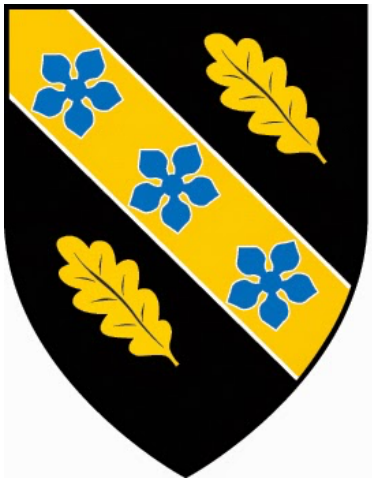
HTML & CSS Web Development



PRIFYSGOL CYMRU
Y Drindod Dewi Sant
UNIVERSITY OF WALES
Trinity Saint David

Siobhan Kelly Stephens
1800709

02nd May 2019

Internet Technology and Security

School of Applied Computing

Abstract

This report outlines the author's design, implementation and evaluation of a website created for the Internet Technology and Security module. The website is a personal portfolio hosted on the Amazon Web Services platform with a custom domain, allowing users to find out more information about the author's education, career, and hobbies. The website has been created by following modern HTML and CSS standards, along with JavaScript and the Bootstrap framework. The Web Accessibility Initiative has been considered throughout the process and the website aims to meet the four principles of the WAI.

Table of Contents

1. Introduction 3
2. Requirements 4
   - 2.1. Purpose and Design 4
   - 2.2. Target Audience 6
   - 2.3. Standards 7
3. Implementation 8
   - 3.1. Overview 8
   - 3.2. Pages 8
     - 3.2.1. Index Page 8
     - 3.2.2. Education Page 11
     - 3.2.3. Career Page 14
     - 3.2.4. Horses Page 17
     - 3.2.5. Hobbies Page 20
     - 3.2.6. Contact Page 23
   - 3.3. Standards 25
     - 3.3.1. HTML Validator 25
     - 3.3.2. CSS Validator 26
   - 3.4. SEO 27
4. Evaluation 29
   - 4.1. Accessibility 29
   - 4.2. Standards 30
   - 4.3. Overview 30
5. References 32

1. Introduction

This report will outline the process of designing, developing and evaluating a website created for the Internet Technology and Security module. The website will use modern technologies and frameworks, including HTML5, CSS3, JavaScript and Bootstrap. Web development standards and Search Engine Optimisation will be considered and implemented throughout the project.

The Web Accessibility Initiative will also be considered during the development of the website, as disability affects 1 in 5 in the UK. This includes 11 million with hearing loss and 2 million with sight-loss or impairments, and of these 11 million, almost 30% have dexterity problems [1]. This indicates that modern websites must be able to cater to these users.

Once developed, the website's HTML and CSS will be validated to ensure it follows standards and does not contain any errors. Finally, the website's accessibility will be evaluated against the Web Accessibility Initiative using a range of tools, considering its use for impaired users, along with its overall design, look and feel, and content.

2. Requirements

2.1. Purpose and Design

The purpose of the website is to represent the author as a personal portfolio and CV. It will contain information on her qualifications, career experiences, personal life and hobbies.

It will contain six pages: a home page; a career page; a hobbies page; a horses page; an education page and a contact page.

For the purposes of development and testing, the website will be hosted using an Amazon Web Services (AWS) S3 bucket [2]. AWS S3 provides 11 9's of durability, therefore ensuring that the website is almost always accessible. The website will use the author's custom domain, http://www.siobhanstephens.co.uk/ for the length of this project. Further to this, the website will be developed using the Google Chrome browser (version 73.0.3683.103).

Google fonts [3] will be used to source the various fonts for the website, the specifics of which will be outlined in the wireframe diagrams below.

The website's colour scheme will be various shades of grey and pink, as shown in figure one below.

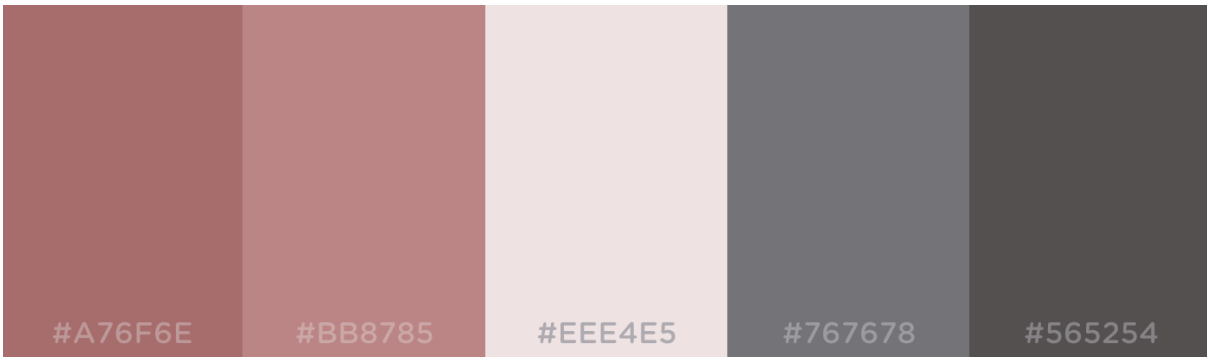


Figure 1. HTML Page Colour Scheme

The webpages will follow a similar format, all sharing the same header and footer, as shown in the wireframe diagram below in figure two. All pages however will contain different background images that may/may not represent the current page. Some background images will be the author's own, and some will be licence free images sourced from Pexels [4].

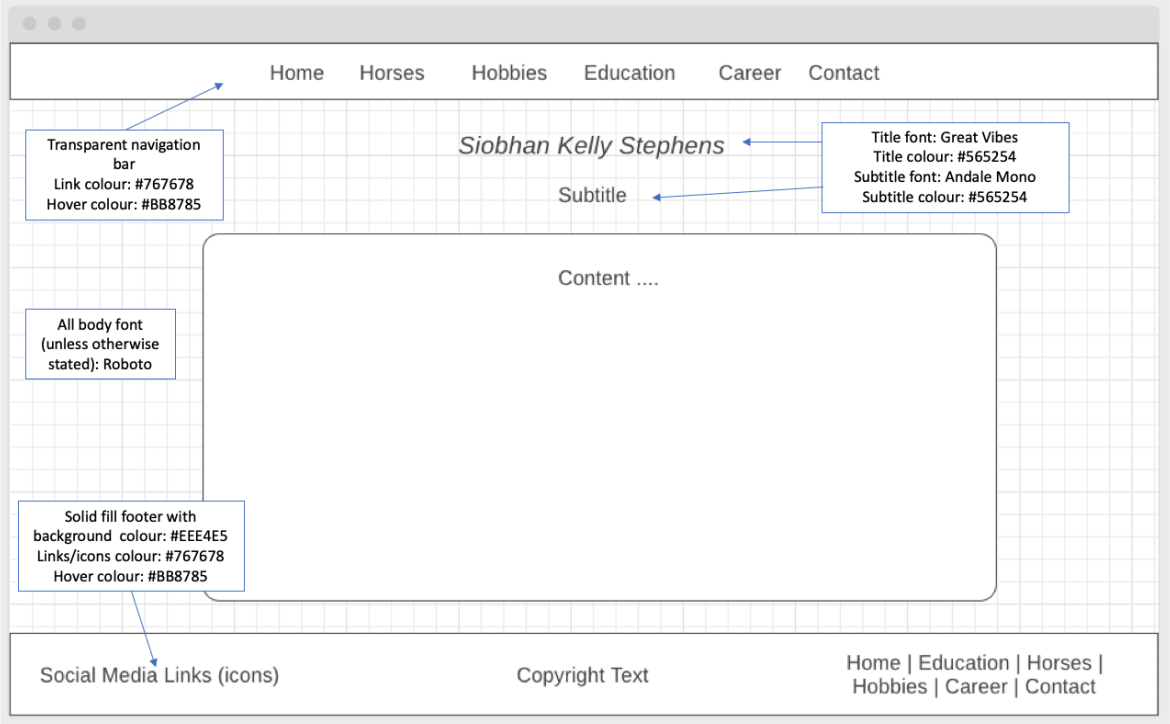


Figure 2. Wireframe diagram for all pages

The home page will feature a minimalistic design and will follow a slightly different design from the other pages, as shown below in figure three.

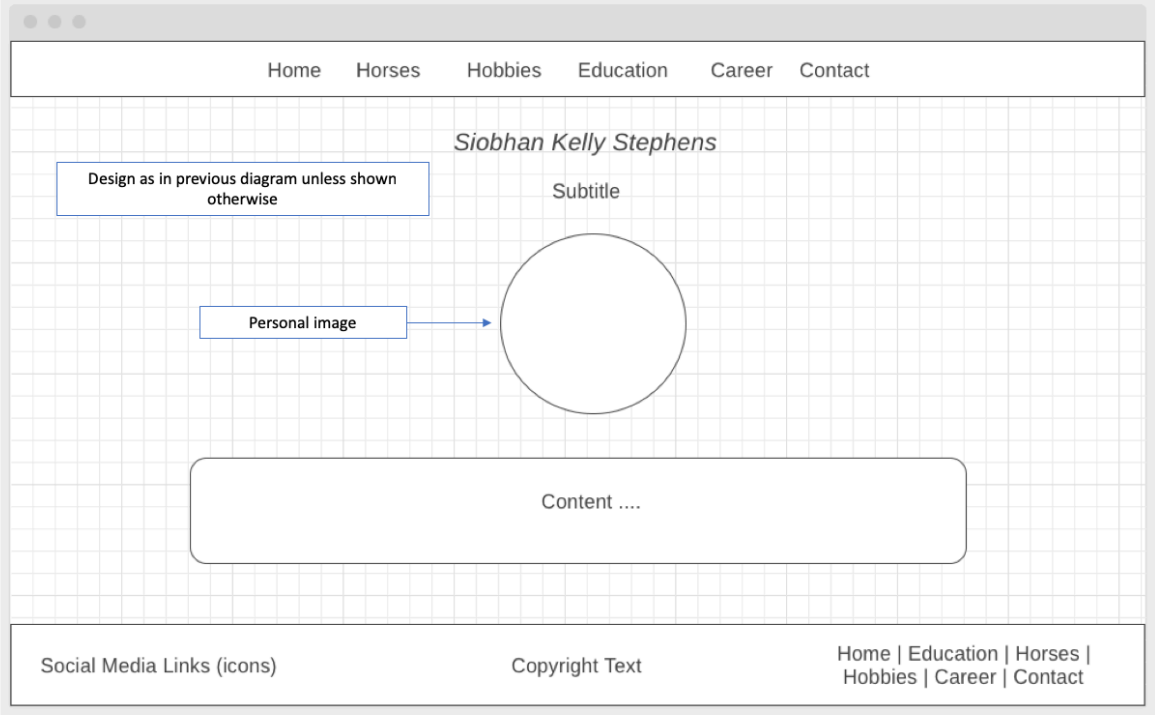


Figure 3. Diagram for index page design

Icons will be used throughout the website to represent certain links, or to add a graphical element to the content. Font Awesome [5] will be used to source these icons as they provide a simple embedding service and are free to use.

The website will be responsive and therefore mobile friendly, however will not follow mobile-first design standards. As a result, the website will be best viewed on a computer or laptop monitor.

A general wire-frame diagram of how the website will look on mobile is shown below in figure four.

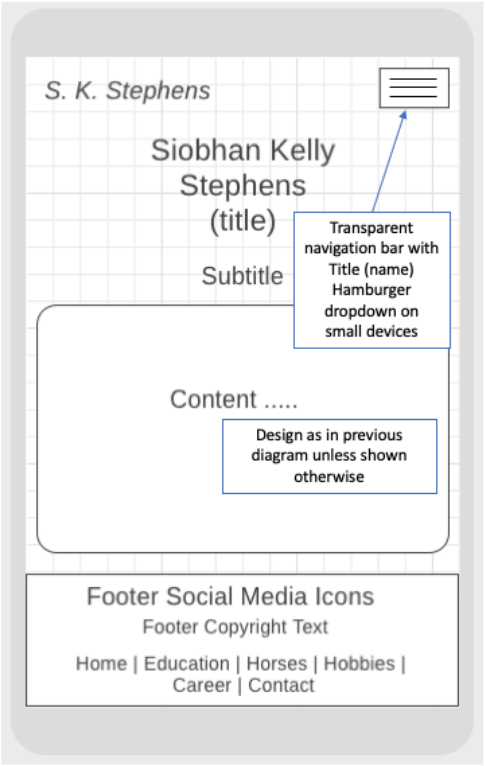


Figure 4. Design diagram for mobile devices

In order to improve the website's user friendliness, a CSS and JavaScript loader will be used whilst loading each web page [6]. This will be done due to the fact that the web pages will use background images instead of faster loading plain background colours, and pages will also contain other images. However, images used on the website will be compressed using Squoosh [7], which compresses images to much smaller sizes without a noticeable drop in image quality, allowing them to be loaded far more quickly.

2.2. Target Audience

The target audience of the website will be colleagues, potential employers and other interested parties, with an estimated age range of 19 – 55. As a result, the website must maintain a consistent design as to look professional and represent the author well.

2.3. Standards

The website will be created using HTML5 [8] and CSS3 [9] plus some basic JavaScript [10]. Correct standards will be followed for all three and will evaluated in section four of the report. The testing will use common tools including the W3C HTML [11] and CSS [12] validators.

The website will make use, where possible, of the bootstrap framework [13], including the navigation and footer bars, along with the use of bootstrap cards and other elements. It will use the bootstrap 12-column grid, which will be used to design the website firstly for desktop but will use device viewport appropriate classes to hide/show/rearrange the web page items for mobile and smaller devices if necessary.

Bootstrap helpers such as ml-1 (margin-left) [14] will be used to implement margin and padding where necessary, however it is expected that custom CSS helpers will be required.

The website will incorporate some on page SEO, or Search Engine Optimisation, through the use of correct tags including alt and meta data tags. On-page SEO refers to optimising web pages to help them rank higher in search engine results [15].

3. Implementation

3.1. Overview

Development and testing will be undertaken using a monitor of 2880 x 1800 pixels, using the Google Chrome browser (version 73.0.3683.103). As stated previously, the website has not been designed as mobile-first, but instead desktop, however the website will be responsive and mobile friendly.

3.2. Pages

Below are screenshots of each of the website pages on 3 different device sizes aiming to replicate desktop, tablet and mobile devices using Google Chrome Inspection tools.

3.2.1. Home Page

The home page is the first page a user will get to when visiting the site, therefore it is simple but contains some information regarding the author.

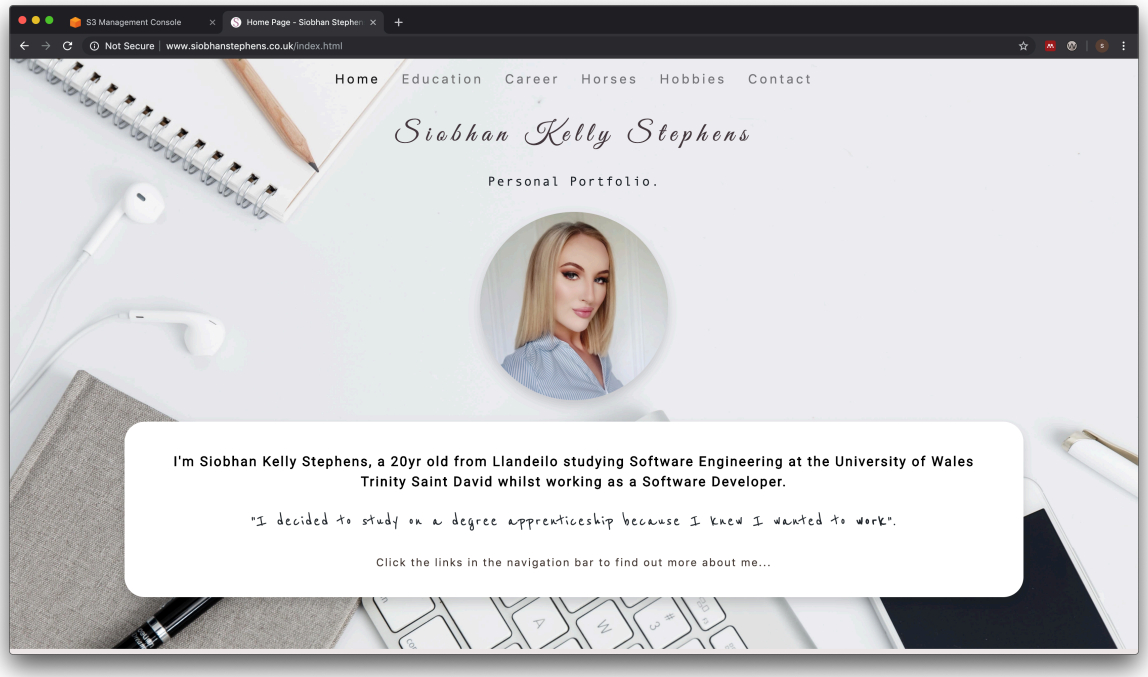


Figure 5. Home page - Desktop (2880 x 1800 pixels)



Figure 6. Home Page - iPad (768 x 1024 pixels)

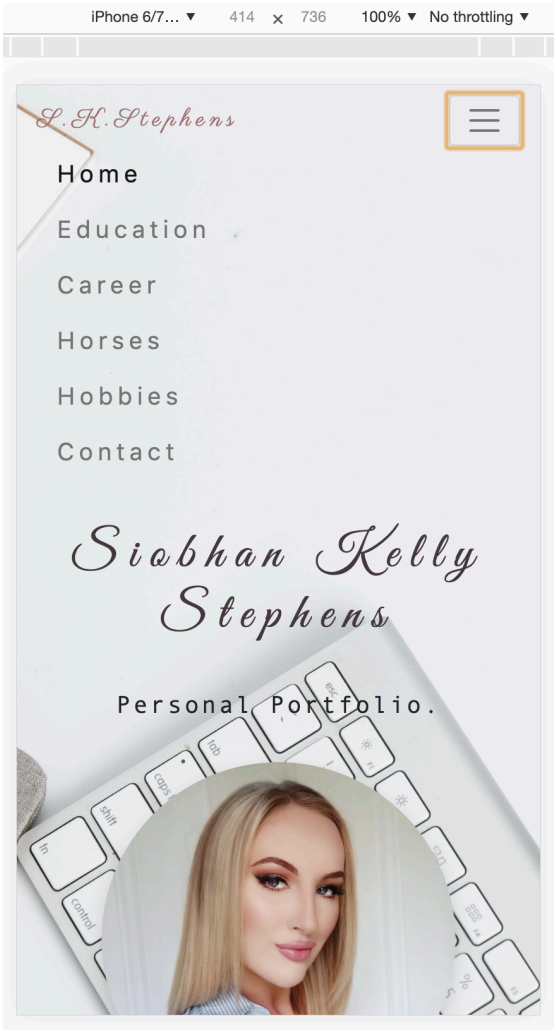


Figure 7. Home Page - iPhone 6/7/8 (414 x 736 pixels)

3.2.2. Education Page

The education page outlines the author's previous and current education, including GCSE's, A-Levels, primary education and current degree.

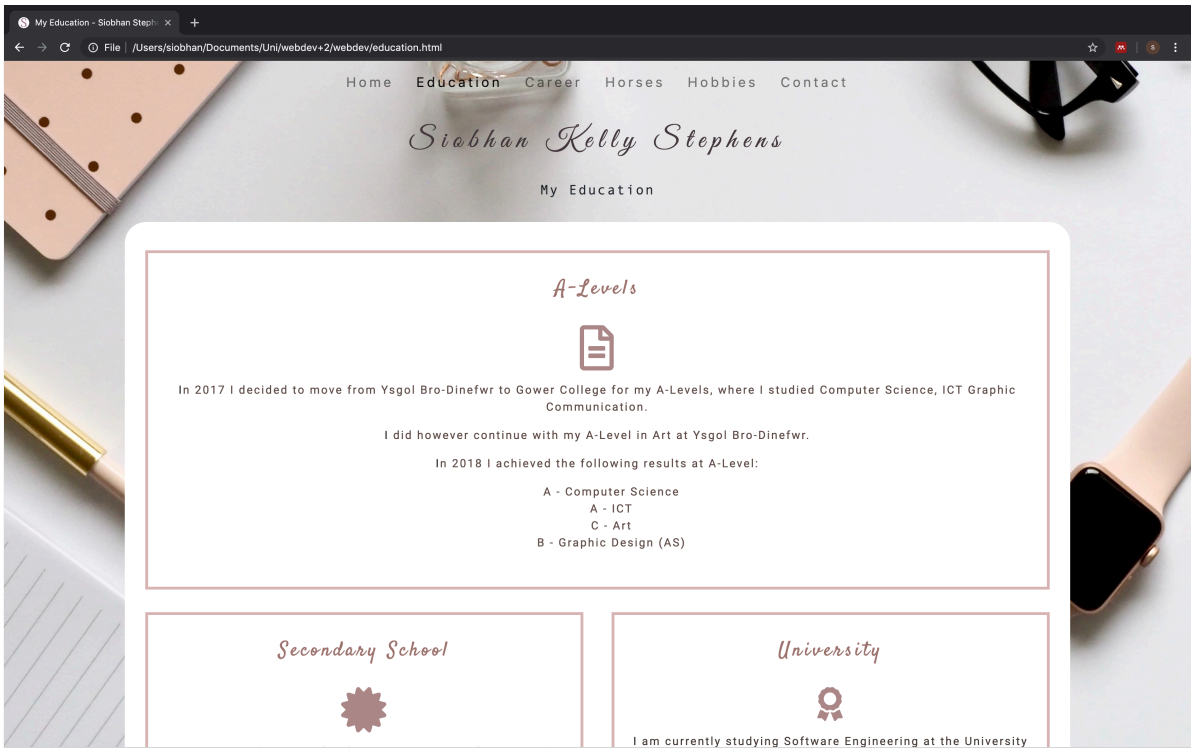


Figure 8. Education Page - Desktop (2880 x 1800 pixels)

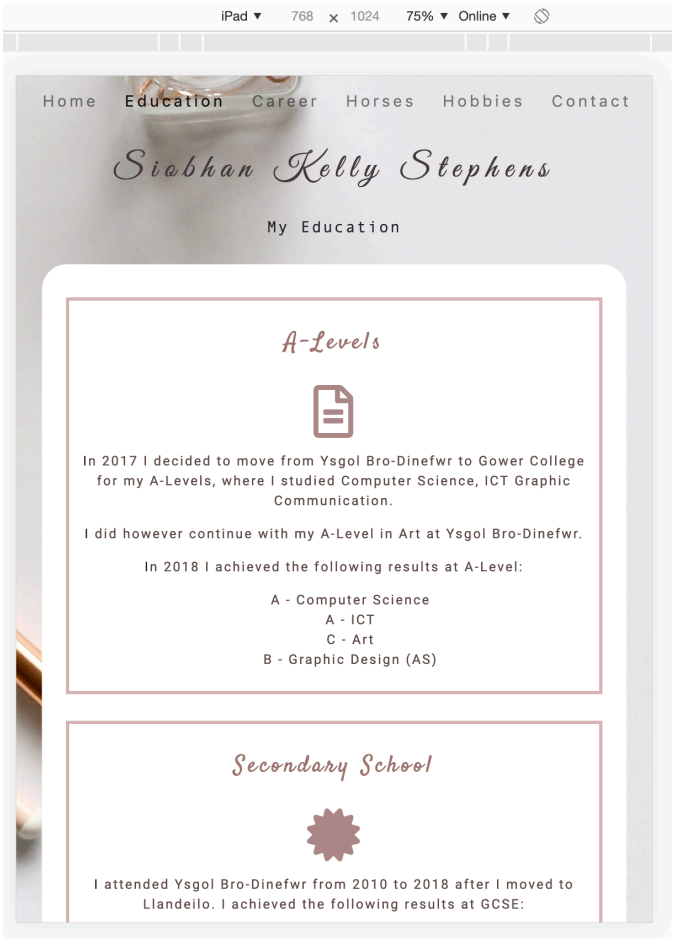


Figure 9. Education Page - iPad (768 x 1024 pixels)



Figure 10. Education Page - iPhone 6/7/8 (414 x 736 pixels)

3.2.3. Career Page

The career page contains a simple bar-chart to represent the author's current estimated skill level for the stated languages / technologies. It also uses simple icons to head boxes containing snippets of information regarding the author's experience.



Figure 11. Career Page - Desktop (2880 x 1800 pixels)



Figure 12. Career Page - iPad (768 x 1024 pixels)

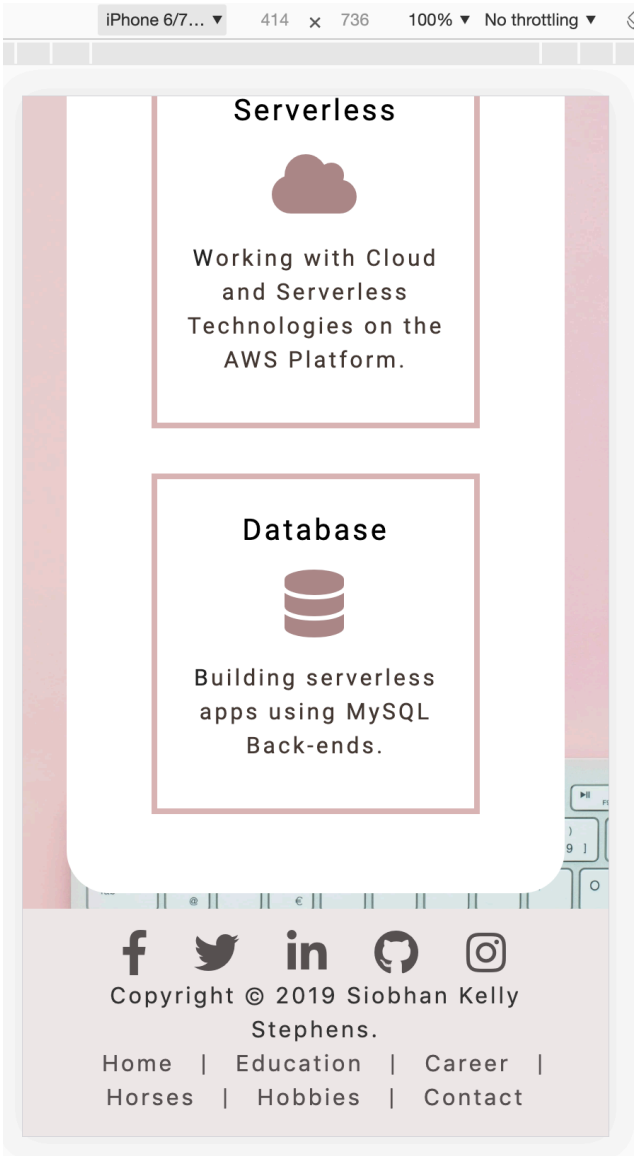


Figure 13. Career Page - iPhone 6/7/8 (414 x 736 pixels)

3.2.4. Horses Page

The horse's page makes use of bootstrap cards, a simple slideshow and an embedded YouTube video. It has a simple description for each horse including their ages.

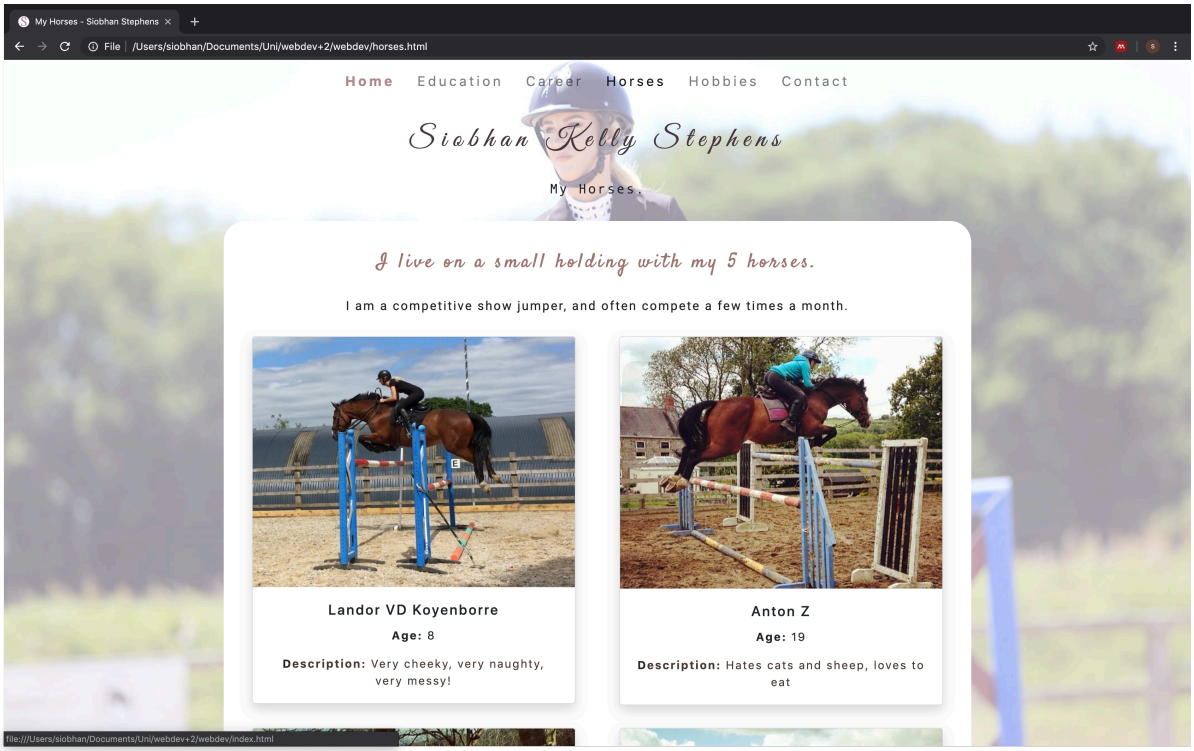


Figure 14. Horses Page - Desktop (2880 x 1800 pixels)



Figure 15. Horses Page - iPad (768 x 1024 pixels)

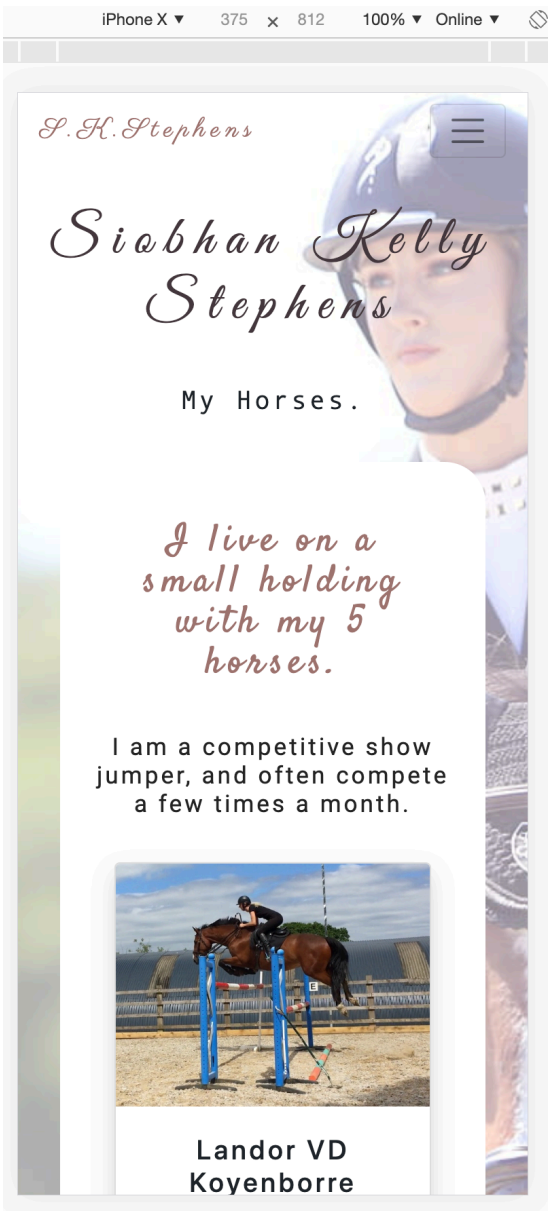


Figure 16. Horses Page - iPhone X (375 x 812 pixels)

3.2.5. Hobbies Page

The hobbies page uses embedded content from the author's Instagram feed to represent their favourite hobbies and interests.

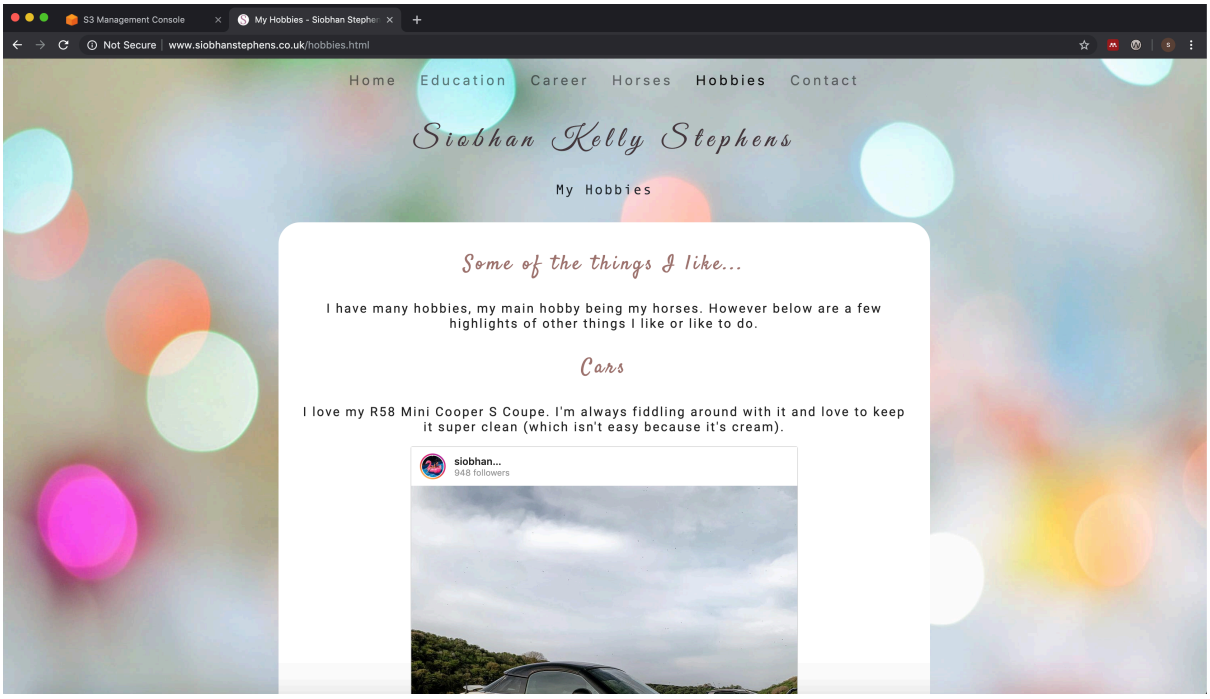


Figure 17. Hobbies Page - Desktop (2880 x 1800 pixels)

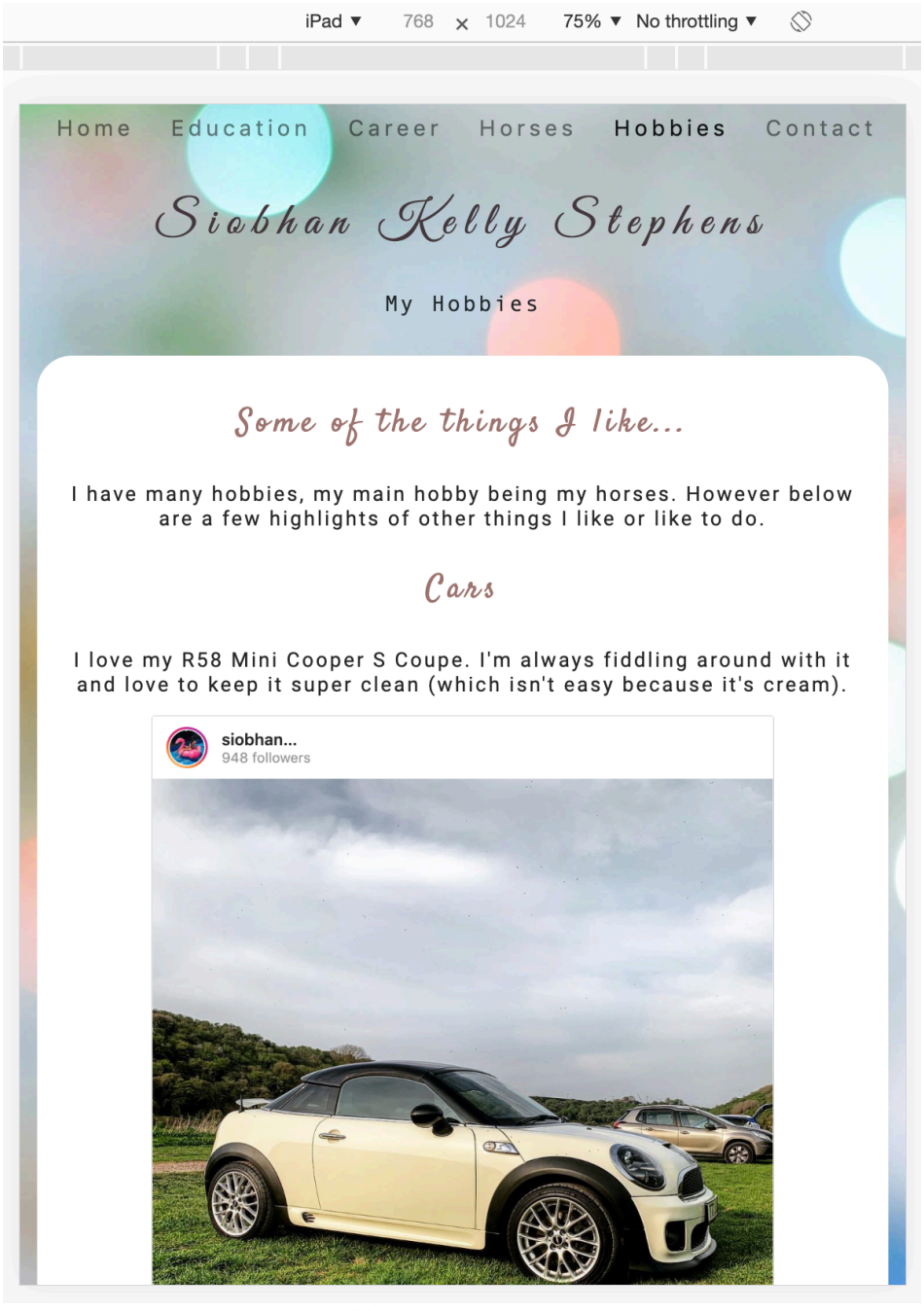


Figure 18. Hobbies Page - iPad (768 x 1024 pixels)

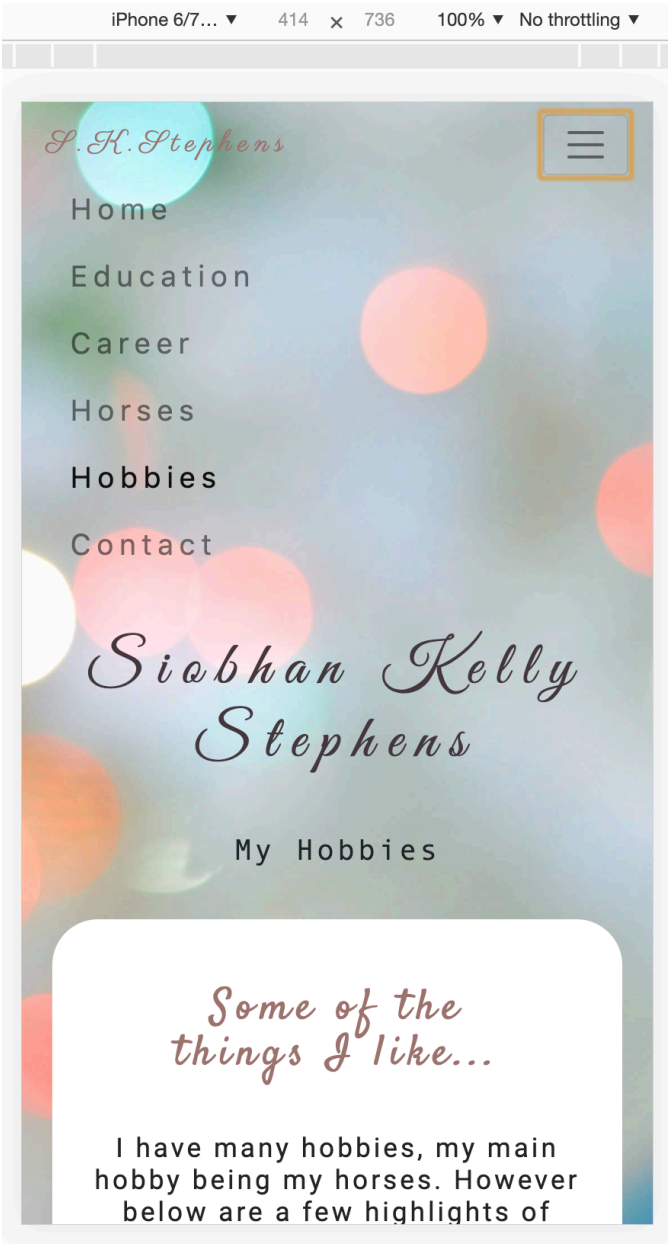


Figure 19. Hobbies Page - iPhone (414 x 736 pixels)

3.2.6. Contact Page

The contact page uses a simple bootstrap form (no back-end implemented) to allow a user to send a message to the author.



Figure 20. Contact Page - Desktop (2880 x 1800 pixels)



Figure 21. Contact Page - iPad (768 x 1024 pixels)

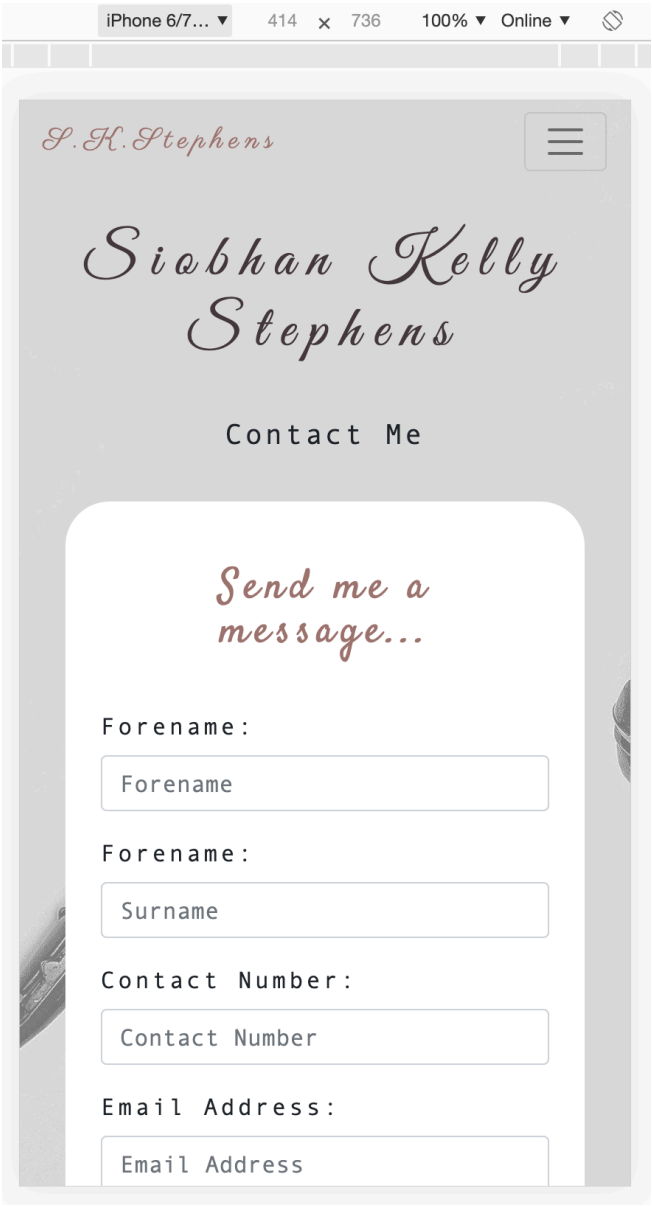


Figure 22. Contact Page - iPhone (414 x 736 pixels)

3.3. Standards

Below are the results of comparing the individual web page's HTML and CSS files against both a HTML and CSS validator.

3.3.1. HTML Validator

Each web-page was tested against the W3 HTML Validator [11]. Below, in figure 23, is an error highlighted by the validator relating to the home page.

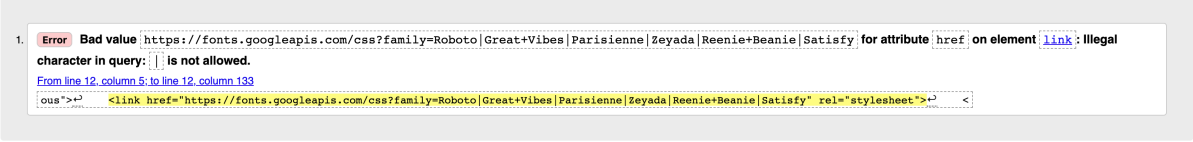


Figure 23. HTML Validator Result for Index Page

The error relates to the following line of HTML in the home page:

```
<link
href="https://fonts.googleapis.com/css?family=Roboto|Great+Vibes|Parisienne
|Zeyada|Reenie+Beanie|Satisfy" rel="stylesheet">
```

In order to resolve the error, the Google Fonts API link was split into separate statements as below:

```
<link href="https://fonts.googleapis.com/css?family=Roboto"
rel="stylesheet">
<link href="https://fonts.googleapis.com/css?family=Great+Vibes"
rel="stylesheet">
<link href="https://fonts.googleapis.com/css?family=Parisienne"
rel="stylesheet">
<link href="https://fonts.googleapis.com/css?family=Satisfy"
rel="stylesheet">
```

The index page was then re-tested using the HTML validator and produced the following result.



Figure 24. HTML Validator Result for Re-try on Index Page

After making small changes to the other pages, which contained the same error, they were tested using the same HTML validator. The table below outlines the results for the tests.

Table 1. Results from HTML Validator

Page Name	Test Result	Error	Fix
Education	"No errors or warnings to show."	N/A	N/A
Career	"No errors or warnings to show."	N/A	N/A
Horses	"No errors or warnings to show."	N/A	N/A
Hobbies	Errors found.	Errors including incorrect values all relating to the external embedded content (provided by Instagram)	No fix required, as the content is displayed correctly, and the code was not produced by the author.
Contact	"No errors or warnings to show."	N/A	N/A

3.3.2. CSS Validator

In order to test the validity of the website's CSS, the CSS file main_css.css was tested using W3's CSS validator [12]. The result of which can be found below.

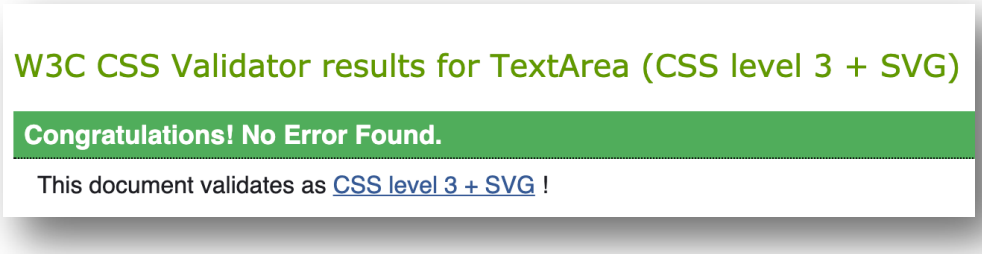


Figure 25. CSS Validator Result for main_css.css

The website contains a total of 3 CSS files, therefore it is important to test the other two files. The results of the validity tests for both can be found below.

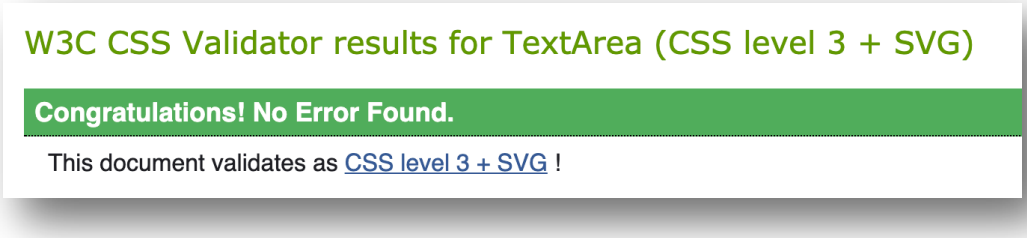


Figure 26. CSS Validator Result for loader.css

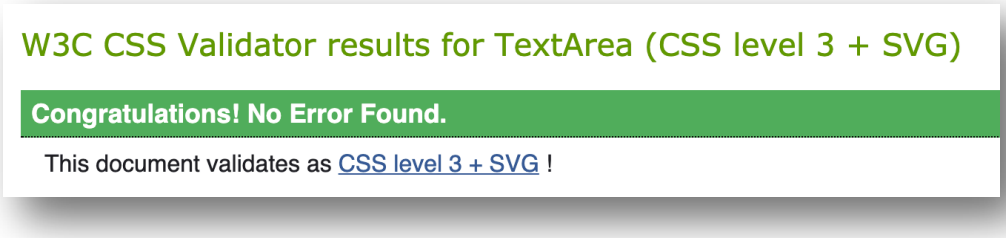


Figure 27. Figure 28. CSS Validator Result for slideshow.css

3.4. SEO

In order to meet basic on-page Search Engine Optimisation (SEO) guidelines, the web pages all contain relevant title tags and meta content description tags, such as the ones found in the education page, quoted below.

```
<meta name="description"
      content="I'm Siobhan Stephens, a software developer studying a part time
degree at UWTSD. Here's a list of my current and previous education, including GCSE
and A-Level Results."/>
```

```
<title>My Education - Siobhan Stephens</title>
```

The use of a title tag ensures that the user of the website knows the purpose of the current web page.

All images and videos contain alt tags with keywords, an example of which is below from the Horses page.

```
<img class="card-img-top" src="./img/landor.jpg" alt="Landor Van De Koyenborre">
```

4. Evaluation

4.1. Accessibility

The Web Accessibility Initiative have developed a set of guidelines for web content with 4 main principles which are *Perceivable, Operable, Understandable*, and *Robust* [17]. Firstly, according to the definitions provided by the Web Accessibility Initiative, the principle of perceivability states that "Information and user interface components must be presentable to users in ways that they can perceive" [18]. This means that the website's meaning and content should be clear and that it is accessible to those users who may have issues with one or more of their senses, for example hearing.

Secondly, the principle of operability states that the user interface and navigation must be operable. Thirdly, the principle of understandable states that "Information and the operation of user interface must be understandable" [18]. Finally, the principle of robustness states that the website must be able to "be interpreted reliably by a wide variety of user agents, including assistive technologies" [18].

Consideration for screen readers has been implemented, such as for the icons used in the footer bar. The icons follow guidance as documented by Font Awesome [19], and therefore are accessible to screen readers. The code snippet below shows how this has been implemented.

```
<a href="https://www.facebook.com/siobhankellyss" target="_blank">
    <i title="Facebook" class="fab fa-facebook-f fa-2x" aria-hidden="true"></i>
    <span class="sr-only">
        Facebook
    </span>
</a>
```

The website's accessibility was tested using the WAVE extension tool for chrome [20], with the result below for the home page.

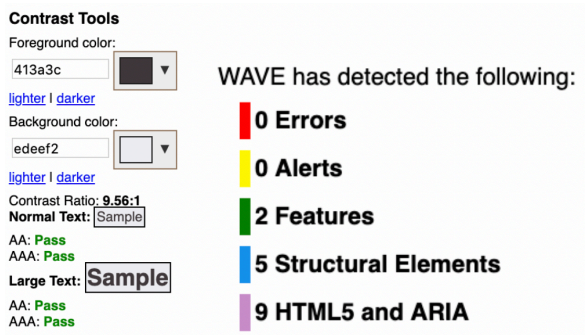


Figure 29. Result from WAVE Accessibility Tool on Home Page

All other pages were tested using the same tool with the full results below in table 2.

Table 2. Results from WAVE Accessibility Tool

Page	Result
Home	0 Errors, 0 Alerts, AAA Pass for normal and large text
Education	0 Errors, 0 Alerts, AAA Pass for normal and large text
Career	0 Errors, 1 Alert, AAA Pass for normal and large text
Horses	0 Errors, 2 Alerts, AAA Pass for normal and large text
Hobbies	0 Errors, 0 Alerts, AAA Pass for normal and large text
Contact	0 Errors, 0 Alerts, AAA Pass for normal and large text

The results of the WAVE tool conclude that the website therefore meets the principle of robustness, as it will allow for screen readers and other accessibility tools to use the website.

The website's user interface is intuitive, consistent and easy to navigate as it follows a standard web design template of a top horizontal navigation bar and a footer at the bottom of the page, with content displayed in the middle, along with simple vertical-only scrolling. All webpages follow the same design and colour scheme, ensuring that once the user is able to navigate one page, it is the same for them all. Each page is identified with a heading located at the top of the page, ensuring the user is able to perceive its purpose.

The menu bar is clearly visible on all pages and the interactive elements, such as those on hover, help to create a more immersive experience for the user. The information on each page is concise and relevant, and uses non-technical language, ensuring it can be perceived by a wide audience. There is also a logical layout to the information and the various pages help to split the information up into digestible sections.

It is for the above reasons and testing results that it can be concluded that the website meets the four principles of the Web Accessibility Initiative.

4.2. Standards

The website's HTML and CSS were tested using validators, as outlined in section 3.3. The results showed that the HTML was properly formatted, and did not have any errors, except those outlined on the hobbies page, due to the use of external content. The CSS also did not contain errors and uses correct identifiers and selectors.

On-page Search Engine Optimisation (SEO) was implemented to a small degree, through the use of title and meta tags, however in order to improve this the website should include more text content with relevant keywords, and the author should publish new content regularly, such as through the use of a blog. Further to this, changes to the current alt tags could be made so that they contain more detailed descriptions about the content they represent.

4.3. Overview

The website makes use of modern pastel colours, background images and a clean but constant theme throughout to create a professional and premium feel. The animated loader icon keeps the user

entertained whilst the page content and images load, which avoids them getting bored and leaving the site before they are able to see the content.

In order to make improvements to the website in the future, each page should contain more written content, as currently there is only very minimal text on each page. Beginning with the home page, to improve it should contain more information about the purpose of the website, as currently it only guides the user to the other pages by using the navigation bar.

The career page should contain more detailed content about the author's everyday tasks, along with any notable events or activities they have been involved in, this would allow readers to get a better insight into the author's skills and knowledge. The horses page has many images however more information about how the author started horse riding and perhaps some recent competition results would make the page more interesting, especially for users with sight impairments.

In the future the contact page should implement a back-end, so that users of the website can send the author a message. This could be done through JavaScript or a server-side language such as PHP but would then require a server, which was beyond the scope of the current project.

Finally, optimisation for mobile and tablet devices should be implemented, along with cross-browser compatibility. The website has only been tested using the Chrome browser, but in the future, it should be tested with other popular browsers, such as Firefox, Safari and Internet Explorer/Edge. It should also be tested across various mobile devices using different browsers and operating systems.

Overall, a clean, professional, useable and accessible website has been created with web and accessibility standards in mind.

5. References

[1] “Web Accessibility in the UK - True Facts [infographic] - A Bright Clear Web.” [Online]. Available: https://www.abrightclearweb.com/web-accessibility-in-the-uk/. [Accessed: 22-Apr-2019].

[2] “Cloud Object Storage | Store & Retrieve Data Anywhere | Amazon Simple Storage Service.” [Online]. Available: https://aws.amazon.com/s3/. [Accessed: 22-Apr-2019].

[3] “Google Fonts.” [Online]. Available: https://fonts.google.com/. [Accessed: 22-Apr-2019].

[4] “Free stock photos · Pexels.” [Online]. Available: https://www.pexels.com/. [Accessed: 20-Apr-2019].

[5] “Icons | Font Awesome.” [Online]. Available: https://fontawesome.com/icons. [Accessed: 22-Apr-2019].

[6] “How To Make a Loader.” [Online]. Available: https://www.w3schools.com/howto/howto_css_loader.asp. [Accessed: 22-Apr-2019].

[7] “Squoosh.” [Online]. Available: https://squoosh.app/. [Accessed: 22-Apr-2019].

[8] “Introduction to HTML.” [Online]. Available: https://www.w3schools.com/html/html_intro.asp. [Accessed: 22-Apr-2019].

[9] “CSS Syntax and Selectors.” [Online]. Available: https://www.w3schools.com/css/css_syntax.asp. [Accessed: 22-Apr-2019].

[10] “JavaScript Functions.” [Online]. Available: https://www.w3schools.com/js/js_functions.asp. [Accessed: 22-Apr-2019].

[11] “The W3C Markup Validation Service.” [Online]. Available: https://validator.w3.org/. [Accessed: 22-Apr-2019].

[12] “The W3C CSS Validation Service.” [Online]. Available: http://jigsaw.w3.org/css-validator/. [Accessed: 22-Apr-2019].

[13] “Introduction · Bootstrap.” [Online]. Available: https://getbootstrap.com/docs/4.0/getting-started/introduction/. [Accessed: 22-Apr-2019].

[14] “Spacing · Bootstrap.” [Online]. Available: https://getbootstrap.com/docs/4.0/utilities/spacing/. [Accessed: 22-Apr-2019].

[15] “On-Page SEO: An Actionable Guide.” [Online]. Available: https://ahrefs.com/blog/on-page-seo/. [Accessed: 22-Apr-2019].

[16] “PageSpeed Insights.” [Online]. Available: https://developers.google.com/speed/pagespeed/insights/. [Accessed: 22-Apr-2019].

[17] “Web Content Accessibility Guidelines (WCAG) 2.1.” [Online]. Available: https://www.w3.org/TR/WCAG21/. [Accessed: 22-Apr-2019].

[18] “Introduction to Understanding WCAG 2.0 | Understanding WCAG 2.0.” [Online]. Available: https://www.w3.org/TR/UNDERSTANDING-WCAG20/intro.html. [Accessed: 22-Apr-2019].

[19] “Accessibility | Font Awesome.” [Online]. Available: https://fontawesome.com/how-to-use/on-the-web/other-topics/accessibility. [Accessed: 22-Apr-2019].

[20] “WAVE Web Accessibility Tool.” [Online]. Available: https://wave.webaim.org/. [Accessed: 22-Apr-2019].