

# Fostering More Equivalent Access to Images for Blind and Low Vision Users

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## I. ABSTRACT

Blind and low-vision (BLV) individuals primarily access images through alternative text (“alt-text”) and image descriptions. However, alt-text can often be inaccurate or insufficiently detailed, failing to convey the full complexity of images. These complexities include subtle details such as colors, object sizes, positions, and depth. Providing BLV users with a way of understanding these intricacies can offer them with a richer, more nuanced understanding of images, which could be particularly valuable within educational contexts. In this work, we conducted a formative interview with a low-vision student about their experiences with images within educational settings. From this interview, we discovered that conveying the texture of materials is crucial to gain a better understanding of a digitized image. We then developed an audio-based prototype that communicates material texture information to BLV users interacting with images on touchscreen devices. We hope that this work can significantly enhance education within STEM fields, particularly in disciplines where understanding material properties and spatial relationships are essential, such as biology, geology, and engineering.

## II. FORMATIVE INTERVIEW

We performed a formative interview with a member of the BLV community in order to gather information about some of the challenges they face when understanding images. We found that some of the biggest challenges BLV students face have been in the field of education. Images within these subjects can be very detailed and have many small components, often rendering alt text and descriptions insufficient for communicating all of these little details.

We also asked questions about BLV students’ experiences in understanding various characteristics of images. We found that users desire more information about specific people within the image (their appearance and actions) and objects (including their sizes, presence, and depth). However, for specific subjects, they desire information about the specific materials present in the image, especially their names and textures.

Our results affirm prior work that has found that alt text is often insufficient for a deep understanding of images<sup>1</sup>.

<sup>1</sup>Nair V, Zhu H.H, Smith B.A., (2023, April) ImageAssist: Tools for Enhancing Touchscreen-Based Image Exploration Systems for Blind and Low Vision Users

However, we *also* learned about specific details that users desire when surveying an image — in particular, the names and characteristics of materials shown in the images.

## III. PROTOTYPING

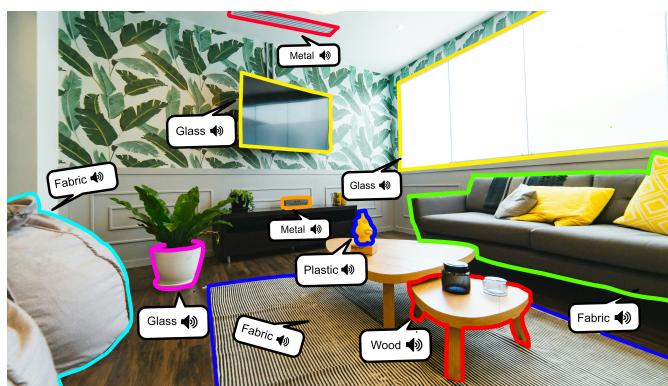


Fig. 1. A sample image used to test our prototype. Users tap a certain area to play sounds corresponding to the material at that location.

To this end, we prototyped a smartphone-based tool that allows BLV users to survey an image using their finger and get more detailed information about the materials present within the image. We created this prototype app for Android & iOS devices within the Unity game engine.

## IV. FUTURE WORK

Future work will more deeply engage with the BLV community. We plan to collaborate with Helen Keller Services for the Blind. By partnering with community leaders, we aim to gain a deeper understanding of the challenges faced by BLV individuals and identify how our tools can best support their needs. This collaboration will provide valuable insights that will guide the development and refinement of our audio-based tools, ensuring they are both effective and user-friendly. We envision that these tools can further enhance STEM education, improving BLV students’ understanding of images within classes.

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