

Smart phone meets the Cloud for Blind Ambition

Electrical and Computer Engineering
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Motivation

A significant percentage of population affected by visual impairment becomes subject of sympathy and dependent heavily on people around them. According to **2008 National Health Interview Survey (NHIS) Provisional Report**, an estimated **25.2 million** adult Americans reported they either "have trouble" seeing, even when wearing glasses or contact lenses, or that they are blind or unable to see at all[1]. Global data from **World health Organization (WHO)** states that, **the number of people with visual impairment in 2002 was in excess of 161 million** [2]. It becomes quite challenging to do each and every simple task without visual sensing. We, the humans, rely heavily on our vision in our activities, and often there is little focus on accessibility issues while designing what we see around us. Thus enabling the visually impaired doing their tasks without the help from others is necessary as well as challenging.

Goals

We are going to address the problems in their daily activities and provide simple, yet effective and portable solutions. Utilizing the service oriented computing architecture; we are going to help them by

- ◆ Enhancing their experience in sensing the environment they live in.
- ◆ Improving the quality of their lives.

What has been done?

We have already implemented an application [3] that can help visually impaired individuals read labels on food packaging, letters from social security office, and labels in medicine bottles etc.

- ◆ The optical character reader (OCR) is set with android – R-MAP version 1.
- ◆ The usability of R-MAP [4] is analyzed with end users.

What will be done?

We are working to provide the following

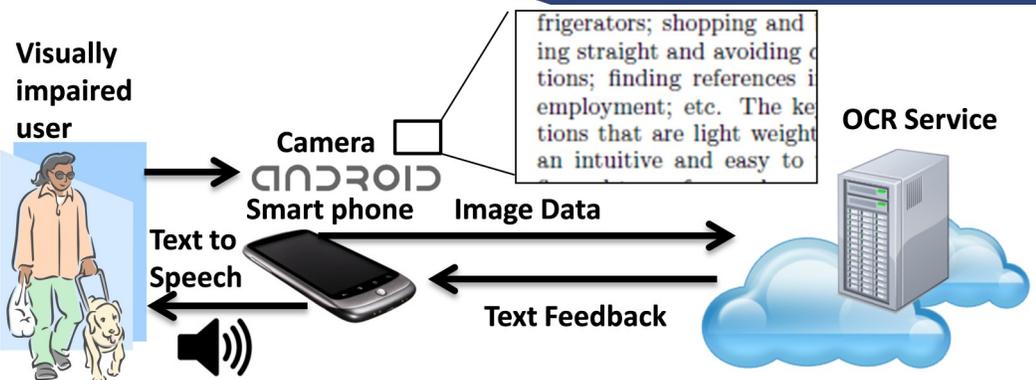


Figure: Architecture of Reading service in the Cloud



Operation of R-MAP

- Step-1 Open application,
- Step-2 Capture Image
- Step-3 Send Image to OCR Service
- Step-4– Listen to Speech (Voice output).

services that will improve their lives:

- ◆ Finding sense of direction in an open space
- ◆ Navigating unfamiliar indoor locations using sparse digital maps
- ◆ Access to affective states of the surrounding individuals
- ◆ Providing guidance during extreme conditions, such as flood, hurricane, or earthquakes.

The cloud based architecture in the above figure shows how thin clients can be utilized using the power of cloud computing and connectivity to render diverse set of services not only to the visually impaired, but also to people with other types of impairments and even to the sighted individuals.

What challenges remain?

- ◆ Taking "good" pictures
- ◆ Managing complex backgrounds
- ◆ Complex fonts, handwritings
- ◆ Removing artifacts, e.g. blur, skew,

- ◆ Cross platform implementation

References

1. American foundation for the blind, <http://www.afb.org/Section.asp?SectionID=15>
2. WHO data and Maps, http://www.who.int/blindness/data_maps/en/
3. Akbar S. Shaik, G. Hossain, and M. Yeasin. 2010. **Design, development and performance evaluation of reconfigured mobile Android phone for people who are blind or visually impaired.** In Proceedings of the 28th ACM International Conference on Design of Communication (SIGDOC '10). ACM, New York, NY, USA, 159-166.
4. G. Hossain, Akbar S. Shaik, and M. Yeasin. 2011. **Cognitive Load and Usability Analysis of R-MAP for people who are blind or visually impaired.** In Proceedings of the 29th ACM International Conference on Design of Communication (SIGDOC '11). ACM, New York, NY, USA.

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