - "Every application must have an inherent amount of irreducible complexity. The only question is who will have to deal with it.". This is basically meaning that our device should offload the difficulty of predicting what type of instrument the sound came from. It should remove the user from having to take on the complex task of determining exactly what instrument a sound is.

5 Dimensions of Interactive Design

- Words - What words should we use so our end users can understand them?
    - The Case's button labels should be simple and easy to read.
    - The LCD should display simple messages which effectively communicate appropriate information to the user.
- Visual Representation - not applicable (typography, icons, imagery, etc)
- Physical Objects or Space - What will users have to do with their keyboards, mice, and touchpads to effectively interact with our product?
    - How does the user interact with the device? Buttons?
    - Within what space does the user do so? In a quiet place?
- Time - How much time will the user need to spend with the product? Can users track the previous recorded predictions? Are they able to save their recording to be predicted at a later time?
- Behavior - How does the user operate the product? How do they react to the product?

Example Questions:

What can a user do with their mouse, finger, or stylus to directly interact with the interface? This helps us define the possible user interactions with the product.

- The user can read prompts on the LCD and respond by pressing a button.
- This means we need like 3 buttons: Up Down Enter

What about the appearance (colour, shape, size, etc.) gives the user a clue about how it may function? This helps us give users clues about what behaviours are possible.

- We could signify an action using the SMG-RGB led:
    - Recording audio could flash green
    - End Recording Audio could flash red

Do error messages provide a way for the user to correct the problem or explain why the error occurred? This lets us anticipate and mitigate errors.

- If the Record Audio failed for some reason, are they able to start the recording over?
- If the Record Audio was never ended, will it stop on its own?
- If the MFCC results in NAN values how will you mitigate the errors?
- If the Prediction is bad or not possible for some reason, how will you recover?

What feedback does a user get once an action is performed? This allows us to ensure that the system provides feedback in a reasonable time after user actions.

- Success message or Failure message

Are the interface elements a reasonable size to interact with? Questions like this helps us think strategically about each element used in the product.

- Standard buttons presumably

Are familiar or standard formats used? Standard elements and formats are used to simplify and enhance the learnability of a product.

- yes

Single Button that works with the Record Function. Start / Stop recording

Multiple predictions per recording - display the percentage of each predictions