

Peya Mowar Carnegie Mellon University https://peyajm29.github.io

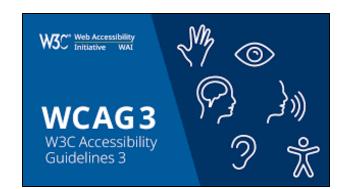
Accessibility in AI-Assisted Web Development

W4A Doctoral Consortium





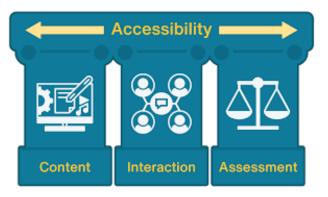
Efforts in Web Accessibility



Web Accessibility Content Guidelines



Accessibility Research



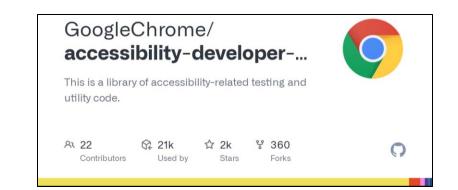
Accessibility Trainings

Building with accessibility in mind

Ensuring your app can be used by everyone means building accessibility into it from the start. For some apps, that's easier said than done. In the video below, two of our engineers take a mobile app from a dire accessibility state to one that takes advantage of Flutter's built-in widgets to offer a dramatically more accessible experience.

Building in Accessibility with Flutter (Fl., Watch later

Developer Advocacy and Awareness



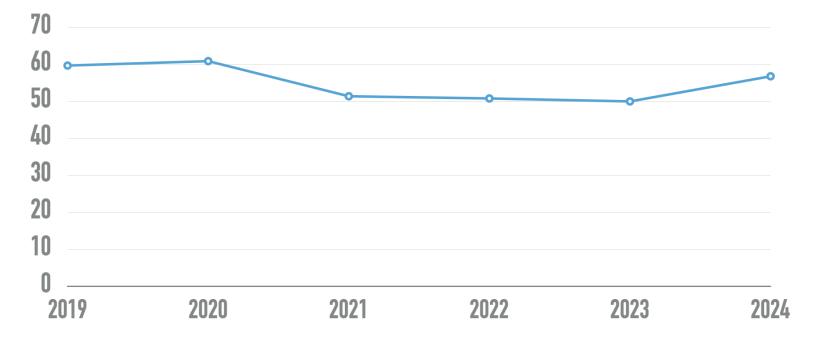
Accessibility Developer Tools



Legal Requirements



Current State of Web Accessibility

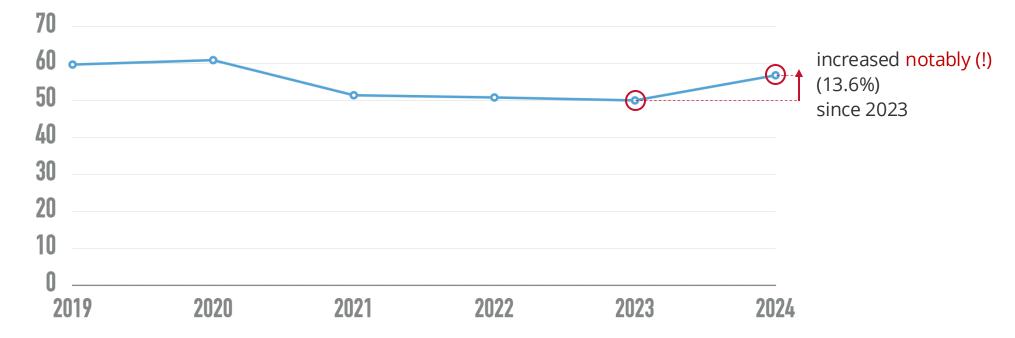


Number of detected accessibility errors per homepage

The WebAim Million Report, 2024



Current State of Web Inaccessibility

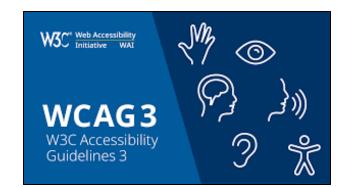


Number of detected accessibility errors per homepage

The WebAim Million Report, 2024



Why is Web Inaccessibility still prevalent?



Web Accessibility Content Guidelines



Accessibility Research



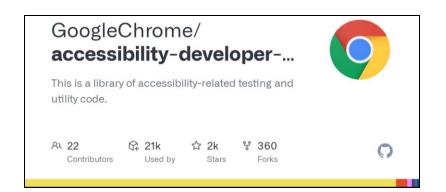
Accessibility Trainings

Building with accessibility in mind

Ensuring your app can be used by everyone means building accessibility into it from the start. For some apps, that's easier said than done. In the video below, two of our engineers take a mobile app from a dire accessibility state to one that takes advantage of Flutter's built-in widgets to offer a dramatically more accessible experience.

Building in Accessibility with Flutter (Fl., S

Developer Advocacy and Awareness



Accessibility Developer Tools



Legal Requirements





Challenge: Still requires developers to be aware about accessibility!

How to get developers to produce accessible UI code *automatically*?

Yes, LLMs!

The world's most widely adopted Al developer tool.

Get started with Copilot >

70% of developers are using or are planning to use AI tools in their development process this year.

Stack Overflow Developer Survey, 2023



How to get developers to produce accessible UI code automatically?

Developers are using AI Coding Assistants.

If these assistants suggest accessible UI code, we can get developers to create accessible UIs.

Research Questions:

Can AI coding assistants produce accessible UI code?

2 Can AI coding assistants eliminate the need for developer accessibility awareness?

Further, is the increasing prevalence of these tools *introducing* accessibility-related vulnerabilities?

Carnegie Mellon University

Recall: 13.6% increase in accessibility errors since last year.



Can AI coding assistants produce accessible UI code?

We conducted an empirical evaluation of GitHub Copilot by comparing its code suggestions against the developer's source code on real world open-source websites.

More details in the paper.

Key takeaway:

Yes! With several caveats.

 \bigstar when explicitly instructed to.

 \bigstar for already accessible websites.

And **not** reliably! *Subject to hallucinations*.





Can AI coding assistants produce accessible UI code?

More details in the paper.

Yes, when explicitly instructed to.

Without AI Coding Assistant

.play-button {
background: transparent;
border-radius: 50%;
align-self: center;
border-width: 1px;
padding: 10px;
box-shadow: inset 0 0 0 2px color-mix(in lch, var(--fg) 50%, transparent 94%);
color: var(--fg);

.play-button { 228 .play-button { background: linear-gradient(to right, var 229 background: linear-gradient(to right, var(--black-2), var(--black-1)); border-radius: 50%; 230 border-radius: 50%; align-self: center; 231 align-self: center: border-width: 1px; 232 border-width: 1px; padding: 10px; 233 padding: 10px; box-shadow: inset 0 0 0 2px oklch(var(--b 234 box-shadow: inset 0 0 0 2px oklch(var(--blacklch) / 0.2); →235+ color: white; // Set the text color to white for better contrast 236+ @media (prefers-color-scheme: dark) { 237+ color: white; // Set the text color to white for dark mode 238+ 239

make this button visible in dark mode when background is dark			⊳
Accept Discard V 0	Changed 4 lines of	4	∇



Prompt: Make this button visible in dark mode.



With AI Coding Assistant

Can AI coding assistants produce accessible UI code?

More details in the paper.

Not reliably! Subject to hallucinations.

7

Without AI Coding Assistant

7 {{< figure src="/images/docs/kubernetes-cluster-architecture.svg" alt="Components of 8 Kubernetes" caption="Kubernetesクラスターのアーキテクチャ" class="diagram-large" >}}

Alternate text is provided in English.

With AI Coding Assistant

add figure from source /images/docs/kubernetes-cluster-architecture.svg {{< figure src="/images/docs/kubernetes-cluster-architecture.svg" alt="Kubernetesクラス 8 ターのアーォキテクチャ" width="100%" >}} 9

> Alternate text is provided. However, it is partly in Japanese.



9



Can they eliminate the need for developer accessibility awareness?

We conducted a user study with 16 developers untrained in accessibility, tasked with building web user interface components with and without an AI coding assistant. *Paper under submission to ASSETS*.

Key takeaway:

Not yet. Otherwise,

 $\frac{1}{\sqrt{2}}$ the accessibility that is introduced is likely to not be applied comprehensively. $\frac{1}{\sqrt{2}}$ the features recommended by the assistant are unlikely to be implemented. $\frac{1}{\sqrt{2}}$ the accessibility errors introduced by the assistant are unlikely to be caught.





What next?

Everything else.

 \bigstar We need stronger technical accessibility benchmarks for UI code generation.

 \bigstar Further research in developing accessibility-aware code generative models.

 \bigstar Fine-tuning with accessible UI examples gathered from web crawling data.

 \bigstar Developing effective reward mechanisms for accessibility guidance.

 \bigstar Incorporating additional visual (and other) modality understanding modules.

 \bigstar Exploring AI developer tools as accessibility feedback indicators.





Thank you! Questions?



Peya Mowar Carnegie Mellon University https://peyajm29.github.io

Carnegie Mellon University

About me:

MS in Robotics Student at Carnegie Mellon University Not a doctoral student *yet Applying to PhD programs in Computer Science for Fall'25*

Advisors:



Jeff Bigham Associate Professor, CMU HCII and LTI



Aaron Steinfeld Research Professor, CMU RI and HCII

This work is supported by the CMU School of Computer Science. CMU Accessibility Group: <u>http://accessibility.cs.cmu.edu</u>

