

Making the Digital and Physical Worlds Accessible for People with Disabilities

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ACM Highlights

- **Learning Center** tools for professional development: <http://learning.acm.org>
 - 1,400+ trusted technical books and videos by **O'Reilly, Morgan Kaufmann**, etc.
 - Online training toward top vendor certifications (CEH, Cisco, CISSP, CompTIA, PMI, etc)
 - Learning Webinars from thought leaders and top practitioner
 - ACM Tech Packs (annotated bibliographies compiled by subject experts)
 - Podcast interviews with innovators and award winners
- Popular publications:
 - Flagship *Communications of the ACM* (**CACM**) magazine: <http://cacm.acm.org/>
 - *ACM Queue* magazine for practitioners: <http://queue.acm.org/>
- **ACM Digital Library**, the world's most comprehensive database of computing literature: <http://dl.acm.org>.
- International conferences that draw leading experts on a broad spectrum of computing topics: <http://www.acm.org/conferences>.
- Prestigious awards, including the **ACM A.M. Turing** and Infosys: <http://awards.acm.org/>
- And much more...<http://www.acm.org>.

1 billion

people in the world have a form of disability

Why work on accessibility?



Right Thing to Do



Market Opportunity



Regulation



Better Products

Digital World Accessibility

How can we make the digital world
(e.g., Web sites & mobile apps)
perceivable and navigable by everyone,
regardless of abilities?

Assistive Technologies (examples)



Screen Reader



Refreshable Braille Display



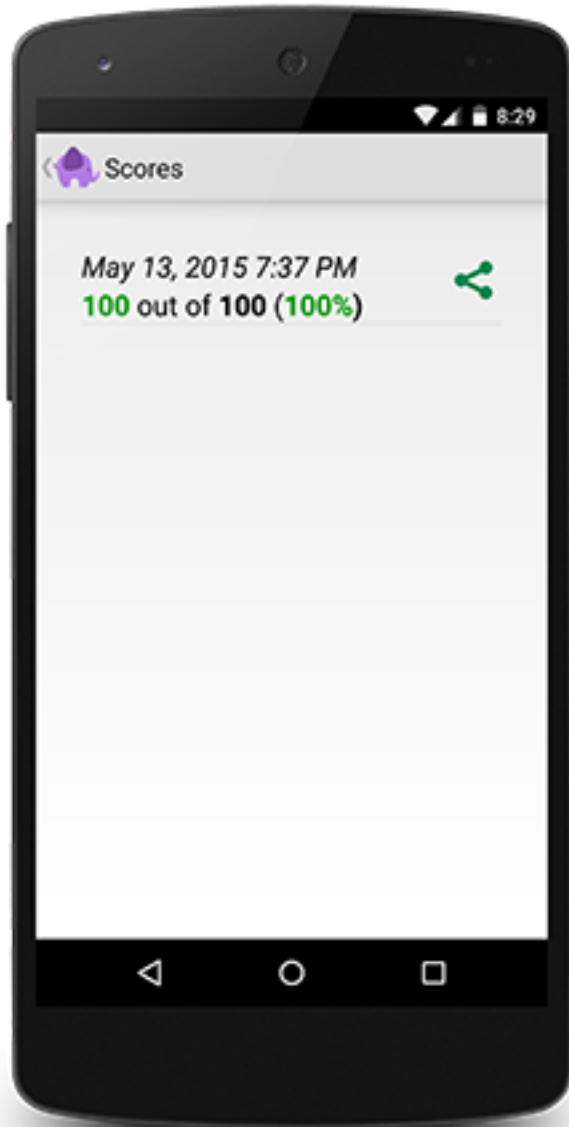
Magnification



Hardware Switch

A few practical tips

Tip 1: Label all images



Share icon has a
contentDescription
“share your score”.

Tip 2: Ensure adequate contrast



Color Contrast Checker

[Home](#) > [Resources](#) > Color Contrast Checker

Foreground color: #0000ff  [lighten](#) | [darken](#)

Background color: #ffffff  [lighten](#) | [darken](#)

Contrast Ratio: **8.59:1**

Normal Text

WCAG AA: **Pass**

WCAG AAA: **Pass**

A contrast ratio (text versus background) of at least 4.5:1 for normal-sized text is recommended.

Tip 3: Provide alternatives to audio content



Captions

Tip 4: Don't rely on color alone

Task	Status
Reserve venue	Complete
Send invitations	Complete
Buy decorations	Not Started
Set dinner menu	In Progress
Order party favors	Not Started

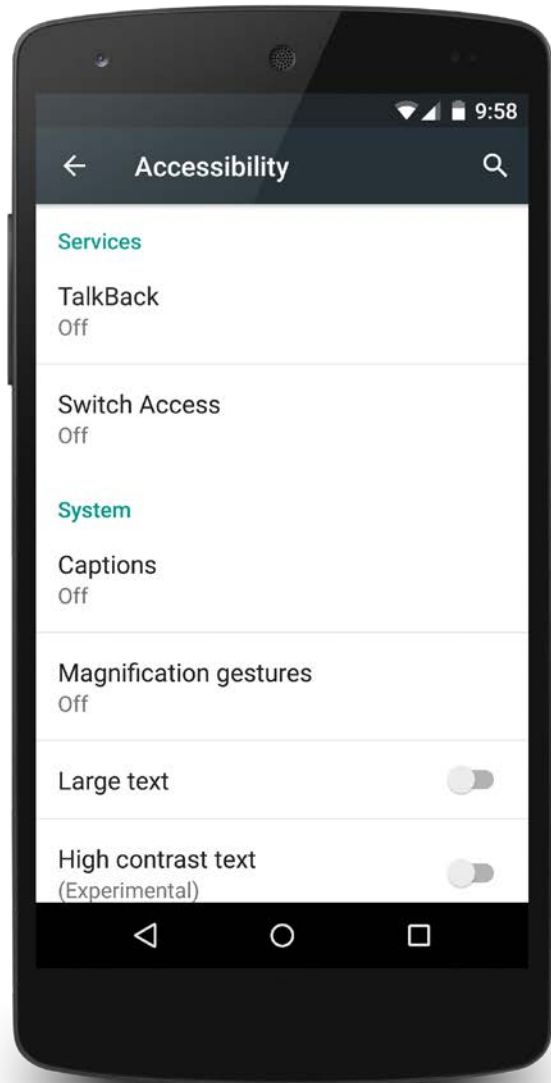
Here status should be indicated by words along with colors

Tip 5: Make touch targets big enough



Touch target should be
at least 48x48 dp

Tip 6: Test



1. Test with sound off
2. Test with accessibility services on
3. Test with real users

Learn More

Widely accepted standard:

WCAG 2.0 (Web Content Accessibility Guidelines)

Many resources available on:

Web accessibility

Android accessibility

iOS accessibility

Research Areas in Digital World Accessibility

Scene Description

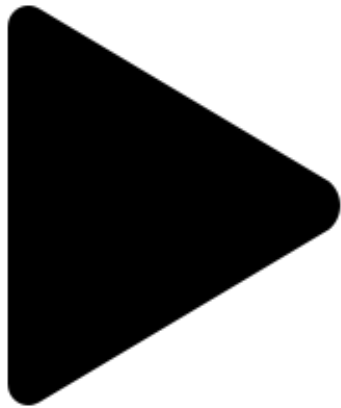


Scene automatically described as: “Two pizzas sitting on top of a stove top oven”

Research published by Google

Not always this accurate

Scene Description (2)



May need to take into account context of page/app, as well as image content.

Does this icon mean “Play” or “Next”?

Automated Testing

The screenshot shows the Wikipedia Main Page in a web browser. The address bar displays the URL https://en.wikipedia.org/wiki/Main_Page. The page content includes the Wikipedia logo, navigation links (Main page, Contents, Featured content, Current events, Random article, Donate to Wikipedia, Wikipedia store), and a sidebar with 'Interaction' links (Help, About Wikipedia, Community portal, Recent changes). The main content area features a 'Welcome to Wikipedia' message, a 'From today's featured article' section about the 21st Waffen Mountain Division of the SS Skanderbeg, and an 'In the news' section with recent events.

At the bottom, the Chrome Accessibility Developer Tools are open, showing the 'Audits' tab. The 'Accessibility' section is expanded, displaying a list of tests:

- ▶ [Warning] Avoid positive integer values for tabIndex (1)
- ▶ [Warning] The purpose of each link should be clear from the link text (54)
- ▶ Not applicable tests (4)
- ▶ Passing tests (10)

The 'RESULTS' section shows two entries:

- <https://www.wikipedia.org/>
- <https://en.wikipedia.org/>

Chrome Accessibility
Developer Tools
plug-in

Graphs



Printing (braille, 3D,
reusable?)

Auditory

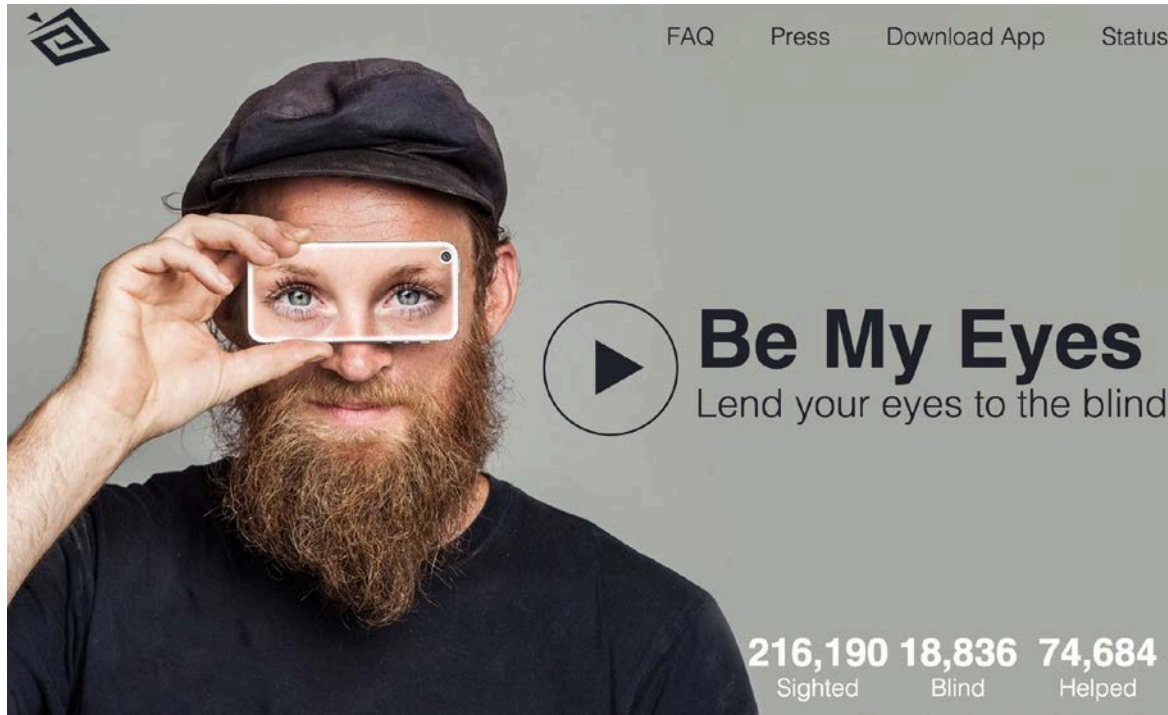
Haptic

Automatic
trend/feature
description

Physical World Accessibility

How can technology help make the physical world more accessible for people with disabilities?

Object Recognition



Be My Eyes:
Crowdsourcing

TapTapSee: Computer
Vision + Crowdsourcing

Real-time digital scene
recognition?

American Sign Language (ASL)

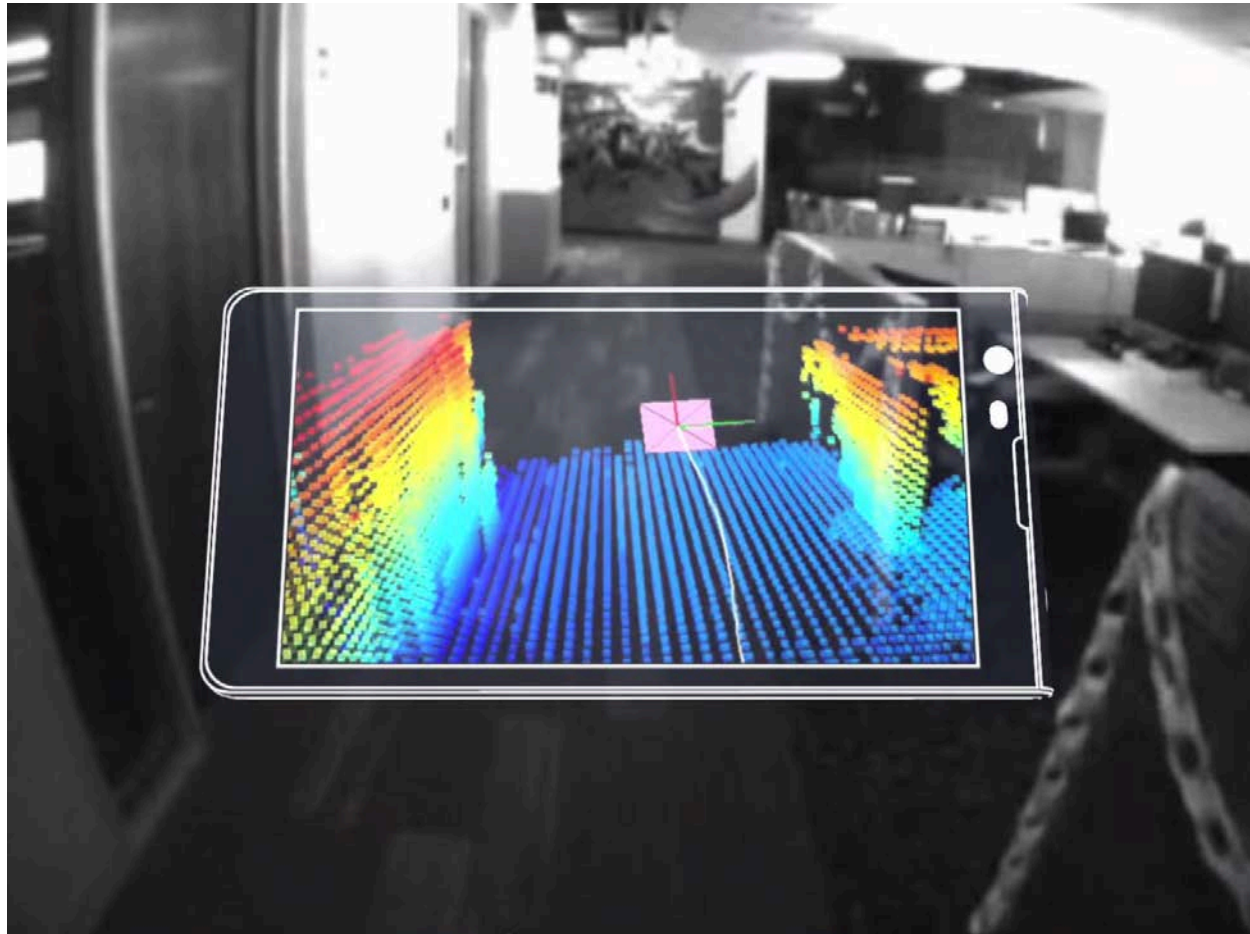


Video compression

ASL recognition

ASL generation

Navigation



Indoor mapping

Localization

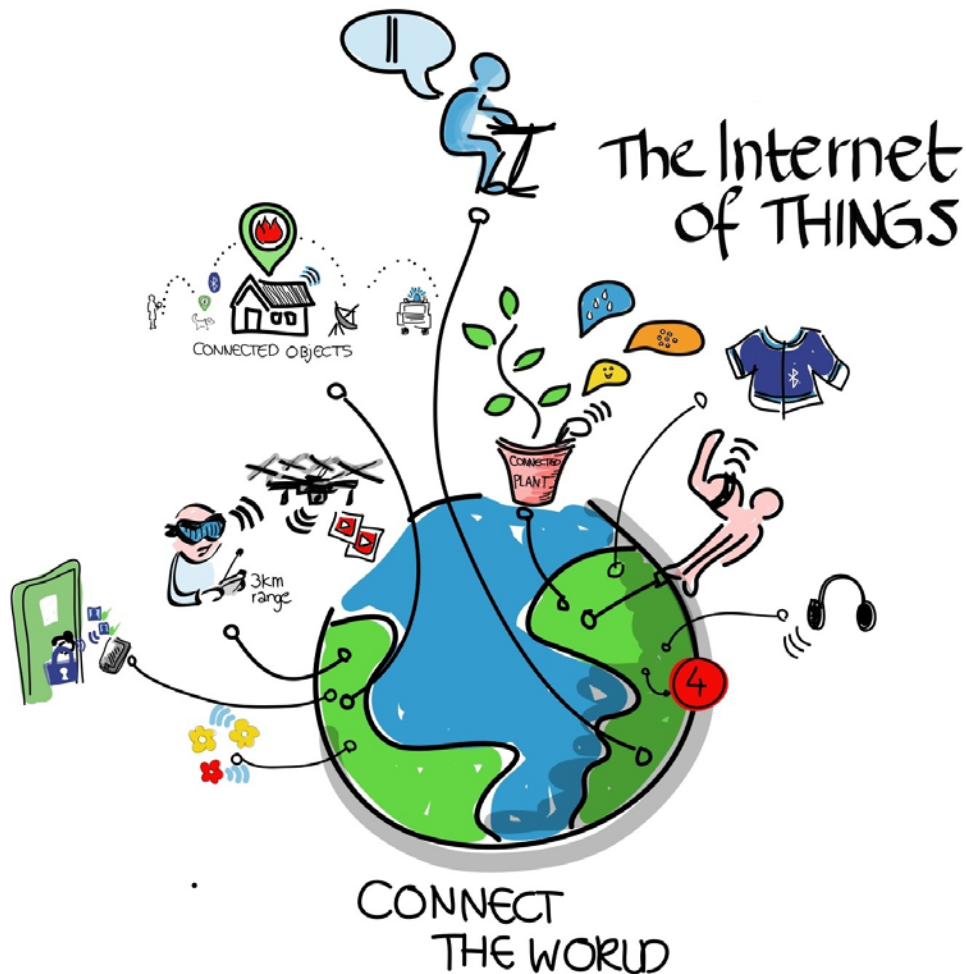
Pathfinding

Obstacle detection

User interface

Autonomous Vehicles

Internet of Things



Interact with physical devices

Identify objects

Thank You



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