AASVI
Adaptive Accessible System for the Visually Impaired

Problem Statement
The main objective of our project is to enhance the accessibility of various products for users with impaired vision. The developed system would help the users make efficient use of different products/appliances like Microwave, TV, ATM, Vending Machine and various electronic devices. We intend to build an assistive system which will enhance the accessibility of using various devices.

Our aim is to take the ‘Dis’Out of ‘Disabilities’ for visually impaired users, thus, to achieve equitable access to technologies for our target user group.

User Profile
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

Requirements
Functional
- Flexible, Consistent, Seamless, tactile and audio Input/Output, simple, customizable, direct access assistance
- Non Functional
- Affordable, Practical, Safe, Independence, Non Hindrance, Socially Acceptable, Level of Technology

Usability
- Simple and Natural Interaction, Interoperability, Customizability, Learnability

Design Alternatives
- UbiKane
- Feel it!
- IntelliPad

Final Design
Major problem that users face while interacting with devices around them is reading through the Interfaces provided. Usually they are either buttons or touch screen interfaces. So in this design we are trying to come up with a solution which can read the things through optical image recognition by embedding camera onto a hand worn device.

Our solution is a 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 his hand 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.

Scenario
This is an optional step, user trying to input the information he wants to search
Band gets activated when user is in close proximity with the device
When Feel it scans the device and gives user a voice feedback of whatever it is scanning

Prototype
Features:
- Flexible material to fit both wrist or hand, two row braille display, LFV (low functional vision) version provides large text, small speaker for audio output, speech based search input using microphone, camera for scanning the control panel display, optical character recognition for extracting the text from camera feed. Text to Speech conversion, Start/Stop button plus proximity sensor to activate the device when started by the user and when it is near to the surface.

Strengths:
- User independence without changing the environment or external help, multiple output methods; easy to carry and use, maps with the current mental model of reading an interface, consistent usage for all the devices

Evaluation - User Walkthrough/Qualitative Feedback
Negatives
1) Feather touch buttons are accidentally clicked while scanning with the device without the knowledge of user.
2) Assistance is required in using 1st time in wearing the device so that camera is always on the palm side
3) User still needs initial orientation to locate the control panel on the device
4) If the panel is exactly vertical and not inclined then using the device leads to strain in the wrists.
5) Requires training for initial usage to get a know-how of all the features and to be able to effectively use them

Positives
1) Users found the device a novel concept and were enthusiastic of using it
2) Learnability is high as observed in the iterative interaction which took less time, user required little assistance and less number of errors occurred
3) Device maps with the natural way the user group interacts with control panel but some suggestions include embedding this device on the index finger or a mobile phone.
4) Users find it cost effective provided the cost vs features that this device offers.