



## Course project report

IDG2012 - Web Accessibility, Usability and Ethics



## Table of contents

<b>Introduction</b>	<b>3</b>
<b>Research: User needs</b>	<b>3</b>
<b>Design brief and personas</b>	<b>4</b>
<i>Persona 1 – cognitive impairment</i>	4
<i>Persona 2 – auditory impairment</i>	5
<i>Persona 3 – visual impairment</i>	5
<i>Persona 4 – visual impairment</i>	5
<i>Persona 5 – motor disabilities</i>	6
<b>Design report</b>	<b>6</b>
<i>Wireframes for the homepage</i>	7
<i>Wireframes for the subpages</i>	7
<i>Wireframes for the sections, and mobile view</i>	8
<i>High fidelity mockups</i>	9
<b>Accessibility report</b>	<b>10</b>
<i>Dark and light mode examples</i>	12
<b>Accessibility – challenges and solutions</b>	<b>13</b>
<b>WCAG 2.1 Checklist</b>	<b>13</b>
<i>Perceivable</i>	13
<i>Operable</i>	13
<i>Understandable</i>	14
<i>Robust</i>	14
<b>Conclusion</b>	<b>14</b>
<b>Sources</b>	<b>15</b>

# Introduction

This is a website for a music school and has pages with various content, which are made accessible. I used this project to simulate how the website of my mother's music lesson services could look like. I considered blue as her favorite color, thus being the general color palette of this website.

I searched around the internet to gain knowledge of making accessible website for my research part.

## Research: *User needs*

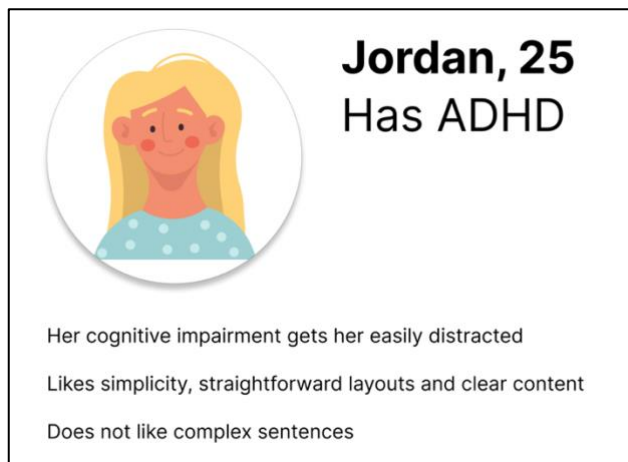
Accessible for	Challenges	Needs
Visual impairment	Vision  Relies on screen reader to access web  Only keyboard, no mouse/joystick	Alt text on images responsive design  sufficient contrasts on text and images (foreground and background)  consistent & predictable navigation  avoid using color alone to identify links or controls
Color deficiency	Hard to distinguish red, green, blue	Do not use color combination of <ul style="list-style-type: none"><li>• green &amp; red</li><li>• blue &amp; yellow</li><li>• green - blue</li><li>• etc.</li></ul>
Auditory impairments	deafness, hard of hearing  multimedia with no caption/transcript	captions for audio/video content  volume controls on media players  options to adjust caption text size and colors on media players  no interaction that rely on using voice only
Motor impairments	inability to use mouse  limited motor control  slow response time	Full keyboard support  Enough time to complete tasks  Simple navigation and general structure

		link and buttons should be clickable size
Cognitive impairments	learning disabilities	Simple navigation and page layouts
	distraction	Avoid complex sentences
	large amount of information	Avoid moving blinking or flickering content
		Videos, animations or auto content able to be paused or stopped


## Design brief and personas

The objective is to design a website for a music lesson school for everyone, considering inclusivity and accessibility. The goal is to create a fully accessible website that provides an enjoyable experience, and will satisfy individuals with various impairments, including visual, auditory, motor, and cognitive impairments. The website aims to be welcoming to all, encouraging an inclusive environment for music education.

### Persona 1 – cognitive impairment



### Persona 2 – auditory impairment




**Jordan, 25**  
Is deaf

Requires captions on audio & video content

Volume controls should be available on multimedia

### Persona 3 – visual impairment




**Sarah, 49**  
Is visually impaired

Relies on screen reader

Cannot see what's on the images

Prefers good contrasts on text and images

### Persona 4 – visual impairment

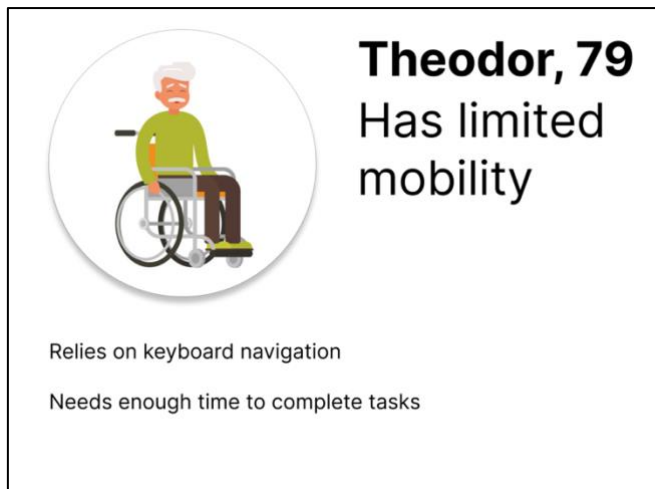


**Alex, 31**  
Is color blind

Difficulty distinguishing red and green

Needs graphs or other visual information to consider his challenge

### Persona 5 – motor disabilities

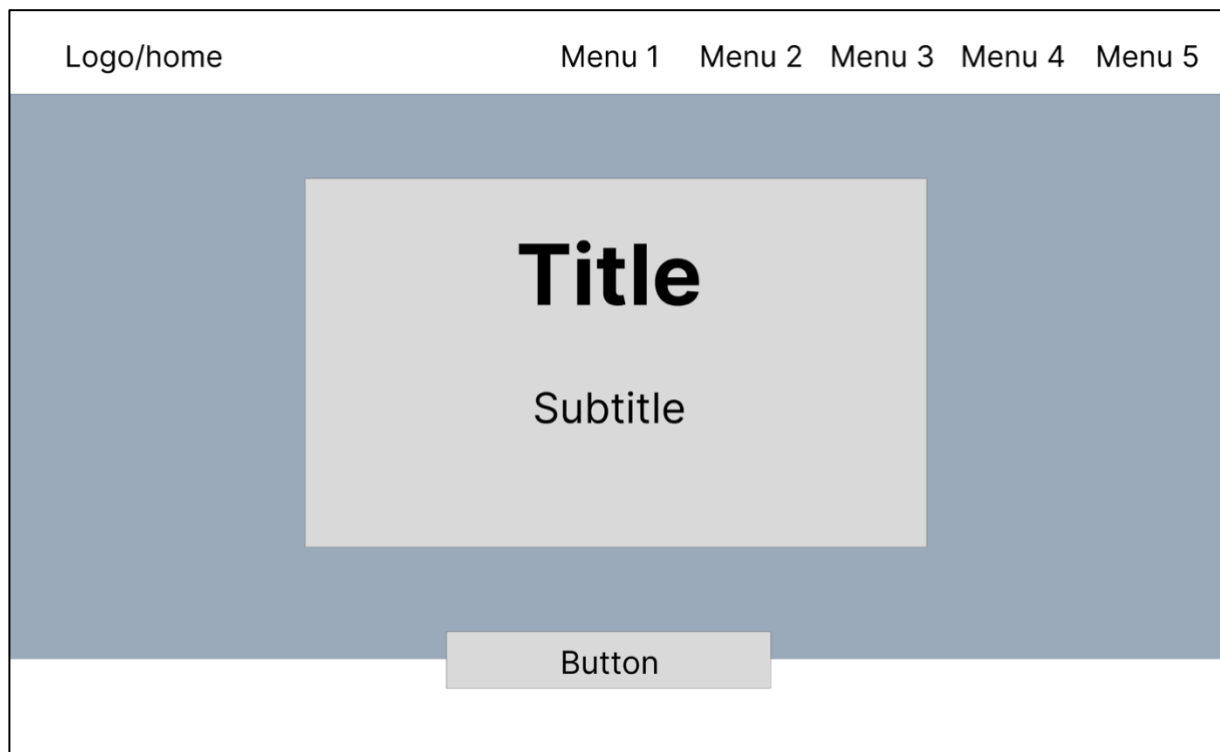


## Design report

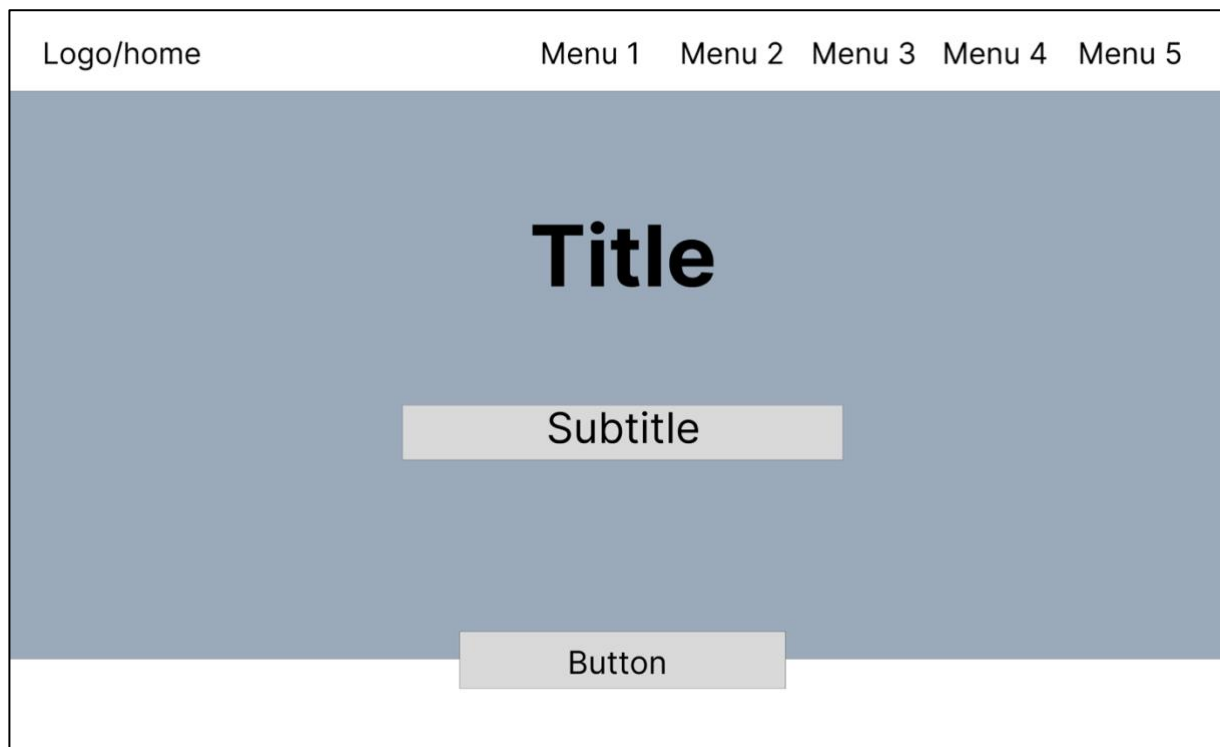
I started to design how I wanted the website to look. I used a software program, Figma, that allowed me to create my design by adding shapes and insert text and images. First, I designed for desktop first, rather than mobile first. The reason is I simply find it easier to make elements responsive from a bigger resolution to a smaller one, especially in the development phase. A term for this is called graceful degradation.

When designing, I was focusing on making it as inclusive and accessible as possible. Whenever I had an idea, I was checking the research data of user needs and challenges if this idea was appropriate. The important demographics were visual impairment, auditory impairment, cognitive impairment, and mobility challenges. This process helped me with considering the objective and goal of this project.

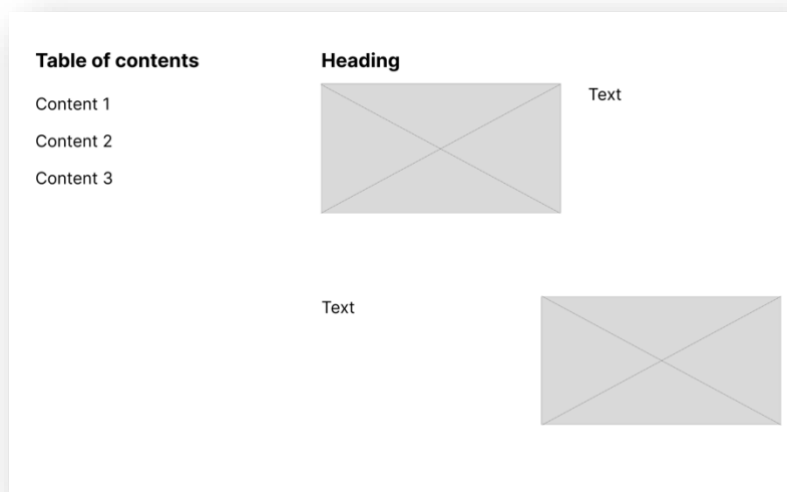
## Wireframes for the homepage



## Wireframes for the subpages



## Wireframes for the sections, and mobile view



To enhance the inclusive design, I started a process where I asked various fellow students in my class and other study programs including interaction and graphic design to gain feedback about my design. This process was a result of gaining feedback about design and usability. I also had a separate session where they could test my website while I was developing it to gain further insight about usability.

I paid attention to color contrast, font sizes and navigational elements. I learnt that alternative text descriptions for images were important to satisfy users with visual impairments, and medias like video and audio should have transcription and captions, both subtitle and closed captions for those with auditory impairments.

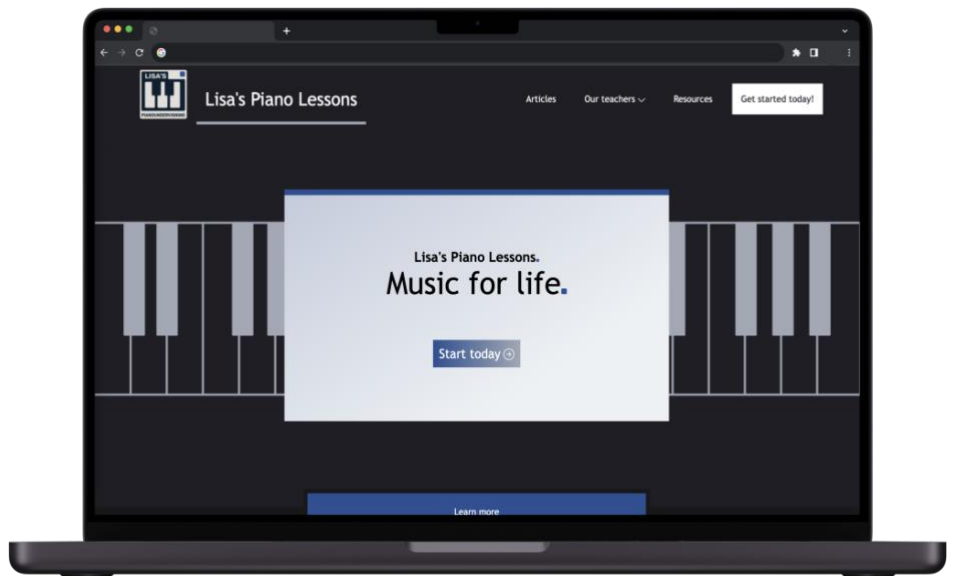
A correct and understandable structure of the interface on the website is crucial for all users in order to make it intuitive when navigating through the website, and the technical/markup part should also be structural, for example with proper hierarchical headings and other semantic tags. This is beneficial for users with mobility challenges who can only access the web with keyboard and screen readers.





After the low fidelity mockups, I jumped over to high fidelity mockups. And with the help of Figma's features and plugins, I could make a mockup that simulates the end-product. The process of designing the high-fidelity mockup was dynamic, as I was able to change and fine tune the design whenever I had an idea. We can safely say the design and end-product are quite similar because of this. Below are the high-fidelity mockups.

### High fidelity mockups



# Accessibility report

I have added various features to ensure accessibility. This includes both visually on the front-end, and the technical part that is on the back-end side. First and foremost is to use grid and flex in CSS, in order to easily convert the layout from desktop to mobile view. I used media queries to specify what and how it should be shown in the specific resolution. This results in making website available for all types of devices, and responsive layout is key to being accessible. With this being the foundation part, I could add other features to it while maintaining accessibility.

When considering visual impairment, I have made sure to add alternative descriptive text on images, so the screen reader can read out what the image is showing for user who are blind. It is also crucial to have proper color contrast on foreground elements and background elements. To test whether the accessibility on this part is fulfilled, I used a Google Chrome extension called "Screen Reader", and another extension called "WAVE Evaluation tool". With the WAVE tool, I could check for any contrast errors, along with other types of errors. The goal of this process was to make it screen reader accessible and have 0 WAVE-errors at the end of the development.

For auditory impairment, I made the website accessible by adding captions for my video. I made sure to add both subtitle and closed captioning. Subtitle will cover the narrator/dialog in the video, and closed captioning will cover for the background noises or music. Also, I ensured to add video controls, and that includes being able to start/stop video, change volume, turn on and off captioning, video speed etc. For the audio media part, I provided a whole transcription of the audio. The transcription can be opened and closed by interaction with a specific element.

Motor challenged users can be unable to use a mouse, so a fully keyboard support is crucial. To make my website support keyboard navigation, my links in the navigation bar can be accessed and navigated by pressing tab on the keyboard. A skip-to-main feature is added, so the user can skip the navigation part, and jump straight to the content of the page if desired. Also worth mentioning, when navigating through with keyboard, the focused elements will have a dashed border around the element, so it is easily to know which element is being selected. The user can of course navigate back and forth by using Tab to go forwards, and Shift+Tab to go backwards.

I have a clear and simple navigation menu, which is also intuitive. This is also empathizing with user with cognitive impairments. The menu that has the submenus, has an arrow down symbol to indicate that this menu can be opened further. Additionally, I avoided complex and long sentences in my project to not cause any distress of these users.

Accessibility made with indications can be found in menu with submenu. As stated earlier, the menu has an extra arrow down. Another indication applied are in the form fields. I have a red star on every field input that are required in order for the form to be submitted. The screen reader will read that fields are required, and also the form consider mistakes by giving

error messages, both visually and auditory. Additionally, when visiting a page, the user can see which page they are on by looking at the underlined text on the menu bar. The title on each page is pretty large and it works like an indication. Lastly, the table with the information have different colors for headers (column and row), and also has the use of scopes in the back-end, so assistive technologies can distinguish between column header and row header.

The form is structured in a way I did not need ordered tab-indexes. It will flow in a natural way. I got this idea by the WAVE tool. It mentioned that if you structure your form well enough, you wouldn't need the use of specified tab-indexes to order your selection. After submitting the form, the user will be met with a pop up asking for a confirmation if you want to submit the form or not. The buttons are big and clear, and you are also trapped within this pop up and must make a decision, whether you approve, disapprove or want to exit with "Escape" key.

Another thing to make my website accessible is by using structural semantic tags. This includes using `<nav>`, `<main>`, `<section>`, `<article>`, `<footer>` etc. These are elements with meaning. Because of this, it was not necessary with the "role" attribute for navigation as I initially put "role='navigation'" on my `<nav>` element. Regarding roles, I did use them for my menus itself. This is because the `<ul>` and `<li>` are generic. `<ul>` would get role "menu", and `<li>` "menuitem".

ARIA stands for Accessible rich internet applications. This provides extra attributes that can help making the site more accessible, especially for assistive technologies. I have used "aria-label" to describe my SVG in my `<h1>`s. Other aria usages include "aria-haspopup" set to true, to indicate that this menu has submenus. Additionally, I have aria-required included in my form to indicate that the field input is required, and lastly, "aria-describedby" to establish relationship with another element, and with this, error messages read out when a mistake has been made in the form.

On mobile view, the navigation turns into a hamburger-menu, a 3 striped menu that you can interact with. It also has a description under the icon to clearly show this is the menu.

In my website, there is a feature where you can skip the table of content. But when you skip this TOC or click on a link within it, you will be scrolled down to the article with a scroll which has a smooth behavior. This is for my own personal preference and can be an issue for people getting nauseous quickly or are sensitive to motion. To consider this, I am checking if the user has set their system preferences to reduced motion. If this is enabled, the smooth scrolling behavior will be turned off. In CSS, the function is "@media (prefers-reduced-motion)".

Another included system preference consideration is if the users whether prefer dark or light mode. I have added "@media (prefers-color-scheme: dark)". Within this function, I added the dark mode version of the website (default is light). The background color of this website, table, form, table of content, focused elements and other background colors dynamically changes based on your system preference.

## Dark and light mode examples

Table of contents

Form

Learn more

Fill out the form to enroll in piano lessons now!

Fields marked with \* are mandatory

\* First name

\* Last name

Child's name (if student)

\* Email

Address

Phone

\* Type of lesson

- Beginner Lessons (kr 198)
- Intermediate Lessons (kr 360)
- Advanced Lessons (Custom price)

Message

Learn

Table of contents

Form

Learn more

Fill out the form to enroll in piano lessons now!

Fields marked with \* are mandatory

\* First name

\* Last name

Child's name (if student)

\* Email

Address

Phone

\* Type of lesson

- Beginner lessons (kr 198)
- Intermediate lessons (kr 360)
- Advanced Lessons (Custom price)

Message

Learn

Detailed information

Type	Beginner lessons	Intermediate lessons	Advanced lessons
Lesson type	Fundamentals and Basics	Technique Refinement	Mastering Complex Pieces
Duration	20 minutes	40 minutes	60 minutes
Instructor	Lisa (Certified Instructor)	Lisa or Alex (Senior Instructors)	Lisa and Guest Instructors
Schedule	Flexible weekdays	Evening slots available	Customized schedules
Materials	Provided by Lisa	Personalized Practice Plans	Advanced Sheet Music
Extras	Fun Music Games	Performance Opportunities	Music Theory Workshops
Price	kr 198	kr 360	Custom pricing for packages

Prices.

20min. kr 198  
40min. kr 360  
Free trial session

Madla Bydelshus.

Åsta Kongemor Gate 20 4044 Høfsløjd  
Monday-Thursday kl 14.00-20.00  
Free parking

Klepp.

Økunevarden 31 4351 Klepp  
Friday-Sunday kl 10.00-21.00  
Free parking

Contact.

Phone: 12345678  
E-mail: lisa-piano-lessons@email.com

Detailed information

Type	Beginner lessons	Intermediate lessons	Advanced lessons
Lesson type	Fundamentals and Basics	Technique Refinement	Mastering Complex Pieces
Duration	20 minutes	40 minutes	60 minutes
Instructor	Lisa (Certified Instructor)	Lisa or Alex (Senior Instructors)	Lisa and Guest Instructors
Schedule	Flexible weekdays	Evening slots available	Customized schedules
Materials	Provided by Lisa	Personalized Practice Plans	Advanced Sheet Music
Extras	Fun Music Games	Performance Opportunities	Music Theory Workshops
Price	kr 198	kr 360	Custom pricing for packages

Prices.

20min. kr 198  
40min. kr 360  
Free trial session

Madla Bydelshus.

Åsta Kongemor Gate 20 4044 Høfsløjd  
Monday-Thursday kl 14.00-20.00  
Free parking

Klepp.

Økunevarden 31 4351 Klepp  
Friday-Sunday kl 10.00-21.00  
Free parking

Contact.

Phone: 12345678  
E-mail: lisa-piano-lessons@email.com

# Accessibility – challenges and solutions

An issue I met with was regarding screen sizes. The task required a 3x3 table. While this table was fully functional on desktop, the mobile view on the other hand, created a horizontal scroll. This is generally caused by an element overflowing parent container. To fix this issue, I figured to put an “overflow: scroll” on the element containing this table. In that way, users can scroll sideways within this table, without it affecting the rest of the page.

Throughout this course, the specific screen reader extension has caused some problems with features that does not happen without screen reader enabled. One of the issues is the skip to main button being automatically focused, when it should be selected only when a user presses the tab once after loading into the site/page. To tackle this problem, I improvised by adding a hidden text before the skip to main button, so the screen reader will focus on that hidden element when loading in. Then this feature will work perfectly as it should.

Something important to notice is that I did not include a tabindex on the paragraph stating “Field marked with \* are mandatory.” This is for a logical reason. The users using a screen reader would normally be blind and would not be able to see those stars anyway. So, a tabindex on that paragraph would be unnecessary. On the other hand, when listening to an audio media, you wouldn’t need to access a transcription through screen reader. But I added a tabindex on the transcript text anyway, to consider if the audio file unexpectedly breaks or gets corrupted. In that way, blind users can listen through the transcription if the audio file is not available for some reason.

## WCAG 2.1 Checklist

In this section I will go through a checklist, based on what I already have written. How I will check is go through relevant points of the main four themes of WCAG 2.1 checklist: Perceivable, Operable, Understandable and Robust.

### Perceivable

In this section it is important to have alternative text for images. Captions for both video and audio are crucial. My website is adaptable with my responsive layout and has meaningful sequences, including form and hierarchical structure. For distinguishable, the color contrasts are considered and overall text spacing, and font sizes are adjusted for optimal accessibility.

### Operable

The project is fully accessible and supports keyboard navigation. And the elements have a border around the element to indicate which element you are currently selecting. The pop-

up stays there until you make a decision, so you have enough time and don't need to stress about time limits. Video and audio have controls where you can stop, play, change volume etc. You can also show/hide transcription by interacting with the element.

### Understandable

The website has a consistent layout and navigation menu. All the fields in my form have labels that clearly shows what label belongs to which field input. The user also will get error messages if any mistakes are made. It is error tolerant. Overall, the page uses simple language.

### Robust

Lastly, the project is robust because it ensures consistent and reliable user experience across various platforms and screen sizes, as well as assistive technology like screen readers.

## Conclusion

To summarize, in this report I have gone through the iteration process of my design, including making low-fidelity and high-fidelity mockups, design brief and personas – based on my user needs research. The important demographics to consider are users with visual, auditory, cognitive, and motor impairments. The development process was educational for me, as I was applying various technical, accessible features I learnt throughout the web accessibility course onto my website. I have also gone through the (successful) process of checking if the website is screen reader accessible, and receiving 0 WAVE-errors feedback.

To highlight the best parts: the website is fully supporting keyboard navigation and assistive technologies like screen readers can be used to navigate my website. It has skip to main, skip 8x4 table and skip table of contents feature, thus going the extra mile of providing a table of contents. The user can open and close the transcription for audio media, and video media has both subtitle and closed captions. The form is error tolerant and has a pop up that requires users to make a decision before continuing. And objectively, the structure, interface and layout are consistent, comprehensible and intuitive.

Something that is worth mentioning is that additionally to meeting the relevant checkpoints of WCAG 2.1's checklist, this project also considers user's system preferences. If the user whether prefers dark or light mode, they will be satisfied – based on what they have set as their preferred color scheme. Additionally, if a user has their reduced motion setting enabled, they will avoid getting nauseous of the website's default "smooth scrolling" behavior when clicking on internal links.

# Sources

Accessibility Checker. (n.d.). Deaf Accessibility: Understanding Barriers and Solutions. Retrieved from <https://www.accessibilitychecker.org/blog/deaf-accessibility/>

Fuzzy Math. (2023). Improve Accessibility for Visually Impaired Users. Retrieved from <https://fuzzymath.com/blog/improve-accessibility-for-visually-impaired-users/>

NYC Design. (2022). Web Accessibility for Physical or Motor Impairments. Retrieved from <https://medium.com/nyc-design/web-accessibility-for-physical-or-motor-impairments-4fe5e170e375>

W3C. (2018). Web Content Accessibility Guidelines (WCAG) 2.1. Retrieved from <https://www.w3.org/TR/WCAG21/>

W3C. (2022). Cognitive Accessibility Guidance. Retrieved from <https://www.w3.org/WAI/WCAG2/supplemental/#cognitiveaccessibilityguidance>