

# **Enhancing Digital Inclusivity Through Website Accessibility**

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**Esha Nama**

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

Advisors

Richard D. Jacques, Ph.D.

Department of Engineering and Society

## Introduction

Picture logging into a website you rely on, whether it is for checking emails, catching up on news, or enjoying a game, only to find that you are unable to navigate or interact with it as easily as before. For nearly 70 million Americans and millions more globally who identify as disabled, this frustrating scenario is a daily reality (Centers for Disease Control and Prevention, 2023). Website accessibility encompasses the overarching question of how to ensure that online platforms are usable and navigable for all users, regardless of their abilities or disabilities. This problem prompts a deeper exploration into the barriers faced by individuals with disabilities in accessing and interacting with websites, as well as the strategies and technologies that can be employed to enhance digital inclusivity. By addressing this problem, the aim is to foster a more equitable digital landscape where everyone, regardless of their physical or cognitive abilities, can fully participate in the online world.

The technical project focused on the redesign of the website of a Houston-based government subcontractor specializing in aerospace research and design, which suffered from outdated design and a subpar user experience, leading to customer complaints and low engagement. To redesign the website, I utilized a variety of web design programming languages and tools, including HTML, CSS, JavaScript, Python, Django, and Wagtail. Through meticulous research, I identified crucial features in need of redesign, and crafted wireframes based on these insights. Moving forward, updates will adhere to these approved wireframes, promising a significant enhancement in user experience and a boost in website traffic. A post-redesign survey will be conducted among users to gauge the effectiveness of the new design.

Website accessibility refers to the practice of designing and developing websites in a way that ensures equal access and usability for all individuals, regardless of their physical or

cognitive abilities (W3C Web Accessibility Initiative, 2005). This paper explores the current state of website accessibility, focusing on the challenges faced by individuals with disabilities and the strategies employed to improve accessibility. The first part examines the impact of inaccessible websites on people with disabilities, highlighting the barriers they face in navigating online content. It discusses the role of technologies such as screen readers in facilitating access for visually impaired users and emphasizes the importance of adhering to web accessibility standards to ensure equitable access for all users. The second part delves into initiatives aimed at enhancing website accessibility, including the efforts of organizations like the World Wide Web Consortium (W3C) and legislative measures such as the Americans with Disabilities Act (ADA). It also addresses the need for greater inclusion of accessibility education in computer science curricula to equip future developers with the knowledge and skills needed to create accessible digital experiences. The concluding section outlines strategies for creating accessible websites, emphasizing the importance of providing alternative text for images, keyboard accessibility, semantic HTML elements, and regular accessibility testing. The paper concludes by highlighting the ongoing efforts to promote website accessibility and the importance of collaboration, innovation, and advocacy in building a more inclusive digital landscape.

## **Part I: The Current State of Website Accessibility**

### **People with Disabilities**

The Americans with Disabilities Act (ADA), a federal law that prohibits discrimination against people with disabilities, defines a person with a disability as “someone who has a physical or mental impairment that substantially limits one or more major life activities, has a history or record of such an impairment, or is perceived by others as having such an impairment”

(U.S. Department of Justice, 2024). Disabilities like blindness or low vision, deafness or hearing loss, and amputation exemplify those most affected by inaccessible websites. For individuals with blindness or low vision, navigating websites becomes arduous, especially when encountering minuscule font sizes or poor text-background contrast. Those who are deaf or hard of hearing face challenges understanding website audio or video content lacking captions. Similarly, individuals with amputations may struggle to access websites conventionally, necessitating specialized keyboards or alternative input methods like voice control. These accessibility barriers undermine the fundamental principle of equitable access to digital information. Efforts to mitigate these challenges through inclusive design not only align with legal mandates but also uphold the values of equality and inclusivity for all internet users.

### **Websites and Technology**

A website is defined as a “collection of files and related resources accessible through the World Wide Web and the Internet via a domain name. Organized around a ‘homepage’, it is one of the foremost vehicles for mass communication and mass media” (Encyclopedia Britannica, 2024). The base of all websites is written using Hypertext Markup Language (HTML), a formatting system that displays material retrieved over the internet by using HTML tags to specify document elements as headings, paragraphs, tables, and more to display those elements in a layout that is adapted to the screen size of devices. Formerly accessed predominantly through laptops or desktops, the advent of smartphones and tablets has expanded accessibility. In 2023, 96% of U.S. internet users accessed the web via mobile phones, contrasting with 72% using laptops or desktops (DataReportal, 2024). Consequently, website designers must cater not only to desktop/laptop users but also to smartphone and tablet users. Critical disparities between devices include screen size and input methods. Designers must navigate these discrepancies

adeptly to ensure optimal user experience across all platforms. Accessibility considerations are paramount, necessitating careful attention to design elements for seamless usability across diverse devices.

### **Screen Readers**

Screen readers are software programs that enable blind or visually impaired individuals to access and interact with computer content using speech synthesis or braille displays (American Foundation for the Blind). They serve as an interface between the computer's operating system, applications, and the user, allowing for navigation and command input via keyboard or braille display. Commands range from reading or spelling words to locating text, announcing cursor position, and accessing advanced features like reading highlighted text or spell checking. Available for various operating systems like Linux, Windows, and Mac, as well as mobile platforms like iOS and Android, screen readers vary in command structures and support speech synthesizers, with prices ranging from free to \$1,200. They cater primarily to those with no usable vision or limited reading ability, aiding in tasks such as word processing or spreadsheet navigation. Screen readers offer essential accessibility tools for individuals with visual impairments, facilitating productive computer use and enhancing independence. Therefore, prioritizing the consideration of screen readers during website design and development is crucial.

### **Inaccessible Websites**

Websites are often inaccessible due to several factors, posing significant barriers to users, particularly those with disabilities, in fully engaging with their content. A primary reason for this is the lack of adherence to web accessibility standards such as the Web Content Accessibility Guidelines (WCAG). Non-compliance with these guidelines can lead to barriers that impede users with disabilities from accessing information effectively. Common accessibility

issues encompass the absence of alternative text for images, which hampers understanding for users with visual impairments, and poor color contrast between text and background, making it challenging for individuals with low vision or color blindness to read content. Additionally, links lacking descriptive text fail to convey their purpose to screen reader users, while inaccessible forms without proper labels or instructions present obstacles for users reliant on screen readers or keyboard navigation. Furthermore, websites not optimized for various screen sizes and devices may present usability challenges for users accessing them on mobile devices. Complex navigation structures can also confuse users, especially those with cognitive disabilities or mobility impairments. These accessibility barriers not only exclude individuals with disabilities but also contribute to a subpar user experience for all users. Building accessible websites not only aligns with legal requirements but also fosters inclusivity, enhancing user engagement and satisfaction overall.

## **Part II: Improving Website Accessibility**

### **World Wide Web Consortium**

The World Wide Web Consortium (W3C) develops international standards and guidelines for the web, based on the principles of accessibility, internationalization, privacy, and security (World Wide Web Consortium). The W3C has a Web Accessibility Initiative (WAI) that develops standards and support materials to help web developers understand and implement accessibility (W3C Web Accessibility Initiative, 2005). The WAI defines web accessibility as websites and technologies that are designed and developed so that all people can perceive, understand, navigate, and interact with the Web (W3C Web Accessibility Initiative, 2005). This encompasses a broad spectrum of disabilities, including auditory, cognitive, neurological,

physical, speech, and visual impairments. Web accessibility can also benefit people without disabilities, such as people using devices with smaller screen, situational limitations like trying to view a website in bright sunlight, temporary disabilities like a broken arm, and using a slow Internet connection. However, the benefits of web accessibility extend beyond individuals with disabilities. Considerations for accessibility also cater to users facing situational limitations, such as those navigating websites on devices with smaller screens or in challenging environmental conditions like bright sunlight. Additionally, individuals with temporary disabilities, like a broken arm, and those accessing the web with a slow internet connection, benefit from accessible design practices.

The guidelines established by the W3C play a crucial role in advancing web accessibility. By providing a standardized framework through initiatives such as the WAI, the W3C offers invaluable resources and support for web developers seeking to enhance the accessibility of their websites. These guidelines offer clear, actionable recommendations for addressing a wide range of accessibility challenges, from ensuring proper text alternatives for images to implementing keyboard navigation functionality. Moreover, the W3C's emphasis on universal design principles ensures that accessibility considerations are integrated into the fabric of web development practices, rather than treated as an afterthought. As a result, adherence to W3C guidelines not only facilitates compliance with accessibility standards but also fosters a culture of inclusivity and user-centric design. Through ongoing collaboration and refinement, the W3C continues to drive progress towards a more accessible web, ultimately benefiting users of all abilities.

## **Legislature**

The Americans with Disabilities Act (ADA) is a federal civil rights law that prohibits discrimination against people with disabilities in everyday activities (U.S. Department of Justice,

2024). The ADA mandates web accessibility for both state and local governments (Title II) and businesses open to the public (Title III). Title II mandates that state and local governments eliminate discrimination against individuals with disabilities across all their services, programs, and activities, extending to online offerings like absentee ballot applications, virtual town meetings, and school registrations. Inaccessibility on government websites can create barriers for people with disabilities in accessing vital services, as outlined by the ADA. Similarly, Title III applies to businesses open to the public, requiring them to ensure equal access to goods, services, and privileges for individuals with disabilities, including both physical and online accommodations such as interpreters or captions for event registration forms on veterans' service organization websites. The Department consistently reinforces the ADA's comprehensive scope, underscoring the importance of web accessibility in preventing discrimination against individuals with disabilities in all facets of state and local government services and public accommodations.

A recent addition to Title II mandates that local and state government websites adhere to the latest version of the Web Content Accessibility Guidelines (WCAG 2.2) set forth by the WAI. This amendment underscores the growing significance of fostering web accessibility within the framework of the ADA. By requiring compliance with the WCAG 2.2, the legislation aims to ensure that government websites are accessible to all individuals, regardless of disabilities, thereby promoting inclusivity and equal access to essential services and information online. Legislation plays a pivotal role in advancing web accessibility by setting clear standards and expectations for website design and development. By mandating compliance with accessibility guidelines, such as the WCAG, laws like the ADA provide a framework for businesses and organizations to follow, fostering a culture of inclusivity and equal access. Moreover, legal requirements incentivize companies to prioritize accessibility in their digital



initiatives, leading to the implementation of best practices and innovative solutions to improve usability for individuals with disabilities. Legislation also serves as a mechanism for accountability, allowing for enforcement measures in cases of non-compliance, thereby ensuring that accessibility remains a priority in the digital landscape. Overall, legislative efforts play a crucial role in driving progress towards a more accessible web, ultimately benefiting individuals with disabilities and society as a whole.

## **Curriculum**

The issue of accessibility is alarmingly underrepresented in higher education, particularly within computer science courses. Out of 1,857 computing and information science faculty members surveyed, only 20% reported integrating accessibility topics into their courses (Shinohara, Kawas, Ko, & Ladner, 2018). During my time at the University of Virginia, I encountered minimal discussion of website accessibility, with just one class briefly touching upon the topic. However, the discussion was superficial, consisting of only two slides in a presentation and a brief mention lasting no longer than five minutes. This deficiency in addressing accessibility in computer science education is emblematic of a broader trend across academia, where essential principles of inclusive design are often overlooked or relegated to peripheral status. As a consequence, students graduate with a limited understanding of accessibility considerations, leaving them ill-equipped to incorporate these critical elements into their future work as developers.

Teaching students about website accessibility in computer science classes is crucial for several reasons. Firstly, it fosters a culture of inclusivity and diversity within the field of technology by equipping future developers with the knowledge and skills needed to create websites that are accessible to all individuals, regardless of disabilities. By instilling an

understanding of accessibility principles early on, students can integrate these considerations seamlessly into their design and development processes, ultimately contributing to the creation of more inclusive digital experiences. Moreover, incorporating accessibility education into computer science curricula helps students recognize the social and ethical implications of their work, encouraging them to prioritize accessibility as a fundamental aspect of responsible digital citizenship. Additionally, as the demand for accessible websites continues to grow, proficiency in accessibility practices enhances students' competitiveness in the job market, empowering them to make meaningful contributions to the advancement of inclusive technology. Overall, integrating website accessibility education into computer science classes not only prepares students for future careers but also cultivates a more equitable and accessible web experience for all users.

### **Part III: Creating Accessible Websites**

Creating accessible websites is a multifaceted endeavor crucial for ensuring that all users, regardless of their abilities, can access and interact with online content effectively. One essential aspect of enhancing accessibility involves providing alternative text for images. This enables screen readers to convey image content to users with visual impairments, ensuring that they can understand the information conveyed by images. Additionally, keyboard accessibility is paramount, as some users may have difficulty using a mouse. Websites should be designed to allow users to navigate and operate all functionalities using only a keyboard, accommodating individuals with mobility impairments or those who rely on alternative input devices.

Semantic HTML elements play a pivotal role in enhancing accessibility by structuring content in a way that is easily interpretable by assistive technologies. By using semantic

elements such as headings, paragraphs, lists, and landmarks, website creators can ensure that screen readers can accurately interpret and navigate the content. Proper heading structure enhances navigation and comprehension for all users, including those using screen readers.

Providing captions and transcripts for multimedia content is essential for users who are deaf or hard of hearing. Captions enable users to access the spoken content of videos, while transcripts provide a text-based version of audio content, ensuring accessibility for all users. Similarly, ensuring adequate color contrast between text and background is crucial for users with low vision or color blindness. Websites should utilize colors that provide sufficient contrast to make content readable for all users, regardless of their visual abilities.

Enabling resizable text allows users to adjust text sizes according to their preferences or needs without compromising the layout or functionality of the website. This feature is particularly beneficial for users with visual impairments who may require larger text sizes for readability. Implementing ARIA landmarks further enhances website accessibility by defining regions of a webpage, making it easier for screen reader users to navigate and understand the structure of the content.

Clear and descriptive link text is essential for facilitating navigation for users with disabilities. Descriptive link text accurately conveys the destination of the link, improving usability for users navigating with assistive technologies. Regular accessibility testing, involving automated tools, manual testing methods, and user feedback, is crucial for identifying and addressing accessibility barriers. By incorporating these strategies into the design and development process, website creators can significantly enhance the accessibility of their websites, ensuring equal access to information and services for all users. Prioritizing website

accessibility not only fosters inclusivity but also enhances the overall user experience for a diverse range of users, contributing to a more equitable digital landscape.

## **Conclusion**

The journey towards achieving website accessibility is an ongoing endeavor that requires concerted efforts from all stakeholders involved in the digital ecosystem. The current state of website accessibility underscores the pressing need to address the pervasive barriers faced by individuals with disabilities in accessing online content and services. Despite advancements in technology and awareness, significant gaps persist, from inaccessible websites and limited accessibility education in higher education to uneven enforcement of legislative measures.

However, there is cause for optimism as initiatives aimed at improving website accessibility gain traction and momentum. Organizations like the W3C play a pivotal role in setting international standards and guidelines, providing a framework for developers to create accessible digital experiences. Legislative measures, such as the ADA, mandate compliance with accessibility requirements, signaling a commitment to promoting inclusivity and equal access to digital information and services. Moreover, the growing recognition of the importance of accessibility education in computer science curricula reflects a shift towards a more inclusive approach to technology education.

Moving forward, it is essential to continue advancing efforts to enhance website accessibility through collaboration, innovation, and advocacy. By prioritizing accessibility in design and development practices, developers can create digital experiences that are inclusive and equitable for all users. Regular accessibility testing, ongoing refinement, and user feedback are integral to ensuring that websites meet the diverse needs of users with disabilities.

Ultimately, the pursuit of website accessibility is not merely a legal obligation, but a moral imperative rooted in the principles of equality and social justice. Together, we can work towards building a digital world where everyone, regardless of ability, can fully participate and thrive.

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