

Technicality behind e-ink and various reading behaviours on e-readers.

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Abstract

Electronic reading devices were not favoured because of their active light emitting LCD displays. In new types of readers such LCD displays have been replaced with e-ink technology which has display properties close to that of a printed material. E-ink has revolutionized the way reading is done on electronic devices. It has not just paved the way for the development of cheaper and eye-friendly screens but it has also helped readers get a better experience out of their readings. E-readers based on such e-ink technology imitate the process of reading on paper as they do not emit any light on their own. At a microscopic level screens of such e-readers are made out of ultra thin layer of plastic that contains millions and millions of micro cavities forming pixels [1]. These micro cavities contain positively and negatively charged pigmented particles (usually positively charged white particles and negatively charged black particles) and each such cavity has oppositely charged electrodes, one sitting at the top surface of the screen and the other at the bottom surface of the screen. Say a pixel/micro cavity is to be turned black, in that case the bottom electrode is negatively charged repelling the negatively charged black ink towards the top and attracting the positively charged white ink towards the bottom. Since no electricity is used to rearrange the order of pixels while the page is static, such devices do not consume electricity when the display is not changed and hence go on for weeks and even months before they run out of battery. Besides energy efficiency, due to the digital format of the books used such devices can store thousands and thousands of books in a single tiny chip thanks to the advanced storage technology we have nowadays. This spares from having to carry around bulky

books hence proving e-readers with much portability.

On the behavioural side, various researches [2] suggest that reading behaviours in such e-ink readers are quite similar to that of reading on paper. [2] found out that participants made significantly longer fixations while reading books compared to e-readers suggesting e-readers provide better legibility.

[3] suggests two basic requirements e-readers should meet : legibility and usability. The same paper goes on to suggest that while most ereaders provide adequate or even better legibility compared to that of print, most of them lack usability in that most of these readers are not as intuitive as reading books failing to imitate the natural process of reading print. However e-readers nowadays have become more intuitive and give an experience closer to reading books.

References

- [1] Kevin Bonsor. How electronic ink works.
- [2] Eva Siegenthaler, Pascal Wurtz, Per Bergamin, and Rudolf Groner. Comparing reading processes on e-ink displays and print. *Displays*, 32(5):268 – 273, 2011.
- [3] Eva Siegenthaler, Pascal Wurtz, and Rudolf Groner. Improving the usability of e-book readers. *J. Usability Studies*, 6(1):3:25–3:38, November 2010.