The
Accessibility
Simulator

Accessibility Simulator

Process Book

Roshni Choudhary

Artist Statement

While I knew about web accessibility before working in user experience design, I had thought of the web accessibility guidelines as a burden to my freedom as a designer. I saw that peers and leaders around me seemed to share that attitude. However, later I learned more about user experience and accessibility through my work experiences. While working as an UX Design Intern at Edward Jones I volunteered to work with the accessibility team and learned a great deal of what good accessibility is and is not. I also worked in the Achieve Program at Southern Illinois University, which helps those with learning disabilities in college. Through both of these experiences I learned to gain empathy for people with disabilities and learned how much they are so often misunderstood.

I decided to create the accessibility simulator to help educate others and increase empathy for the people who suffer from lack of web accessibility.

I also got the chance to not only design the software but also utilize what I had learned in IT classes to code the website through HTML, CSS, and Javascript.

I hope that the Accessibility Simulator gives designers a taste of how it is like to navigate the web with such disabilities so that we can slowly pay more attention to the usability and accessibility of all that we design.

Thesis Proposal

According to the Center for Disease Control and Prevention (CDC) 12 million Americans suffer from visual disabilities. Approximately 6.5 million Americans suffer from cognitive/intellectual disabilities. Even though visual and cognitive disabilities are so prevalent in society, a 2019 study by the WebAIM (Web Accessibility In Mind) Organization found that of the top 1 million website homepages on the internet, 97.8% had notable Web Content Accessibility Guideline (WCAG) errors. This means that the web accessibility needs of more than 300 million internet users who suffer from visual and cognitive disabilities are being largely ignored. The Web Content Accessibility Guidelines (WCAG) are often viewed as legal barriers to web design and sometimes almost entirely ignored as unimportant.

Thesis Proposal Continued

Although there are laws such as WCAG to help those with cognitive and visual disabilities, I argue that we can only enforce these laws to create a long-term impact by creating empathy towards their day to day experiences. According to the Oxford American College Dictionary, empathy is defined as the ability to understand and share the feelings of another. Although we might have learned a little about what these disabilities are and may have even heard stories from the people who experience it on a daily basis, in order to create a long-lasting impact we must feel what they feel and experience it ourselves.
I will explore ways that empathy is built and how to utilize design to build empathy towards those dealing with visual and cognitive disabilities in order to create a long-lasting impact for them.

Similar Research

I researched similar endeavors for improving empathy in design and the importance of empathy for accessibility. Similar tools to increase empathy for accessibility include:

Color Blindness Filter
https://www.toptal.com/designers/colorfilter

Dyslexia filter
http://geon.github.io/programming/2016/03/03/dsxyliea
https://www.sldread.org/dyslexia-simulator/

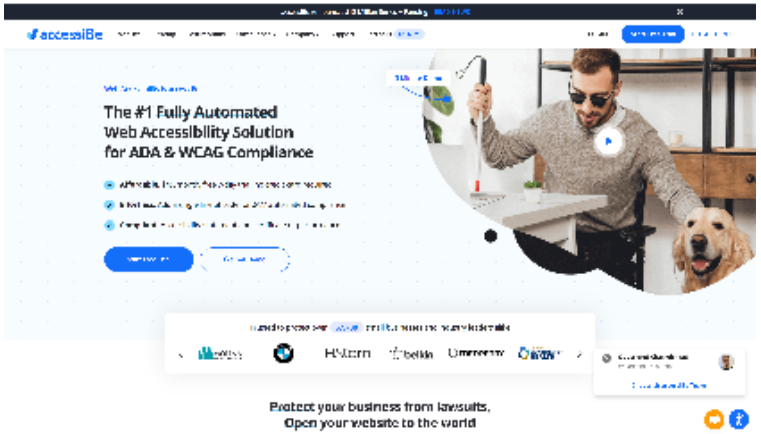
Screen Readers
https://apps.apple.com/us/app/ghostreader/id893631492?mt=12
https://www.nvaccess.org/ (Most Popular screen reader)

IBM Equal Access Accessibility Checker
https://chrome.google.com/webstore/detail/ibm-equal-access-accessib/lkcagbfjnkomcinoddgooolagloogehp?hl=en-US

Similar Research Continued

Microsoft Active Accessibility API
https://docs.microsoft.com/en-us/windows/win32/winauto/microsoft-active-accessibility

AI Accessibility fixing app:
https://accessibe.com/



Accessibe is an AI tool that simulates how the web might look from the eyes of someone with various disabilities, and also points out and automatically fixes accessibility issues.

Disabilities to Focus On

For my thesis I had to choose which disabilities to simulate. I researched which disabilities were most effected by the web. I also spoke with the Disabilities Coordination Director at Southern Illinois University, Carbondale, who informed me about how people with disabilities navigate and use the web.
Out of the disabilities affected most by web accessibility, I researched which were the most prevalent in America. The top three were:

Dyslexia: 43.5 million Americans
Visual Impairment: 12 million Americans, 1 million legally blind
Autism: 6 million Americans

Dyslexia

I learned many key points about Dyslexia from my research.

- It is a Cognitive and Learning Disorder which orginates from brain. It is not a Visual Disability.
- Each person's experience of Dyslexia is different, and its severity is on a spectrum.
- Those with Dyslexia have trouble reading and spelling words. For some words seem to jump, for others they flip or aren't straight, and others say they have shadows behind them. Dyslexia does not affect general intelligence.
- Those with Dyslexia need more time to read words. It is best to layout the design so that there is not too much text. If something has lots of text such as a textbook, they prefer to hear it as an audiobook.

Visual Impairment

Visual impairment is on a spectrum, but I decided to focus on the most tangible and empathetic experience, complete blindness. Some key pointss about blidness and visual impairment that I learned throuugh my research and were integral in my project include:

- Those with blindness utilize the keyboard to navigate a website and a screen reader to read the options and text.
- To improve web accessibility for those with blindness, it is important to make websites screen reader compatible, use alternate text for images, have
- keyboard shortcuts for the website, and have strong contrast.

Autism

Like the previous disabilities, Autism is on a spectrum and everyone's experience of it is different. Key points I learned about Autism included:

- Those with Autism have difficulty with communication and social interactions.
- They experience obsessive interests and repetitive behaviors. They may have trouble paying attention and have an intense interest in a limited amount of things.

Some ways to improve accessibility for those with Autism include:

- Specifying keyboard focus so they know where they left off on a website.
- There should be no distracting ads.
- Information should only be revealed when needed through progressive disclosure.
- It is important to have a consistent design.

Personna

Name:
Rea
Occupation:
UX/UI Designer
Age:
32
Location:
St. Louis, MO
Family:
Married, 2 kids

Rea is an UX/UI Designer in a mid-sized software company that just built its UX/UI Team of five designers. Although she enjoys design, she has to check if her site is accessibility friendly as well. She does not enjoy checking and fixing the design and code for the website and would rather get to the designing aspect of her job. She has little to no training in accessibility and had to learn many of the WCAG rules from the accessibility checkers such as the IBM Equal Accessibility Checker.

Personna Goals & Motivations

Goals:

-Career growth to a leadership position
-Flexibility with job to spend time with kids
-Appreciation for her job well done

Frustrations:

-Overtime because of having to adhere to accessibility guidelines. They are a burden
-Wants to do design, not deal with accessibility.
-Feels lost when it comes to accessibility because she feels like she has no background in it
-Feels like she isn’t solving important problems, more like a cog

Designing the Solution

After researching similar projects to increase empathy for those with visual and cognitive disabilities, I decided to focus on the top most prevalent disabilities: Dyslexia, Autism, and Blindness. After researching these disabilities and what was good and bad accessibility for each one, I thought of how to show others their web experience. The best solution would be to create an Accessibility Simulator that translated experiences we heard about to something more tangible for those who hadn't experienced them.

Designing Empathy for Dyslexia

I researched Dyslexia and how someone with it experiences the web. I also found something similar, a website simulating Dyslexia by switching up text (view it at http://geon.github.io/programming/2016/03/03/dsxyliea). Many who had Dyslexia agreed that the website did a great job with simulating it.
I decided to create something similar but put it in context with a task and quiz. The task would be to read a chapter of a textbook with animating characters. Those with Dyslexia might have to quickly read a chapter along with the class and have to deal with the trouble of comprehending a large amount of text quickly. After the chapter the user would take a timed quiz to make sure they comprehended their reading. After the quiz, the user is given tips on how to design with Dyslexia in mind.

Designing Empathy for Blindness

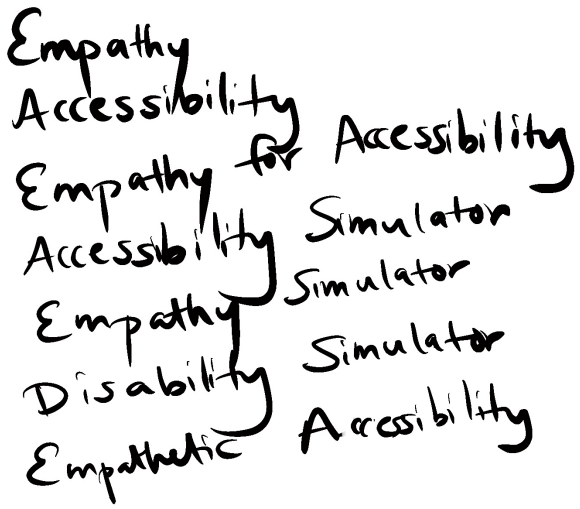
I researched how those with blindness use the web and what is good and bad accessibility for them. I also talked to the Director/ADA Compliance Coordinator at Southern Ilinois University (SIU) about how those with blindness use the web. They use keyboard shortcuts and screenreaders. In order to understand it myself, I utilized screenreaders such as Apple Voiceover and Ghostreader to read the websites. I also learned some keyboard shortcuts to navigate a web page. Through this research, I decided to make the Accessibility Simulator's blindness task navigating a dark screen where one is unable to see anything (simulating blindess) and can only navigate through the website through keyboard shortcuts and the screenreader reading it out loud to them.

Designing Empathy for Autism

I researched what is bad design for Autism. This includes distracting inconsistent design. For the Autism task I decided to make a distracting website with many ads and animations, with a distracting background as well. This would help one see what is bad accessibility for Autism but also how what may seem a little inconvenience to those without Autism is a big deal for those with it.

Choosing the Name

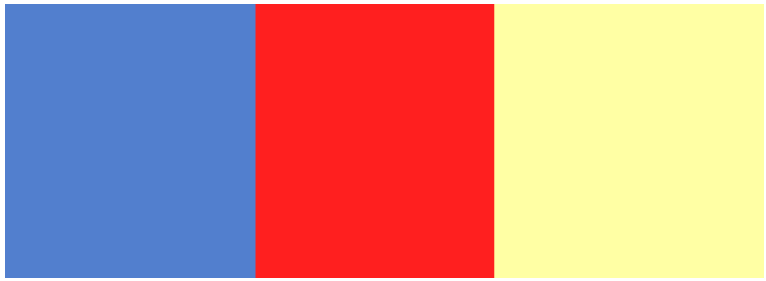
I brainstormed many names for the Accessibility Simulator. Some of these names included Empathy for Accessibility, Disability Simulator, and Empathetic Accessibility Simulator. However, I chose Accessibility Simulator because it focused on the positive aspect.



Brainstorming various names for the site

Color Palette Selection

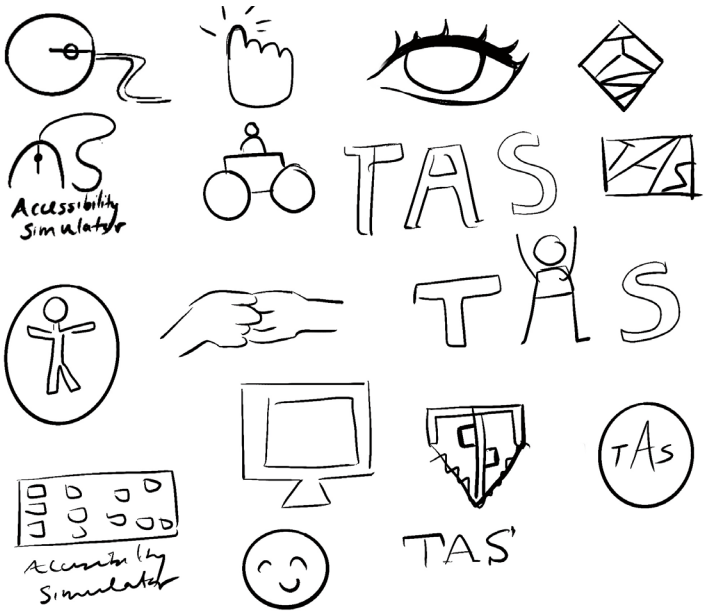
I utilized a mainly blue color scheme because blue is the color of the WCAG Guidelines and hints at something medical (since the simulator simulates disabilities). I was first going with a more colorful scheme that included red, blue, and yellow. However, I later went with more of an analogous and subdued blue and gray color scheme.



Logo Process

I sketched out every object and icon that reminded me of accessibility, empathy, or technology. However, I later decided to uuse just typography as the logo to give the website a serious and professional look.

Software Used: Ai



The Accessibility Simulator

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Final Logos

For the logo I used a font that is similar to the font used with code because the website will be for UX Designers who will be familiar with that font.

Software Used: Ai

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Deliverables

The Accessibility Simulator would be presented at an UX Design Conference Booth (IXDA, UXPA). This is because the personna, or target of this project, is an UX Designer who can design and code websites and apps to be accessibility friendly.
In the conference the Accessibility Simulator website would be presented. Accompanying posters, a brochure, social media posts, and conference banner would be used to market the simulator.

Website Design Process

I designed and coded the Accessibility Simulator Website.
My design process included:

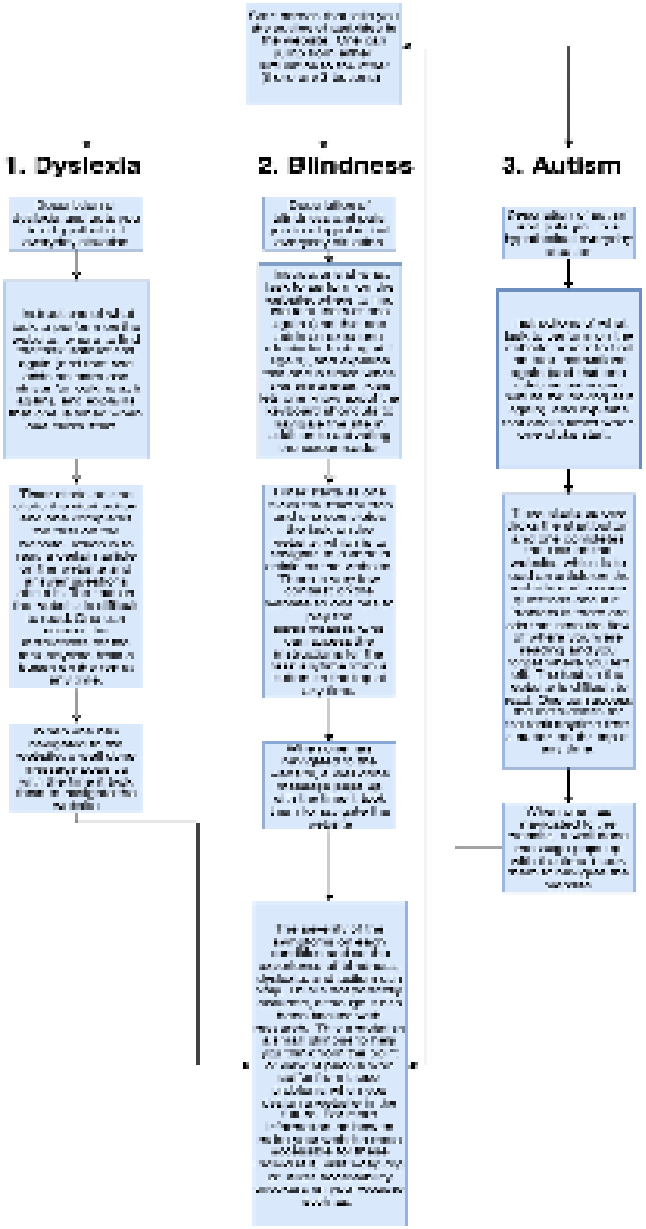
1. Researching about web accessibility issues
2. Creating a personna
3. Creating initial sketches of the site flow and navigation
4. Prototyping the design on Adobe XD
5. Coding the website utilizing HTML, CSS, and Javascript

Website Design Process:

Site Flow

Using Draw.io I mapped out the site flow.

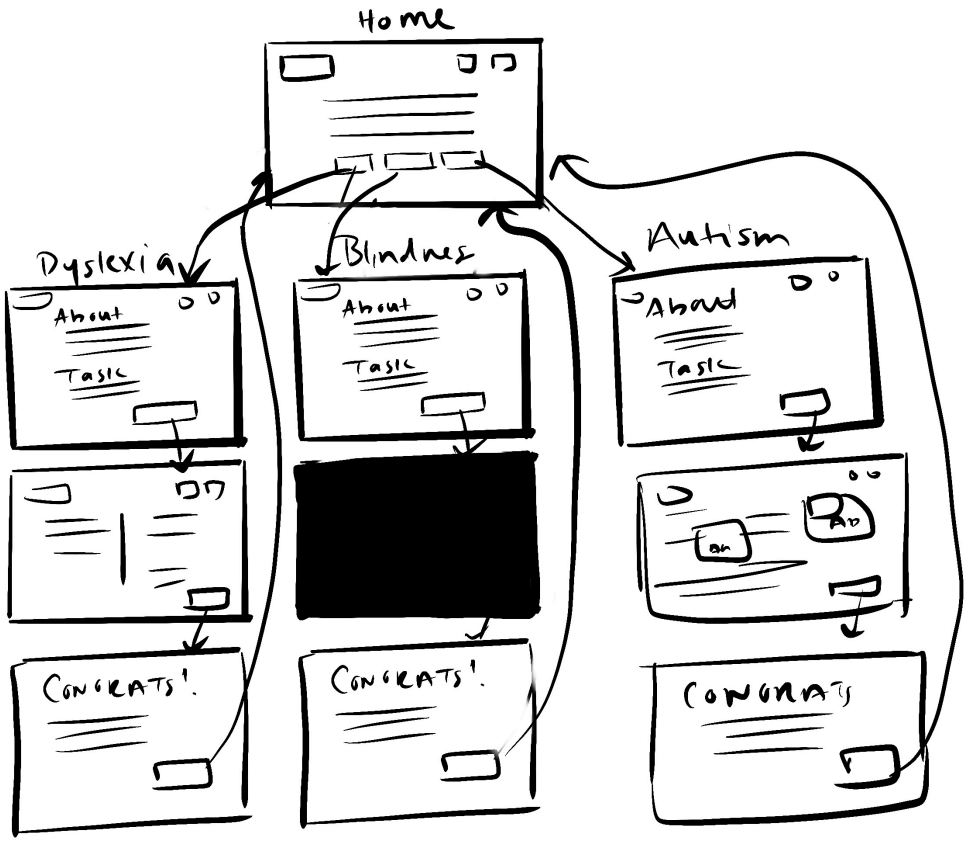
Software Used:



Website Design Process:

Wireframes

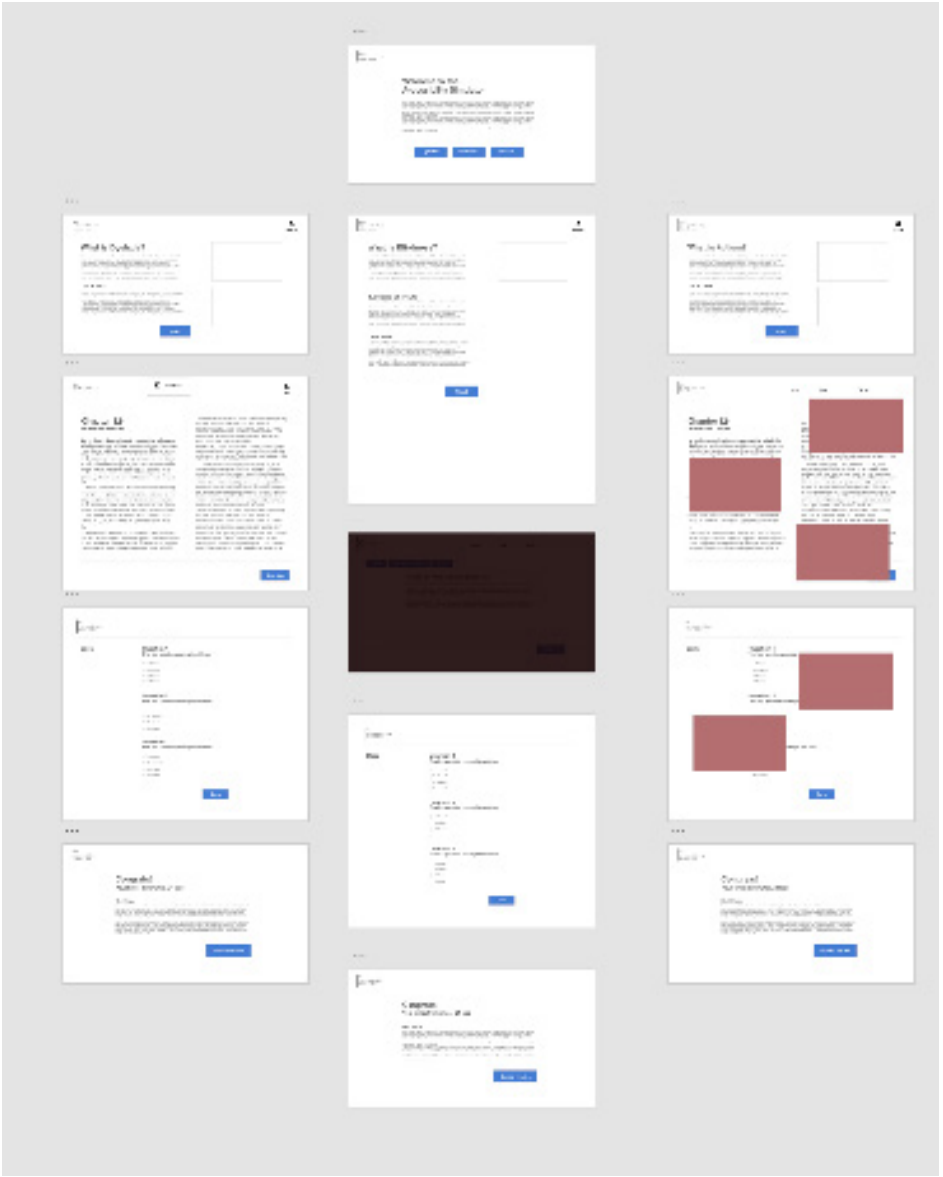
Baed on the siteflow, I wireframed the website to understand the layout and how each element and page of the website would interact with one another.



Website Design Process:
Prototyping

I utilized Adobe XD to prototype the design.

Software Used: Xd

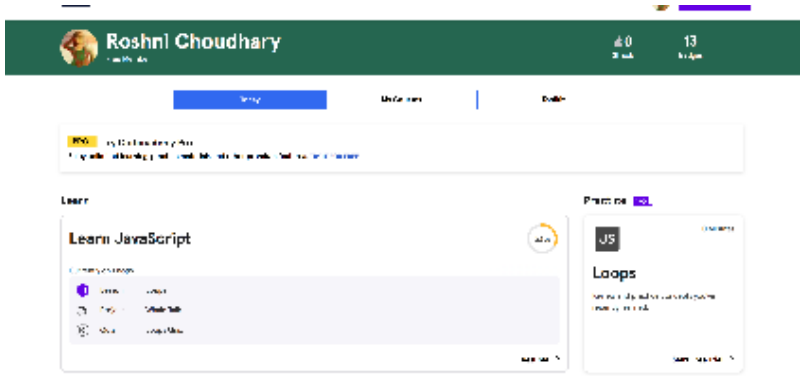


Website Design Process:
Coding

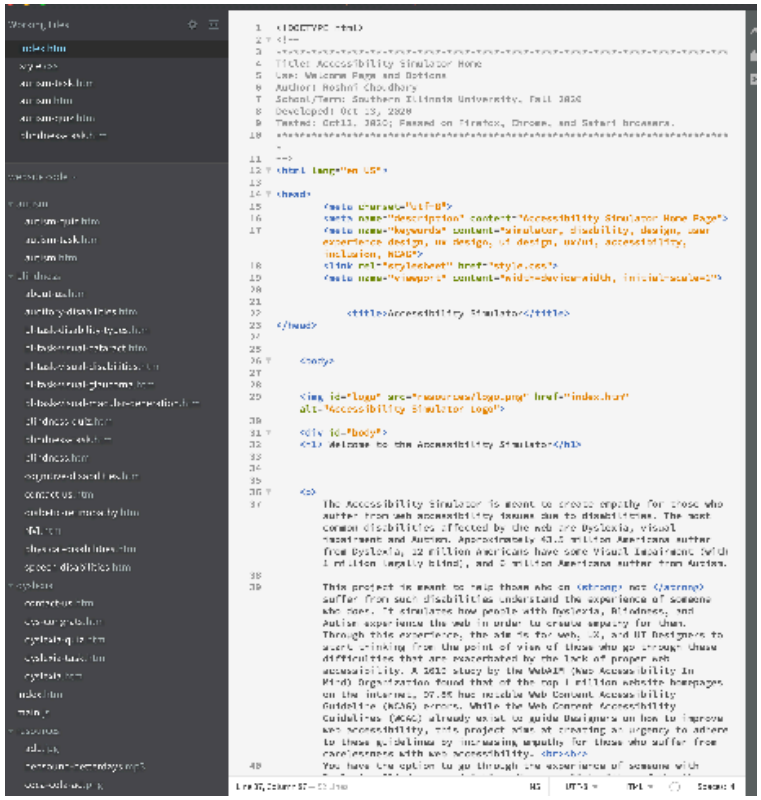
I utilized Brackets to code HTML, CSS, and Javascript. I had never coded in Javascript before, so I learned through Codeacademy. I deployed my website through Github on Github Pages. The website is responsive as well.

Software Used:

Coding Languages: HTML, CSS, Javascript



I made an account on Codeacademy to learn Javascript.



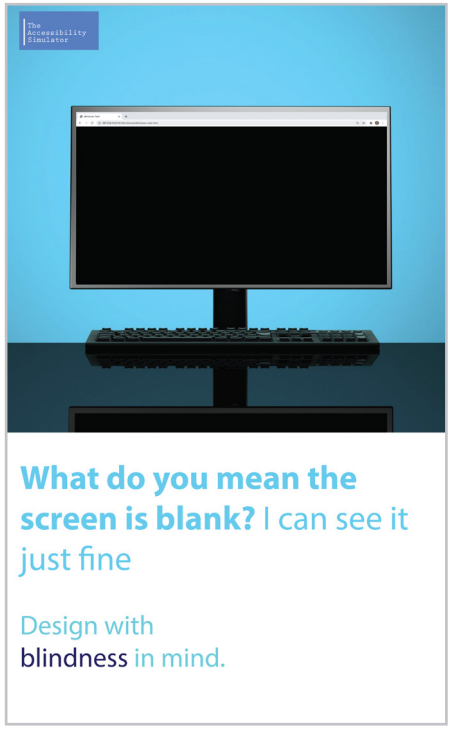
Coding on Brackets

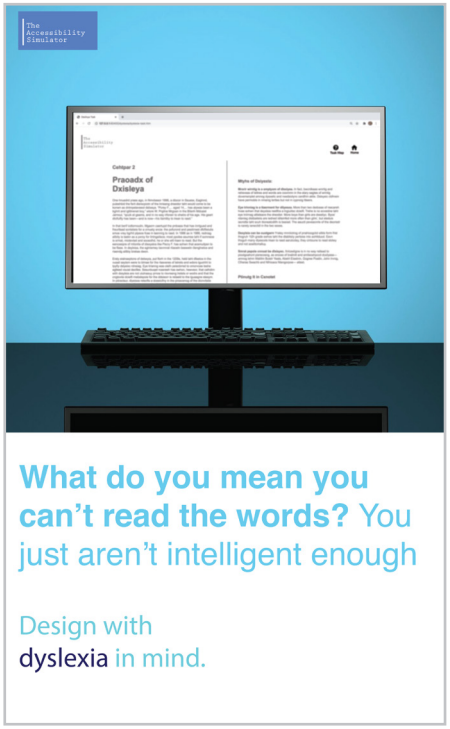
Poster Process

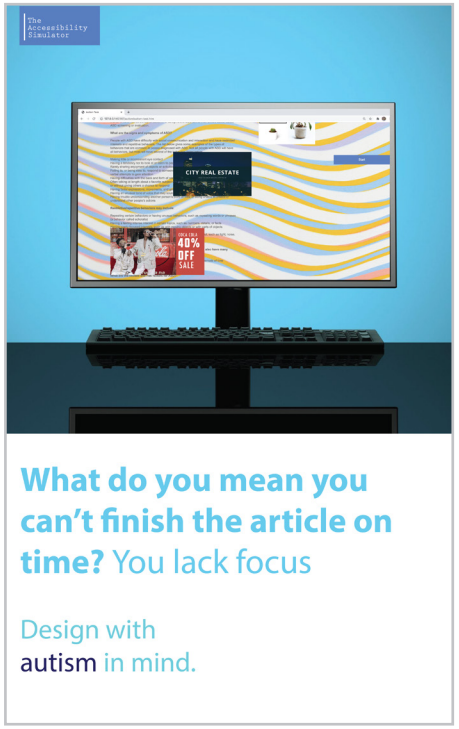
Final Poster Series

I designed the posters so that it showed a glimpse of the difficulty of bad web accessibility and then points out how people who don't suffer from the issues don't understand how others experience it. It is an indirect jab at other's attitudes towards thosse with disabilities so that they can improve their empathy and drive to design products with great accessibility.

Software Used: Ai Ps



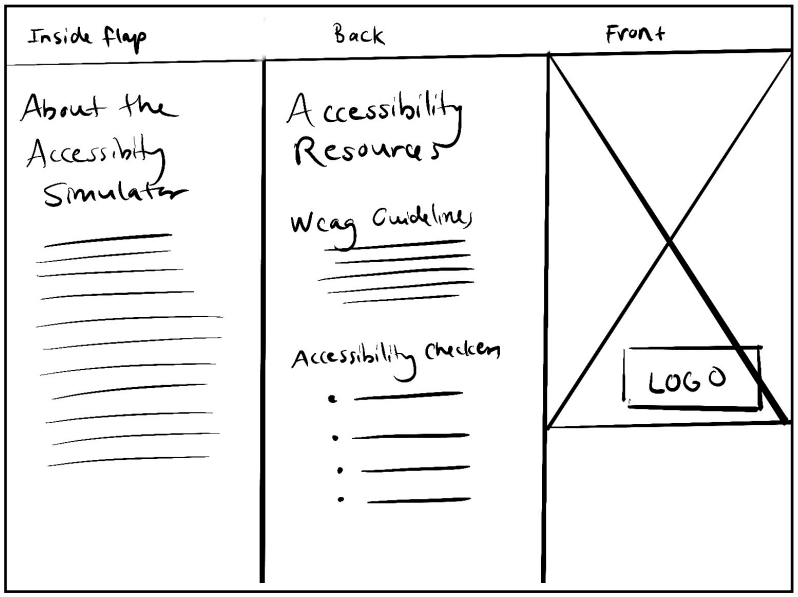


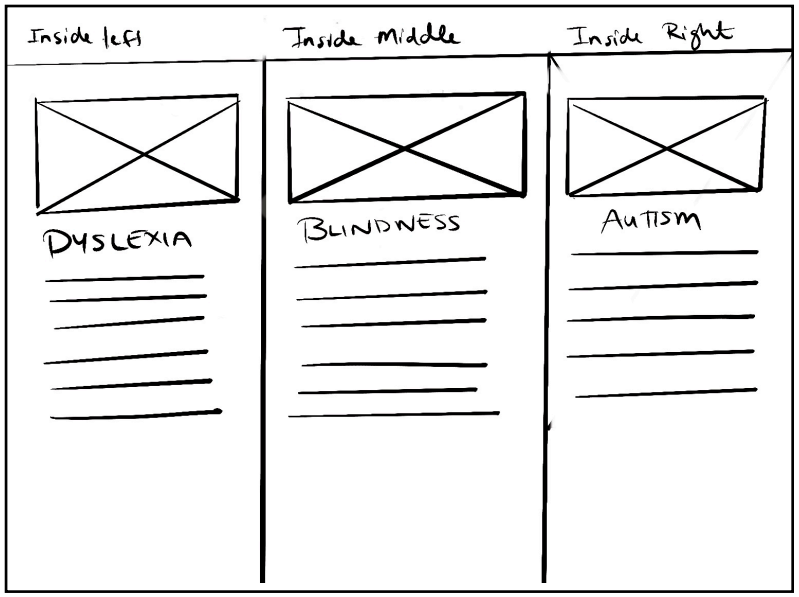


Poster Mockup

Brochure Process

Before designing the brochure digitally I planned out what I needed to include in it as well as how I would layout that information in the correct order.





Brochure

I designed a brochure that could be given out to people at the conference to inform them about the Accessibility Simulator and also how one can design for better web accessibility.

Software Used: Id

What is the Accessibility Simulator?

The Accessibility Simulator is meant to create empathy for those who suffer from web accessibility issues due to disabilities. The most common disabilities affected by the web are Dyslexia, visual impairment and Autism. Approximately 43.5 million Americans suffer from Dyslexia, 12 million Americans have some Visual Impairment (with 1 million legally blind), and 6 million Americans suffer from Autism.

This project is meant to help those who do not suffer from such disabilities understand the experience of someone who does. It simulates how people with Dyslexia, Blindness, and Autism experience the web in order to create empathy for them. Through this experience, the aim is for web, UX, and UI Designers to start thinking from the point of view of those who go through these difficulties that are exacerbated by the lack of proper web accessibility. A 2019 study by the WebAIM (Web Accessibility in Mind) Organization found that of the top 1 million website homepages on the internet, 97.8% had notable Web Content Accessibility Guideline (WCAG) errors. While the Web Content Accessibility Guidelines (WCAG) already exist to guide Designers on how to improve web accessibility, this project aims at creating an urgency to adhere to these guidelines by increasing empathy for those who suffer from carelessness with web accessibility.

Web Accessibility Resources

WCAG Guidelines

The Web Content Accessiblity Guidelines gives guidelines on how to improve web accessibility for your website.
Link:
https://www.w3.org/WAI/standards-guidelines/wcag/

Accessibility Checkers

The IBM Accessibility Checkers
https://www.ibm.com/able/toolkit/tools

WAVE Web Accessibility Evaluation Tool
https://wave.webaim.org/

AI Accessibility Checker
https://accessibe.com/

Disabilities Affected By Web Accessibility

Dyslexia

"Dyslexia is a specific learning disability that is neurobiological in origin. It is characterized by difficulties with accurate and or fluent word recognition and by poor spelling and decoding abilities. These difficulties typically result from a deficit in the phonological component of language that is often unexpected in relation to other cognitive abilities and the provision of effective classroom instruction. Secondary consequences may include problems in reading comprehension and reduced reading experience that can impede growth of vocabulary and background knowledge."

Adopted by the IDA Board of Directors

Design Solutions

-Text is Spaced Out
- Using the Dyslexia Font (www.dyslexiefont.com)
-Breaking up text with images and bullet points

Blindness

Blindness is a lack of vision. It may also refer to a loss of vision that cannot be corrected with glasses or contact lenses.
Partial blindness means you have very limited vision.
Complete blindness means you cannot see anything and DO NOT see light. (Most people who use the term "blindness" mean complete blindness.)
People with vision that is worse than 20/200 with glasses or contact lenses are considered legally blind in most states in the United States.

Design Solutions

-Strong contrast with text
-Making Text Keyboard Accessible

Autism

Autism, or autism spectrum disorder (ASD), refers to a broad range of conditions characterized by challenges with social skills, repetitive behaviors, speech and nonverbal communication. According to the Centers for Disease Control, autism affects an estimated 1 in 54 children in the United States today.

Design Solutions

-Consistent Design
-No distracting design
-Enabling Keyboard Focus

Brochure Mockup

Conference Banner

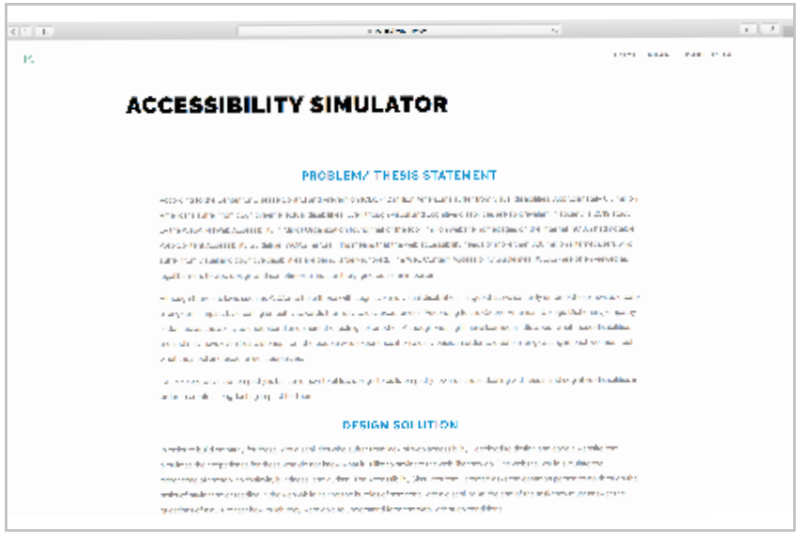
I designed a conference banner to capture the attention of the audience when they would go to a Conference Fair.

Software Used: Ai

Public Exhibition

I shared my senior thesis project to the public through publishing on my website. View it at www.roshnichoudhary.com/accessibility-simulator. I also shared it through instagram posts in the art and design school page and also in my own design instagram and on LinkedIn.

Software Used:



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I also shared my work through Instagram posts in the art and design school page and also in my own Instagram, Facebook, and LinkedIn.

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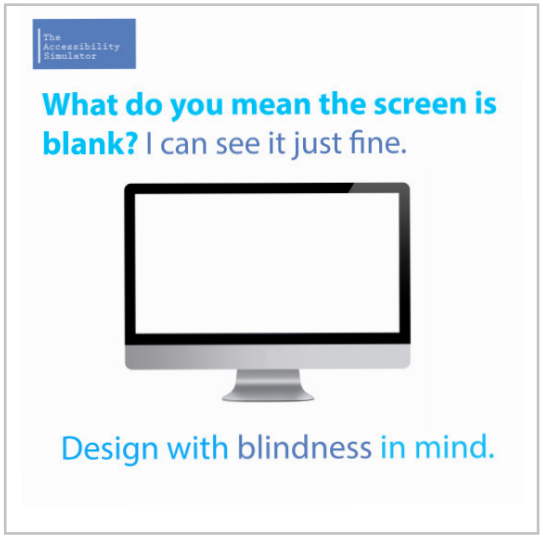

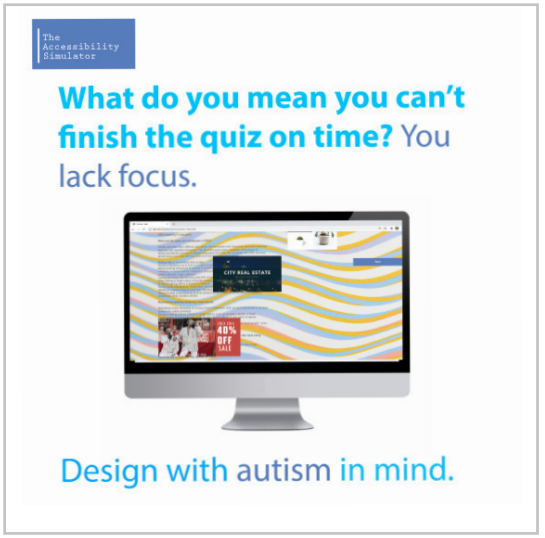

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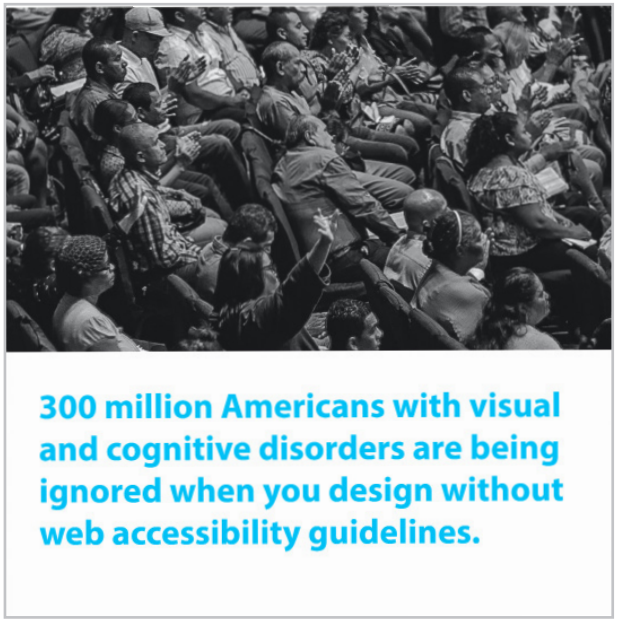

Conclusion

My thesis proposal aimed at trying to improve web accessibility through creating empathy for those with visual and cognitive disabilities affected by the web. I solved this problem through creating the Accessibility Simulator, a website that allows one to go through how it would be like to navigate the web with a disability like dyslexia, blindness, and autism (most prevalent disabilities affected by the web in the US). To create the quickest change in web accessibility I targeted UX and Web Designers who could directly apply what they gain from the simulator to their designs, leading to a surge in web content accessibility guideline compliance.