WEB TECHNOLOGIES

Callum Lawson

40400640

Contents

Introduction

The first piece of coursework required a website to be built using only HTML,CSS and JavaScript. The website is to allow the user to type in a message and then encode and display the message. The requirements are:

- ✓ An area where a user can type in a message
- ✓ An area for encoded messages to be displayed
- ✓ A method to select between different ciphers
- ✓ A method to compute these cyphers
- ✓ A method to retrieve the deciphered message

My website makes use of a Caesar Cipher, Morse Code Cipher and base-64 encoder. These 3 weren't that difficult to implement and so I chose them because I'm new to JavaScript and I didn't want to put in ciphers I didn't understand. My site uses 3 textboxes, one for plaintext, one for encoded text and one to output decoded text. I chose this rather than 2 text boxes so that no text was overwritten in any text box when the user tried to cipher or decipher something, unless they changed the cipher or shift. I used a drop-down menu to allow the user to change cipher/encoding method rather than them having to navigate to a new page each time. There is an encryption and decryption button that have two functions per cipher/encoding method. Before implementing my ciphers, I had to do a lot of reading about what ciphers/encoding methods I wanted to use. This meant quite a bit of reading on Practical Cryptography, Stack overflow, Wikipedia, W3schools and going through my old lecture notes from last year's cryptography class to understand the ciphers, and maths behind the Caesar cipher. My website uses HTML with CSS to style the site uses only one page for its functionality.

Software Design

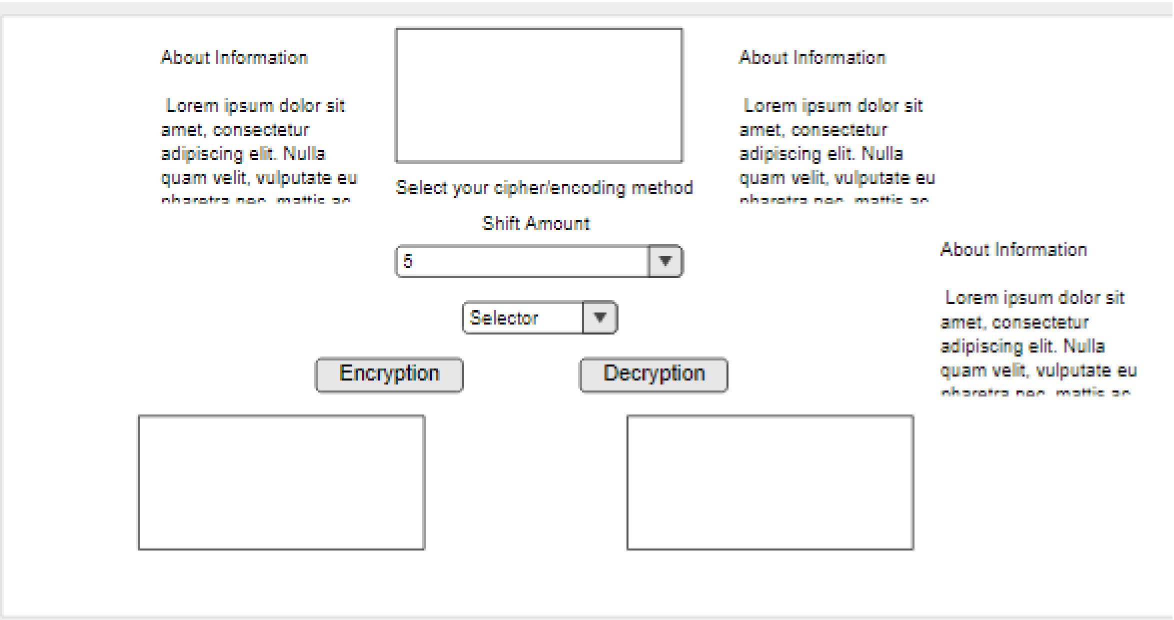
To begin I will use list of requirements to build a wireframe to make sure the user can do everything the requirements ask. There will need to be:

- 3 text areas
- 2 buttons,
- 2 drop down menus about information on the ciphers/encoding methods
- JavaScript Functionality

The HTML will be done first building all the elements needed with the CSS coming shortly after to make everything look presentable. I will need to visit encoding/ciphering websites to get an idea about the look of my site. After the presentation is done, I will need to test my plaintext text areas accept input correctly and that I can select different methods from my drop-down menu and there is 26 different shifts available on the shift drop down menu for the Caesar cipher. There will need to be at least 2 functions for each cipher/encoding method, one for encoding and one for decoding. My plan is to have 3 ciphers/encoding methods. I'm not going to implement anything too overly complicated as this Is my first time working with JavaScript, HTML and CSS for an assignment.

Wireframe

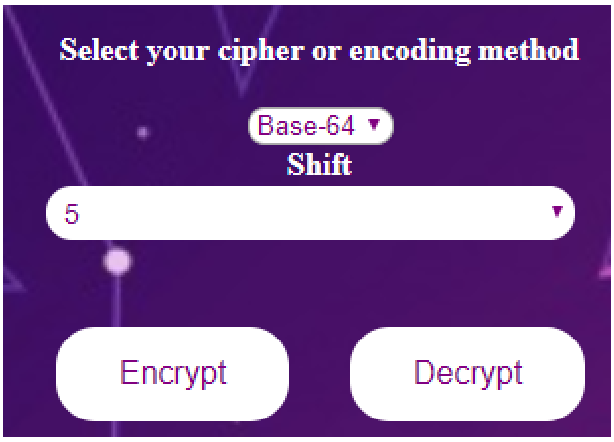
The wireframe I am using to help build the site is based of research of other encoding/cipher websites. The design is simple and involves no moving between pages to change method. I may have sections on the site explaining the different ciphers, this could make the page unattractive though. I don't want to add another page just with information about the ciphers as I think people wouldn't stay long and be more interested in the functional part of the site.


About Information
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla quam velit, vulputate eu
Select your cipher/encoding method
Shift Amount
5
Selector
Encryption
Decryption
About Information
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla quam velit, vulputate eu
About Information
Lorem ipsum dolor sit amet, consectetur adipiscing elit. Nulla quam velit, vulputate eu

Implementation

Presentation

I began with the HTML and CSS before giving any functionality to the site. I went for a colourful approach to be more inviting to the user and a simple layout so there is no messing around with navigation. I gave my text areas some border highlighting and coloured the text of my buttons and drop-down menu's purple to blend with the background image well. I also put some animation on the buttons for a bit of flair. The Caesar cipher required an additional area for a shift to be selected. There is a drop-down button to select the method. I used the same CSS for all text areas and the same colour scheme for all my elements with text.



Select your cipher or encoding method

Base-64 ▾

Shift

5 ▾

Functionality

Base64

After the look and feel of the site was completed, I began working on functionality, I started with the base-64 encoding as this was the easiest. There are two functions specifically designed for base-64 (atob and btoa) so it was a great place to start. All that was needed was to convert ASCII to base-64 encoding an vice versa.

Caesar Cipher.

A Caesar cipher is very similar to ROT13 except the user needs to choose the shift. My cipher allows for 25 shifts and can be selected using a drop-down menu. The code behind this uses Unicode and uses the lower and uppercase alphabet to use only select Unicode characters. Any special characters or numbers are just passed through without being shifted. The encode and decode functions use a for loop and an if else if statement. The decryption function is the same except we go in reverse with the shift.

Morse Encoder

The morse encoder uses a string of english letters,numbers and special characters and an array of these characters translated to more code. The function uses two for loops. The decoder function uses two arrays and splits the characters at the comma, this function was more difficult to implement as I couldn't just copy and paste the encode function and change a few things around. The decoded function uses a for loop and converts the array to a string to be outputted.

Critical Evaluation

My website makes use of two-character encoding schemes and a cipher, which meets the 2 minimum requirements however i think looking back 4 cipher/encoding schemes or more complex ciphers would have been a greater challenge to take on. The 3 in my website were not overly difficult and only the Caesar cipher uses additional user interaction in selecting the shift. The site also could have made use of additional pages, although because on my application you don't need to change pages to select a new cipher/encoding scheme these pages would have likely just been more 'about' pages or other additional information not relevant to the specification. I also noticed after most of the JavaScript was completed my code seems to follow a pattern because I was using a switch statement for all my functions, they all started and ended almost the same and the only difference was in the middle, except for the Morse code decoding function. A big change I would look to make in the future is to reduce the number of functions and have any decryption methods in the same function as the encryption methods if possible. It would also be good in the future to have given my shift selector more purpose by having additional ciphers that use shifting. Having them separate is easier I found because generally you are just reversing what you did before; or just changing the maths around, so really its just a copy and paste method changing only a little bit around. There is a lot of CSS and I chose to give individual elements there own class and positioning absolute so I could move everything exactly where I wanted it, this presented a problem later on when I tried my site on different resolution and different sized monitors as some of my elements would move around and not stay fixed, in the future I would like to use maybe an inline block or just group set elements together so the flow together on the page. I would like to swap fonts from using percentages to ems to make it more scalable. The HTML of my site I'm pleased with but for the next coursework I would like to add more div tags to group content together, so they are easier to implement in CSS, and improve my indentation and keep it at a standard throughout. My website only makes use of one page, which I feel makes it seems a bit emptier than I would have liked, although as I said in my introduction, I didn't want the user to have to change pages frequently. It would have been nice to have an audio API in place to translate the Morse code in to sound and another page with information on the ciphers, so the user has a better understanding of them before using them.

Personal Evaluation

This was my first attempt at building a website and I feel I did relatively well. I regretted the way in which I implemented some of my HTML and CSS and it meant on different sized monitors the elements would sometimes overlap or move. Going in to the next assignment I would like to re-design my HTML and CSS. I had no previous experience with JavaScript but found it wasn't too much different from other Python which I'm most comfortable with. The ROT13 cipher exercise was an excellent starting point for me to create the Caesar cipher which I found the most challenging and helped me get up and running as I was able to take it and change a few things around to get up and running, although the maths of the Caesar cipher did take quite a bit of reading to understand. Once I had the base-64 and Caesar cipher done I did the Morse code functions which weren't too bad, I found a Morse code alphabet to use online and added numbers and other special characters to it.

I'm looking forward to improving my website a lot for the next assignment and have a great foundation to build on. I gave myself a good amount of time to get the website built and didn't have to rush anything which I was pleased with, so I had plenty of time to go back and add little bits of CSS or HTML here and there.

For the future I need to be stricter with my use of positioning and CSS, I mainly used absolute positioning as it allowed me to move elements where I needed, but this caused elements to move if the window was resized or on different resolution monitors. My CSS file has a lot of elements and could be brought down by grouping things together and I only noticed the problem after my website looked how I wanted it to. Overall, I think my site has some decent functionality, but needs additional pages at the very least. I'm pleased with how it turned out.

References

Lyons, J., 2012. *Practical Cryptograpy.* [Online]
Available at: http://practicalcryptography.com/ciphers/caesar-cipher/
[Accessed 1 March 2019].

Anon., n.d. [Online]
Available at: https://image.freepik.com/free-vector/technology-background-with-gradient-colors_23-2147837710.jpg
[Accessed 25 February 2019].

Anon., n.d. *Base64 encoding and decoding.* [Online]
Available at: https://developer.mozilla.org/en-US/docs/Web/API/WindowBase64/Base64_encoding_and_decoding
[Accessed 2 March 2019]..

Philips, S. C., 2018. *https://morsecode.scphillips.com/morse2.html.* [Online]
Available at: https://morsecode.scphillips.com/morse2.html
[Accessed 27 February 2019].

Schools, W., n.d. *CSS Layout - The position Property.* [Online]
Available at: https://www.w3schools.com/css/css_positioning.asp
[Accessed 26 February 2019].

Sutherland, S., 2005. *The Caesar Cipher and Modular Artihmetic.* [Online]
Available at: http://www.math.stonybrook.edu/~scott/papers/MSTP/crypto/3Caesar_Cipher.html
[Accessed 23 February 2019].