

RESEARCH SPOTLIGHT: Blind and Low Vision



Our Mission

To make technology accessible and to make the world accessible through technology

DIGITAL COMMUNICATION

Large-Scale Analysis of Mobile Apps

Mobile apps are ubiquitous in everyday activities, including banking, work, entertainment, communication, transportation, and education. If they are not accessible, they prohibit people with disabilities from fully participating in everyday life. CREATE researchers examined data from ~10,000 apps to identify common accessibility failures. As a result of identifying patterns where apps marginally met or failed accessibility standards, the researchers were able to use this objective, scientific data to recommend better development practices. This study was cited by the U.S. Department of Justice in the 2024 ADA Title II Regulations web and application accessibility findings.

Led by: James Fogarty and Jacob O. Wobbrock, CREATE Associate Directors, and Anne Spencer Ross, PhD

Ga11y

Animated GIFs, prevalent in social media, texting platforms, and websites, often lack adequate alt-text descriptions, resulting in inaccessible GIFs for blind or low-vision (BLV) users and the loss of meaning, context, and nuance in what they read. Ga11y (pronounced “galley”) uses computer vision and generative AI to create an initial description and the improves the description with crowdsourced human annotations.

Led by: Jacob O. Wobbrock, CREATE Associate Director

A11yBoard

A11yBoard (pronounced “ally board”) for Google Slides is a browser extension and phone or tablet app that allows blind users to navigate through complex slide layouts, objects, images, and text. Combining a desktop computer with a mobile device, A11yBoard lets users work with audio, touch, gesture, speech recognition, and search to understand where different objects are located on a slide and move these objects around to create rich layouts.

Led by: Jacob O. Wobbrock, CREATE Associate Director, and Zhuohao (Jerry) Zhang, CREATE PhD student

NAVIGATING DIGITAL SPACE

VoxLens

Visually oriented graphics are not often accessible to people who use screen readers, who either get very little or no information about online visualizations. VoxLens is a JavaScript plugin that allows people to interact with visualizations through speech input and output, musical sonification, and other methods of interaction. To implement VoxLens, visualization designers add just one line of code.

Led by: Jacob O. Wobbrock, CREATE Associate Director, and Ather Sharif, PhD

(Turn sheet over for more!)

Touchpad Mapper

A team of CREATE researchers developed Touchpad Mapper, a system that maps the dimensions of an image to the coordinates of a touchpad and enables image exploration via touch and object recognition. Touchpad Mapper also enables video exploration and playback control.

Led by: Jen Mankoff and Jon Froehlich, CREATE Associate Directors, with CREATE PhD students Ather Sharif and Venkatesh Potluri

SAFETY AND WAYFINDING

RASSAR: Room Accessibility and Safety Scan in Augmented Reality (AR)

RASSAR is a novel smartphone-based prototype for semi-automatically identifying, categorizing, and localizing indoor accessibility and safety issues. With RASSAR, the user holds out their phone and scans a space. The tool uses LiDAR and camera data, real-time machine learning, and AR to construct a real-time model of the 3D scene, attempts to identify and classify known accessibility and safety issues, and visualizes potential problems.

Led by: Xia Su, CREATE PhD student, and Jon Froehlich, CREATE Associate Director

Project Sidewalk

Using a combination of crowdsourcing, computer vision, and online map imagery, Project Sidewalk has labeled over 1 million sidewalk accessibility issues in over 10 cities worldwide. Labels are used to improve city planning, build accessibility-aware mapping tools, and train machine learning algorithms to automatically find accessibility issues.

Led by: Jon Froehlich, CREATE Associate Director

MobiPrint

MobiPrint is a custom-built robotic 3D printer that autonomously maps, navigates, and prints 3D objects directly in indoor environments. MobiPrint provides a multi-stage fabrication pipeline: (1) the robotic 3D printer maps an indoor space using LiDAR scanning and obstacle detection; (2) a custom design tool

converts the map into an interactive CAD canvas for editing and placing models in the physical world; 3) the MobiPrint robot prints the object directly on the ground at the defined location.

Led by: Daniel Campos Zamora, CREATE PhD student, and Jon Froehlich, CREATE Associate Director

Maptimizer

The Maptimizer system generates simplified and easy-to-read tactile maps customized to a user's preferences and requirements. User studies have shown that Maptimizer helped participants more successfully and efficiently identify locations of interest in unknown areas. These results demonstrate the utility of optimization techniques and generative design in complex accessibility domains that require significant customization by the end user.

Contributors include: Jen Mankoff, CREATE Director, Anat Caspi, CREATE Associate Director, and CREATE PhD students Avery Mack and Jerry Cao

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