

An exploration of 2.5D printing as tactile pictures

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Abstract

Novel printing and layering technologies that incorporate a raised or embossed surface have demonstrated new opportunities for novel applications. Textured images have been used extensively in the print industry as decorative decals and embellishments to enhance the surface qualities of packaging and prints.

As the resolution and print quality has improved, and the technology has become more accessible, there are now more opportunities to explore texture in artworks, especially in relation to tactile printing for blind or visually impaired. Over the last two decades, museums have broadened the idea of cultural accessibility for blind people, for example, to cultural events and museums.

Access to knowledge began by enabling users to engage with texts and printed word, and then as second hand experience through audio books and description about artefacts and events, and now the opportunity to give access to images, such as artworks, picture books and photographs, in museums whereby a second hand experience is replaced by first hand experience.

On a practical level, day-to-day understanding of identifying information and things, ways of identifying colour and colour relationships has been developed by Okudera (2015) in the form of textile tags to convey colour information is a practical method to enable blind people to identify the colour of their clothes and to know that their clothes colour co-ordinated. A simple iron on tactile tag, based on the hue circle, enabled users to identify colour relationships. Ten small raised (rubber to the touch) dots are arranged around a Munsell hue circle each representing primary colours, along with three raised vertical dots in the centre to represent white, grey and black. In order to identify the representative colour, a bigger dot or hole is punctured into the tag (Okudera).

Tactile pictures for blind can provide an enhanced understanding for the user. Appropriate methods for image segmentation is necessary to distinguish different parts of a picture. Traditional approaches use contours and patterns, which creates a distinct and recognisable shape and enables separate objects to identified. A contour arises on the boundary between two surfaces and is usually described by a line. Different textures can also be incorporated to convey an idea of a picture. Living Paintings provide touch to see pictures, which can range from current events such as the Olympics to educational books such as dinosaurs to cultural object such as from the British Museum London. These relief tactile pictures use highly simplified shapes, but provide essential unambiguous information. The pages are vacuum formed using thermo plastic sheet over a carved or machined board, and then ring bound together with other pages to form a flip-book. This cheap method means that books can be mass-produced, widely circulated, and are fairly robust.

However, we would argue that accuracy is not even wanted in most of the applications, as a certain degree of interpretation of the full body of things may be more valuable and welcome than a cold replica. An interesting project, where interpretation and exploration is fundamental, is demonstrated by Studios Durero.

The Didu project in collaboration with the Prado Madrid, has attempted to make classic paintings accessible to visually impaired people through relief prints. Their designers worked alongside art specialists and with visually impaired people to understand how to either exaggerate textures already present in a painting, or to create new ones that would be visually relevant but needed to be exaggerated to be perceived by blind participants.

Likewise 3D Photoworks have studied how to make fine art prints accessible by building a high-relief surface of paintings, and Tooteko use sound and touch to assist the user to explore a range of images.

This short presentation will discuss aspects and requirements of relief, tactile 2.5D printing, and surface manufacturing in relation to tactile printing for the visually impaired.

References

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Author Biography

Carinna Parraman is associate professor and deputy director of the Centre for Fine Print Research, University of the West of England, Bristol, UK. In 2009, she gained her PhD in 'The Development of Alternative Colour Systems for Inkjet Printing'. Her current research explores the deposition of colour to create textured surfaces or 2.5D printing

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