

PROJECT STORYTELLER

OCR Reader for Visually Impaired

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Concept

- Went to visit my relative. She had adopted a guide dog. I realized guide dogs are awesome, BUT they can't read
- Phones are good at processing and they take good images too
- Even in today's digital world most content is on paper
- Visually impaired people don't have access to this content

Research in the area

- No real literature in the field
- So instead we will analyse real world technology
- NFB (National foundation for the Blind) has done some work in this field
- First device (Optacon) developed at Stanford in 1972



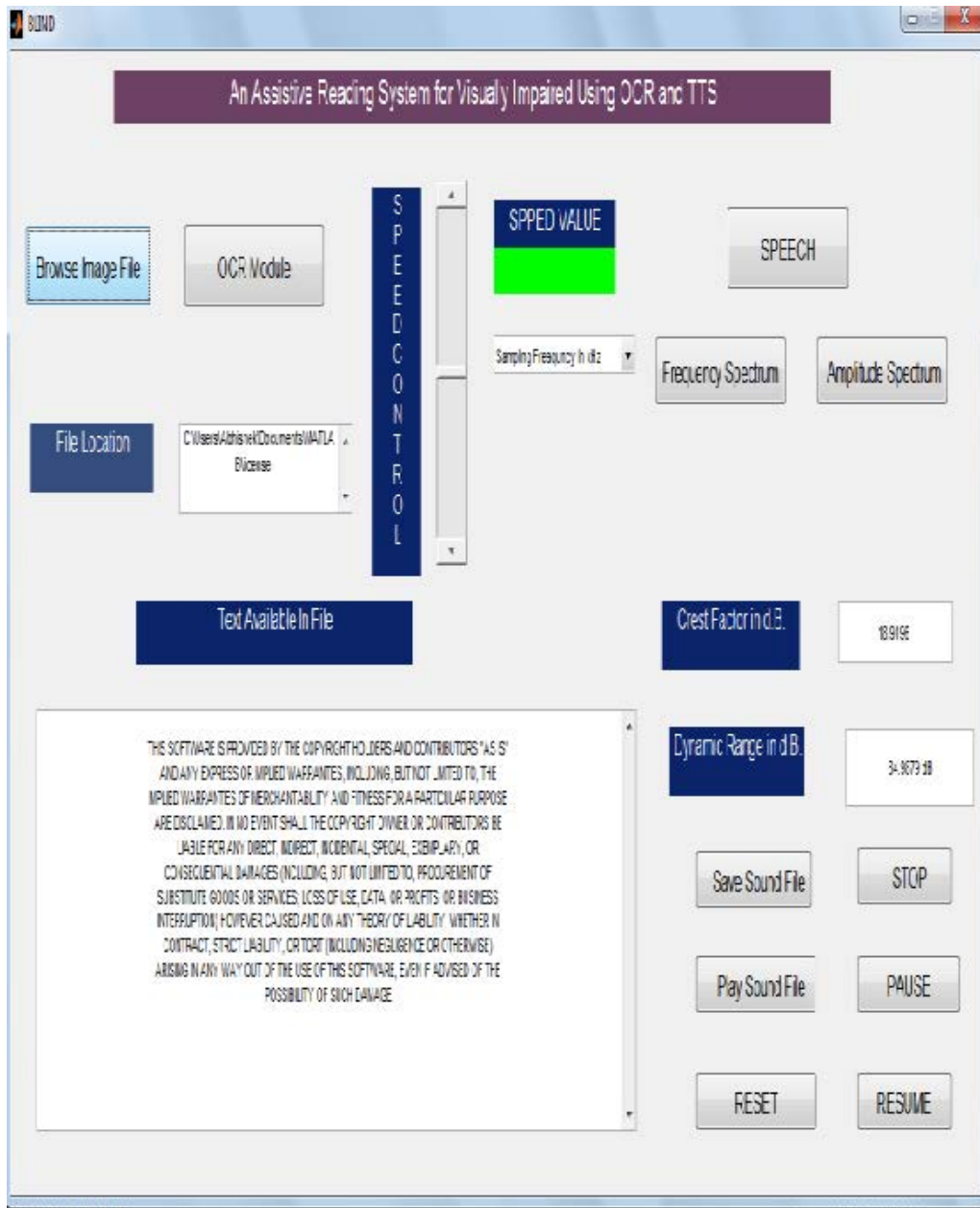
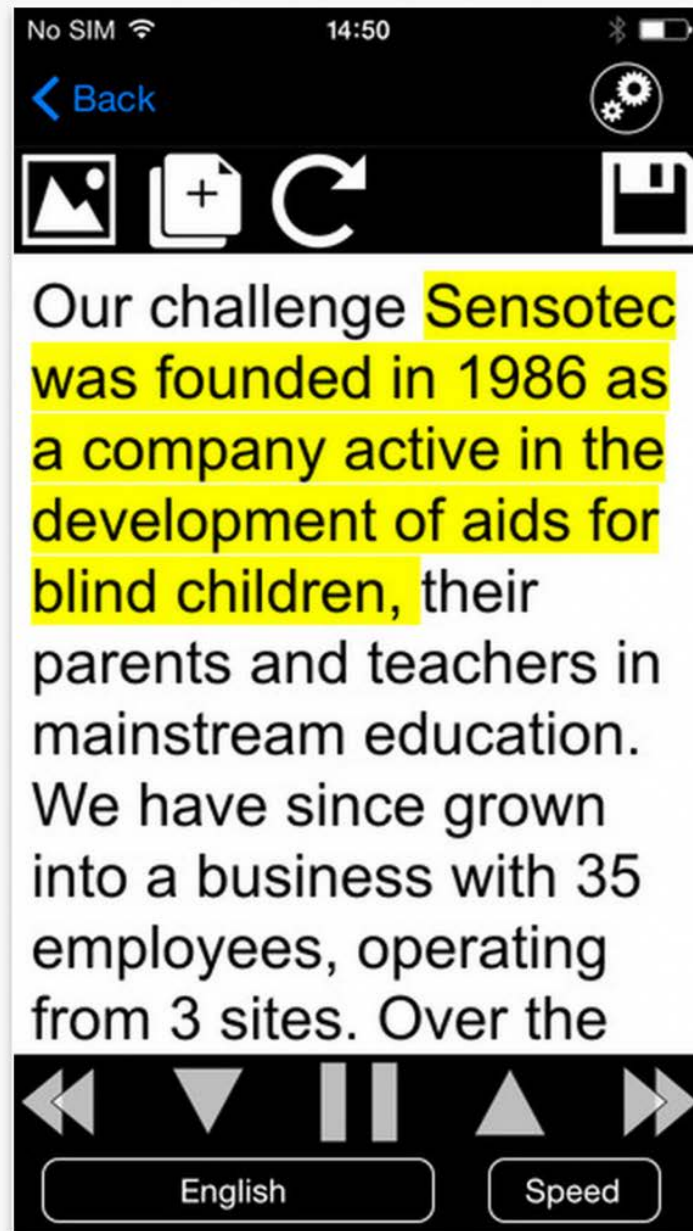


Figure: Desktop Interface

Problems with Desktop Interfaces

- Tedious for continuous use
- Not portable
- Too many possible errors in interactions
- Since mobiles are widely used we will not concentrate on a desktop application



Problems with Mobile Interfaces

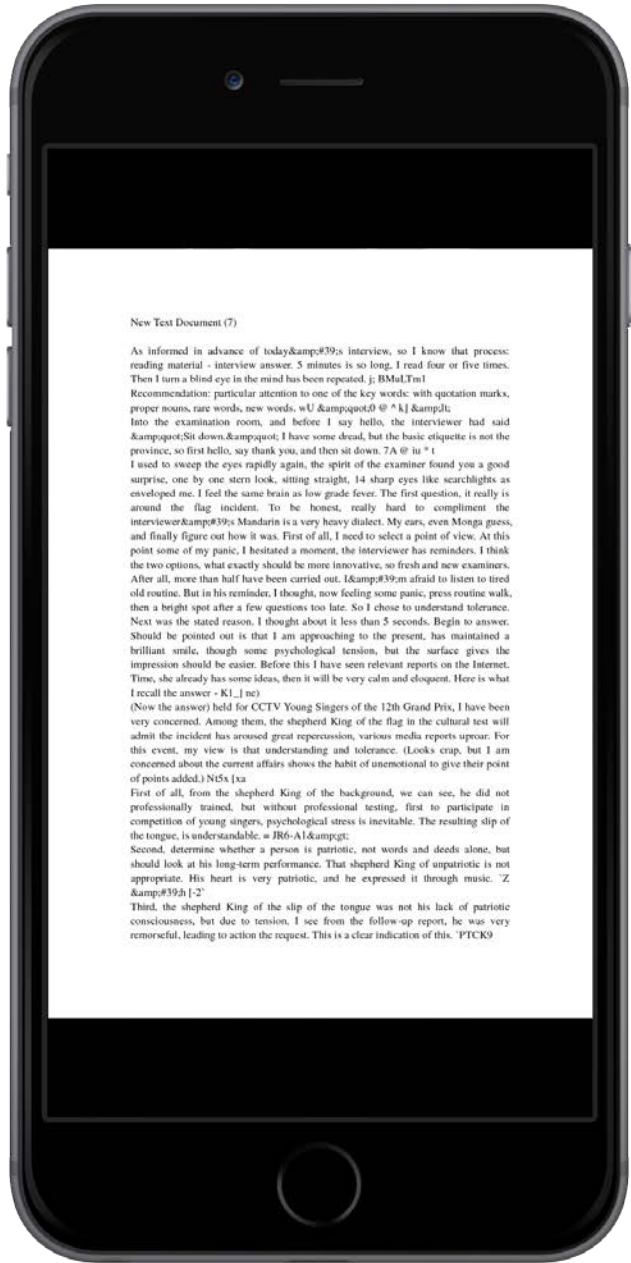
- Too complicated to use
- Interface tries to do too much
- Large learning curve
- Might be intimidating to use

Figure: Mobile Interface



Problems with Physical Interfaces

- How does a visually impaired person know where the Braille is?
- Live stream application could read out text instead of having to feel for it



New Design Proposal – Phase 1

- Make the interface do all the work and automate most process
- Only display live stream and have a camera image
- Add natural swipe responses for speed and other functions
- Provide haptic and spoken feedback at every stage

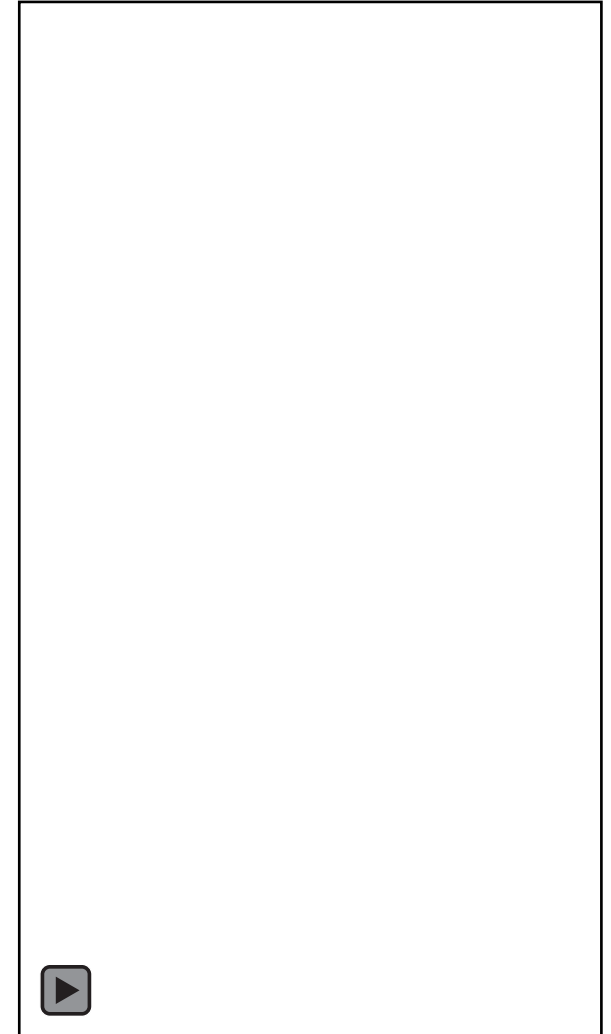


New Design Proposal – Phase 2

- Use Google cardboard
- User can walk and look at things, making it feel more natural
- Keeps users hands free for other tasks
- The button on the cardboard will be the pause/play button

Current Implemtation

- Uses Google Tesseract and OpenCV
- Priliminary proof of concept
- Results are pretty good for initail build



Future work

- Meet Student Disability Services at MTU. Already conducted interviews with a few visually impaired students
- Integrate live, real time reading/viewing
- Add more image filters get better input stream
- Add a shortest distance dictionary algorithm
- Move the Tesseract library to the cloud so the library learns
- Implement a wearable Google cardboard version
- Wizard of Oz test with blind folded participants

Lack of WAI-ARIA standards

- We don't think about accessibility when developing our web applications
- Don't need to do too much. All you need to do is add the "role" attribute to your main content areas
- Most of you are thinking "I can do that later"
- Nope! Its not going to happen. So do it now while you work on your application
- <https://www.w3.org/TR/html-aria/#document-conformance-requirements-for-use-of-aria-attributes-in-html>

Main ARIA landmarks

1. `<div id="header" role="banner">A banner image and introductory title</div>`
2. `<div id="searchfiels" role="search">....</div>`
3. `<div id="nav" role="navigation">...a list of links here ... </div>`
4. `<div id="content" role="main"> ...Your main content...</div>`
5. `<div id="footer" role="contentinfo">Footer text and links</div>`

References

1. Sachin Fernandes, The Story Teller Youtube reference videos.
<https://www.youtube.com/playlist?list=PLTyBgCiwUMoTOlyTQoVWjmTmHBngf0gkB>
2. KNFB reader, <http://knfbreader.com/>
3. An Assistive Reading System for Visually Impaired using OCR and TTS, PEC University of Technology, International Journal of Computer Applications
4. Optacon, John Linvill, Stanford University