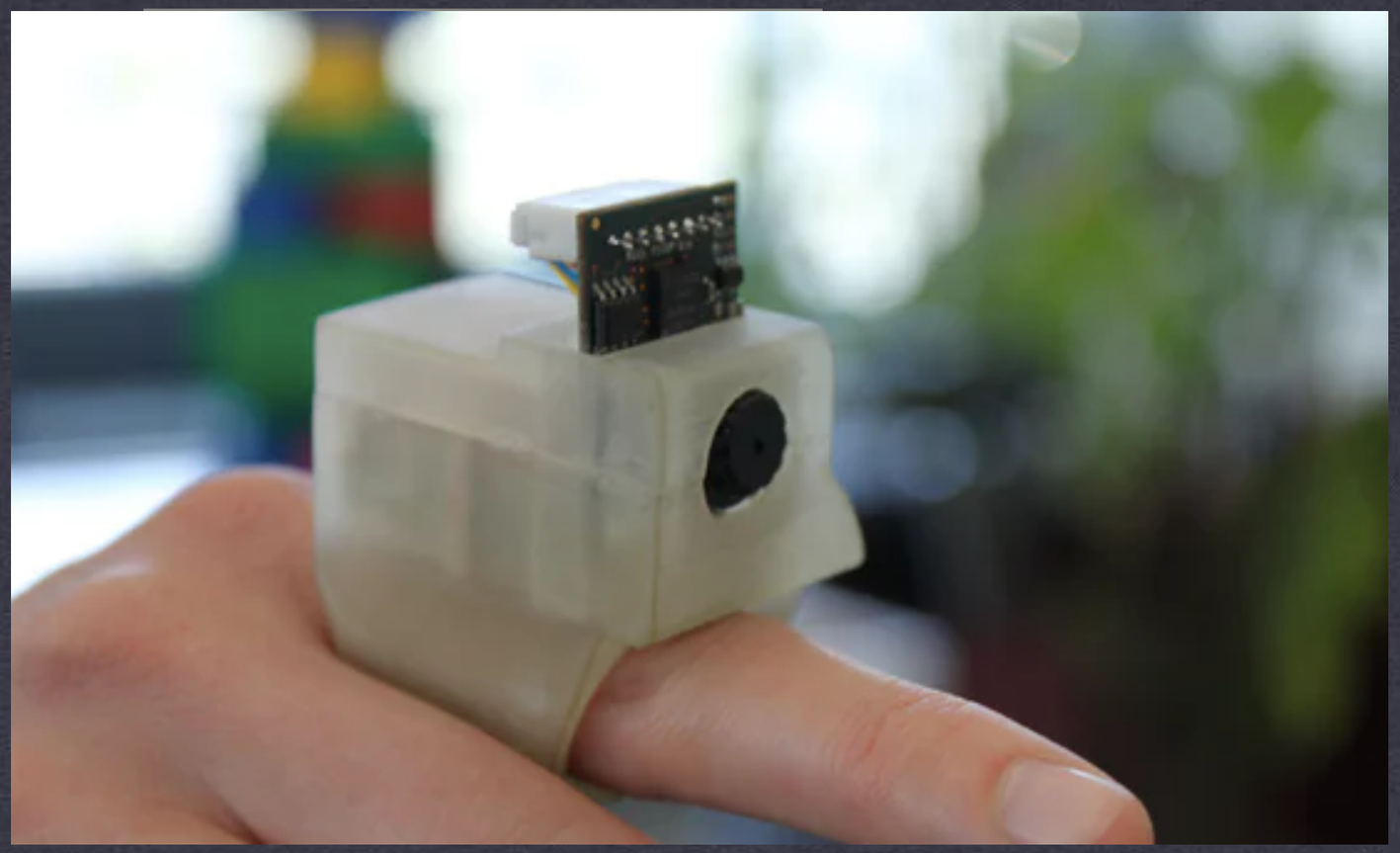
EYE-RING TECHNOLOGY



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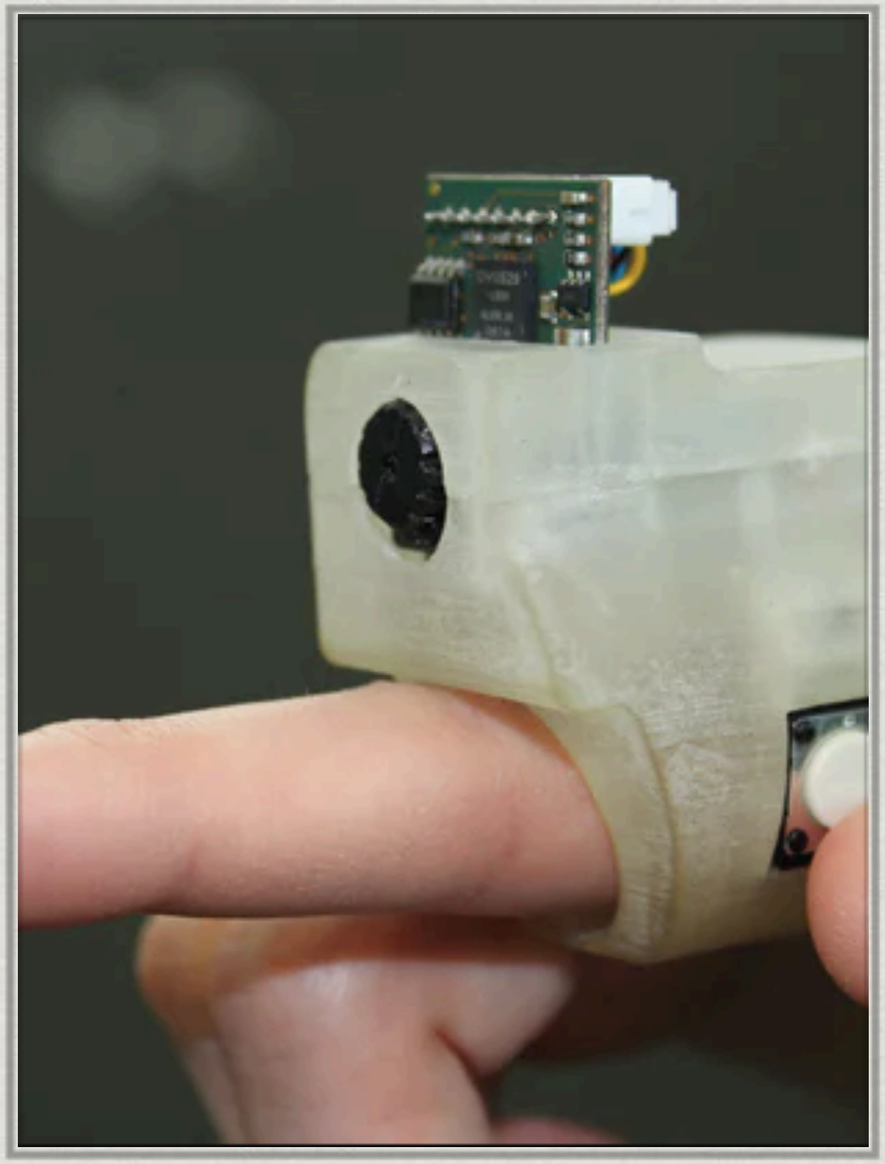
Introduction

- Finger-worn devices are used for interaction with the surrounding world.
- For visually impaired people, it opens a world of possibilities.
- **Eye-Ring,** a novel design and concept of a finger worn device.
- Numerous applications for the visually impaired people such as recognising currency notes, price tags, reading books, etc.

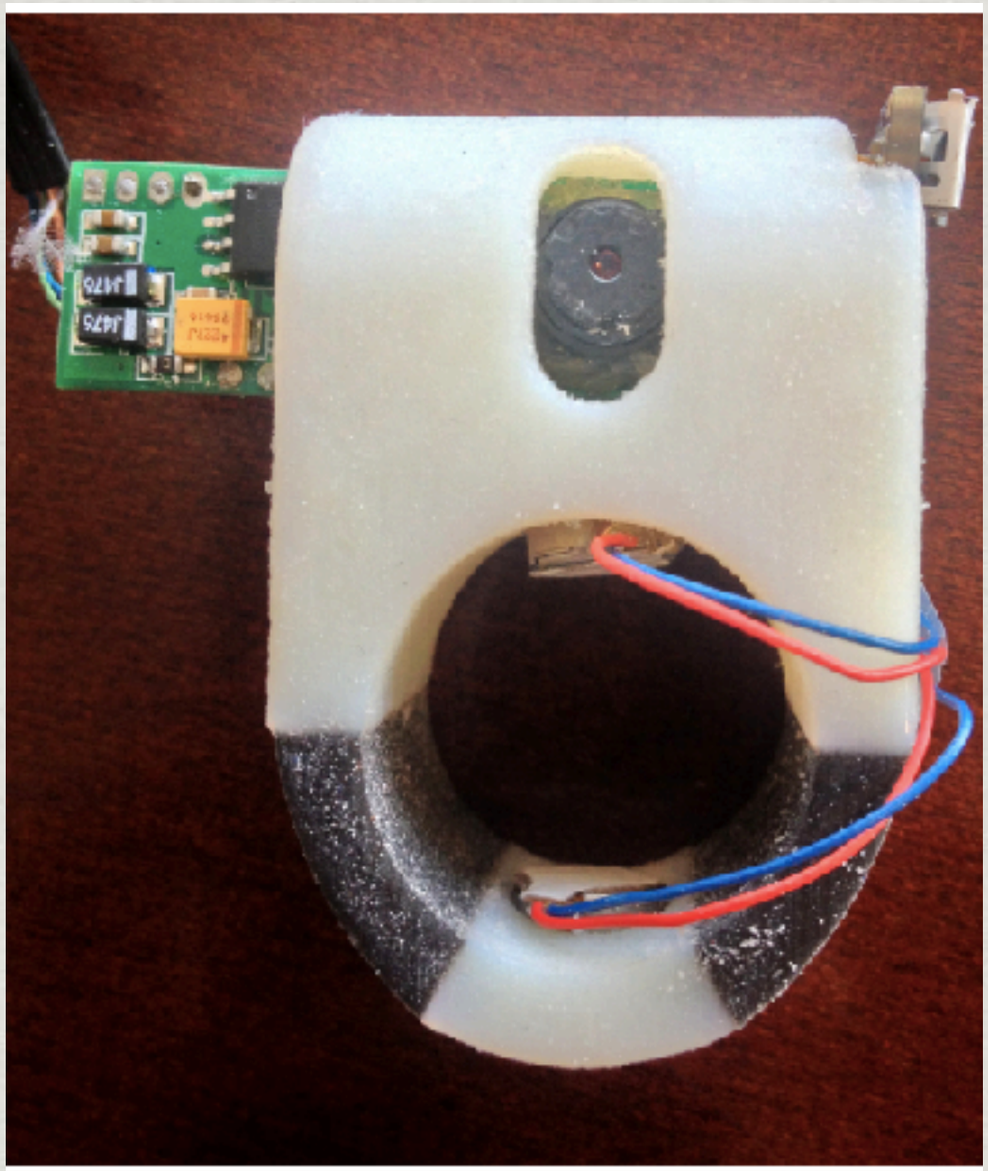


Abstract

Visually impaired people report numerous difficulties with accessing printed text using existing technology, including problems with alignment, focus, accuracy, mobility and efficiency. We present a finger worn device that assists the visually impaired with effectively and efficiently reading paper-printed text.

EyeRing – A Finger Worn Assistant

- A finger-worn device with an embedded camera, a computation element and an earpiece for information loopback.
- Autonomous and wireless, and includes a single button to initiate the interaction.



EYE-RING PROTOTYPE

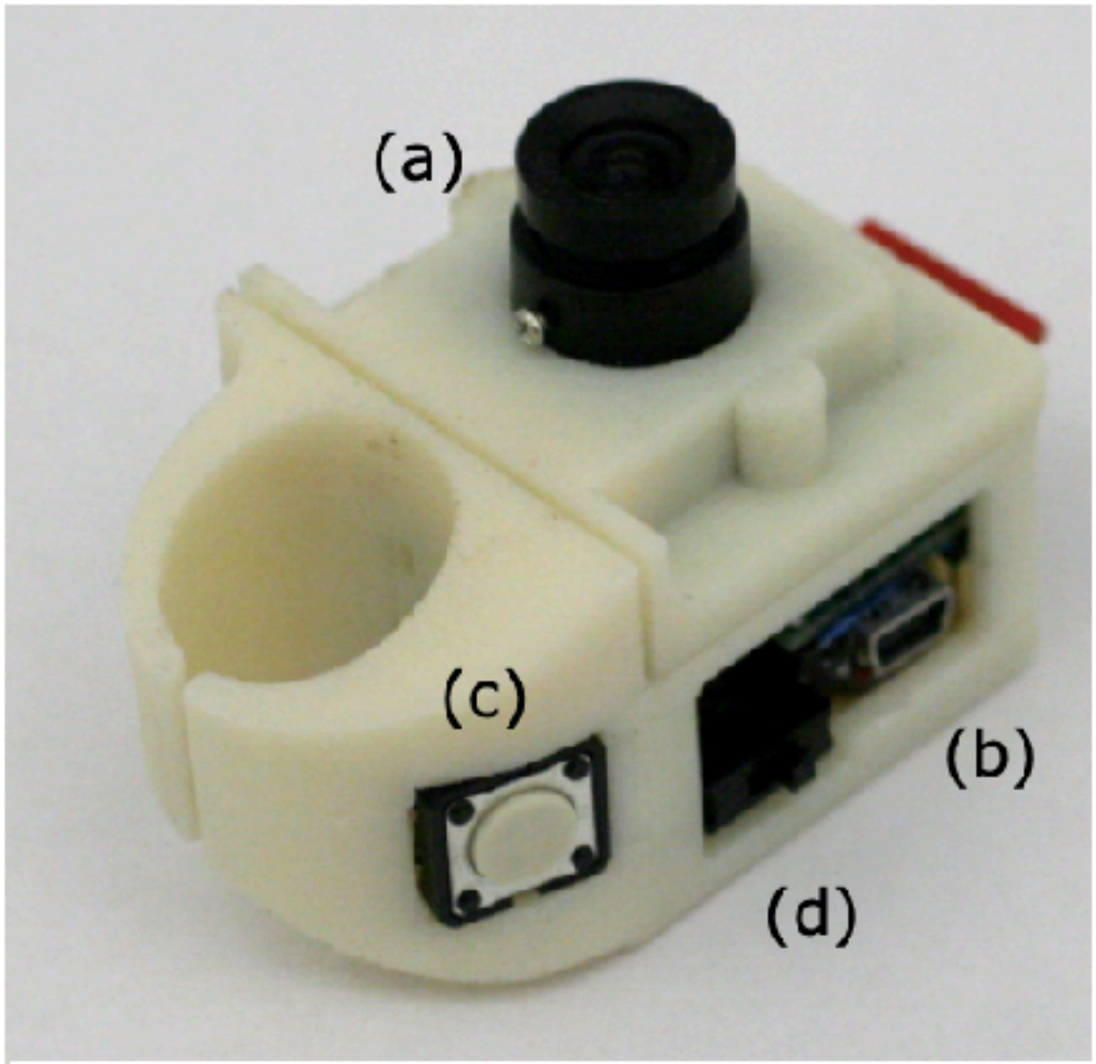


Figure 1: EyeRing prototype. The case was 3D printed with ABS nylon, and the electronics fit completely inside the skeletal compartment. (a) VGA mini camera, (b) Mini-USB port for recharging and reprogramming, (c) Trigger button, (d) On/Off switch.

Applications

Currency Detector

- Intended to help the user to identify currency bills.

Color Detector

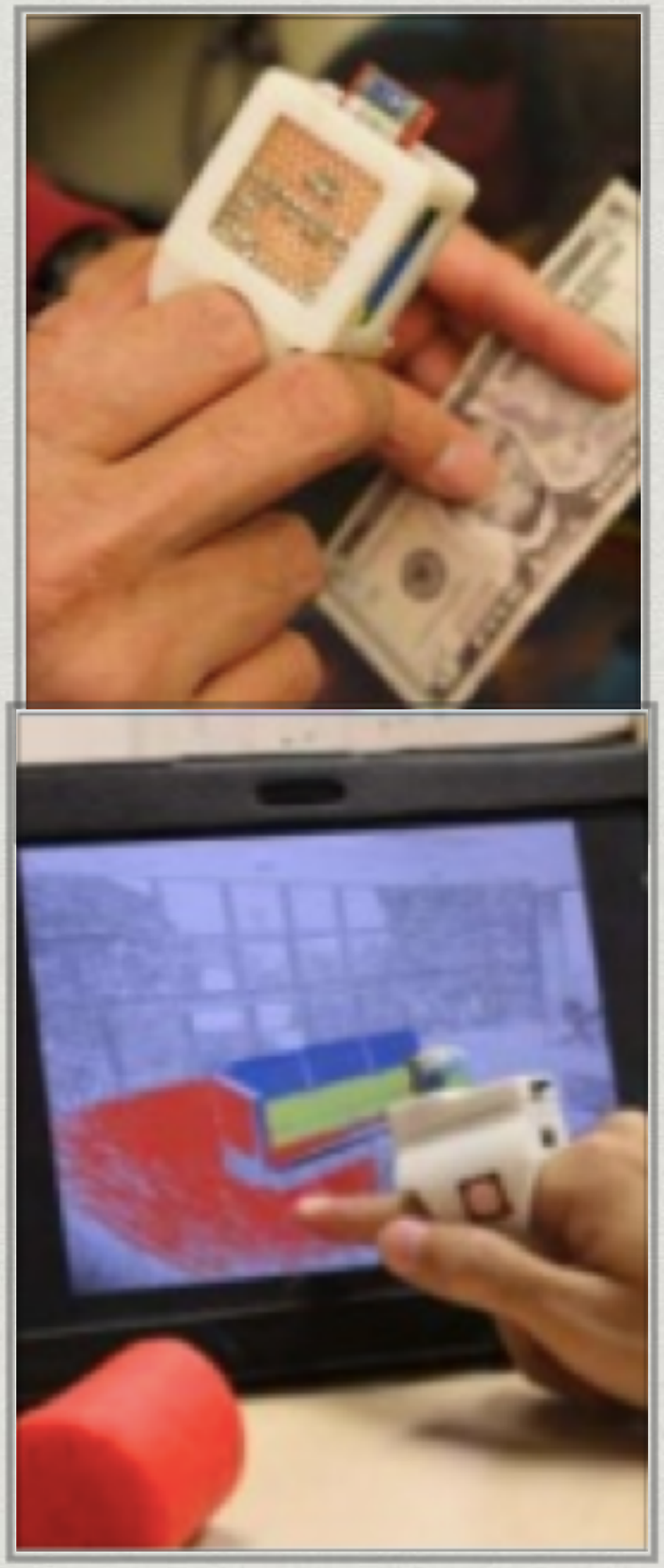
- Aids a visually impaired person to understand the colour of an object.

Virtual Walking Cane

- A finger-worn device used for navigation is certainly less obtrusive, as well as fashionable and appealing.

Tag Detector

- A finger-worn device used for navigation is certainly less obtrusive, as well as fashionable and appealing.



Text Reader

- A finger worn device that assists the visually impaired with effectively and efficiently reading paper-printed text.

- The FingerReader is a 3D printed ring-like device worn on the index finger.

- It has a small camera on top which scans printed text and monitors finger movements.

Technologies Used

Hardware Details:

The FingerReader hardware was designed using:

1. Multimodal feedback via vibration motors.
2. A new dual-material case design.
3. A high-resolution mini video camera.

Software Details:

To accompany the hardware, a software stack that includes.

1. A text extraction algorithm.

2.Hardware control driver.

3. Integration layer with Tesseract OCR.

4. Flite Text-to-Speech (TTS)

Working

- If the user veers away from a text line, tactile feedback is provided by two vibration motors embedded in the 3D printed case.
- Auditory cues alert the user at the beginning and the end of reading passages.
- A novel-tracking based algorithm extracts text locally and sequentially, rather than in whole text blocks and pages like many existing devices use.

Advantages

- The Finger Reader wearable health device can help them gain access to a greater number of learning resources and contribute greatly to their quality of life.
- The index-finger worn device is “a lot more flexible, a lot more immediate than any solution that they have right now,”

Future Scope

- Visually impaired people are mostly bound to reading Braille or listening to audio books but are limited.
- This will allow the user to visualise regular printed images using EyeRing.
- Tourists visiting a new city often rely on maps and landmarks for navigation.
- Further, it can be more optimised by reducing weight, making process faster and user friendly.

Conclusion

FingerReader presents a new way for people to read printed text locally and sequentially rather than in blocks like existing technologies dictate. The design is motivated by a user needs study that shows the benefit in using continuous multimodal feedback for text scanning, which again shows in a qualitative analysis we performed.

References

1. Merrill, D. and Maes, P. Augmenting looking, pointing and reaching gestures to enhance the searching and browsing of physical objects. In Proc. Pervasive'07, (2007) 1–18.

2. Suranga Nanayakkara, Roy Shilkrot and Patricia Maes, EyeRing: A Finger-Worn Input Device for Seamless Interactions with our Surroundings. MIT Media Laboratory 75 Amherst Street Cambridge, MA, 02142.

3. Rushikesh Dhananjay Imade, Akshay Sadashiv Bhoite , EYERING: THE MOTIVATION FOR VISUALLY IMPAIRED PEOPLE . Vidya Pratishthan’s college of Engg. Baramati, India.

4. Hartley, R. and Zisserman, A. Multiple view geometry in computer vision, Cambridge University Press, 2000.

5. Suranga Nanayakkara, Roy Shilkrot https://www.sutd.edu.sg/cmsresource/idc/papers/2017_Eyering_An_Eye_on_A_Finger.pdf

6. Rekimoto, J. Gesturewrist and gesturepad: Unobtrusive wearable interaction devices. In Proc. ISWC '01, (2001), 21-27.