**User profile**

**User Characteristics**
- The problem space consists of visually impaired individuals from late teenage years to early seniors.
- Visually impaired users are those with both low vision and no vision at all.
- Characteristics of this particular target group include:
  - users actively interact with their environment
  - willingness to adapt new technology or system
  - need for independence with daily activities and tasks

Despite these similar characteristics, other characteristics like cognition, perception, mental model of the world, and reason for impairment, age, and gender differ widely. These factors can be classified based on the nature and reason for impairment, age, and gender.

**Scenario - Tasks**

The user walks to gym carrying a walking stick and backpack with a change of clothes, mobile phone, water and towel.

The gym instructor takes the user to the nearest available treadmill for warm-up.

After workout he asks the information desk for the bus route to the nearest supermarket. He goes to bus stand, takes a bus to the supermarket, buys necessary food, and walks to gym carrying a walk-towel.

After the microwave dings, the user puts food into a microwavable bowl and cooks it.

**Design Challenges**

- Consistent interaction for all the scenarios
- Provide seamless transition between target devices
- Integrate with users through visually-driven system
- Use a touch-based system without touch-based feedback
- Allow use of the complex features of a device with a relatively inaccessible interface
- Modality selection provide multiple options for input and output on a relatively small device

**Design Alternative 1 - UbiKane**

**Description**

Hand-held device optionally attached to the handle of the straight walking cane for the blind. Users interact with electronic devices via wireless. Tapping the device on the cane allows users to switch target devices. Users input commands via a d-pad on the top, gesture recognition (mapped to certain functions), or chord key input. Output is from a speaker, 12-character braille display, or slide out large-print display.

**Features**
- Fits over the handle of the cane
- Wireless connectivity
- D-pad navigation
- Gesture recognition
- Chord key input
- Vibration reminder and notification
- 12-character braille display
- LPV version with large-print display
- Audio output

**Design Alternative 2 - Feel it!**

**Description**

Wearable device for the wrist or hand, depending on context of use and user comfort. User scans the area which he wants to "read" using the camera in his palm and the device converts text in that area to braille or enlarges it on the opposite side of the device. It also provides auditory feedback depending on user preference. It acts as a converter, translating the user environment into a more easily accessible format.

**Features**
- Flexible material fits wrist or hand
- One-handed chord key input
- Two column large braille display
- LPV version has large print
- Speaker for audio output

**Design Alternative 3 - IntelliPad**

**Description**

Consists of a scanning pad and a hand-held device with braille or large-text display and speaker. Hand-held is for system navigation and queries. User places pad on a surface they wish to use and the surface is scanned. User moves fingers over the pad and the hand-held displays output corresponding to the contact area. Optionally, the area on the pad corresponding to a button will rise up.

**Features**
- Optical character recognition
- Image recognition
- Multiple input/output modes
- Wireless connectivity
- Chord key input
- Braille display
- LPV version with large-print display
- Audio output

**Goal**

The goal of our project is to ease life for visually impaired individuals by enhancing product and service usability. The system would help individuals make efficient use of products and services like microwaves, vending machines, ATMs, and other electronic devices. We intend to build a system to facilitate the process of selecting, locating, and using various devices. The visually impaired would perform tasks they were formerly unable to, or had difficulty accomplishing.

**Accessibility**

Accessibility is the measure of system usability across the entire user base. It is the "ease of access" of functionality and intended benefit of a system, entity or product.

**Adaptive Systems**

Adaptive systems are able to adapt their behavior according to changes in the environment or parts of the system itself.

**Visual Impairment**

A type of disability with significant limitation of visual capability that cannot be corrected by conventional means, including refractive correction, medication, or surgery.

**Assistive Technology**

For assistance, adaptation, rehabilitation and also the process used in selecting, locating and using these devices.

**Adaptive Accessible System for the Visually Impaired**

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