

Final Year Report

CS3821 Full Unit Project (30 credits)

Human Computer Interaction

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A report submitted in part fulfilment of the degree of

BSc (Hons) in Computer Science

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Declaration

This report has been prepared on the basis of my own work. Where other published and unpublished source materials have been used, these have been acknowledged.

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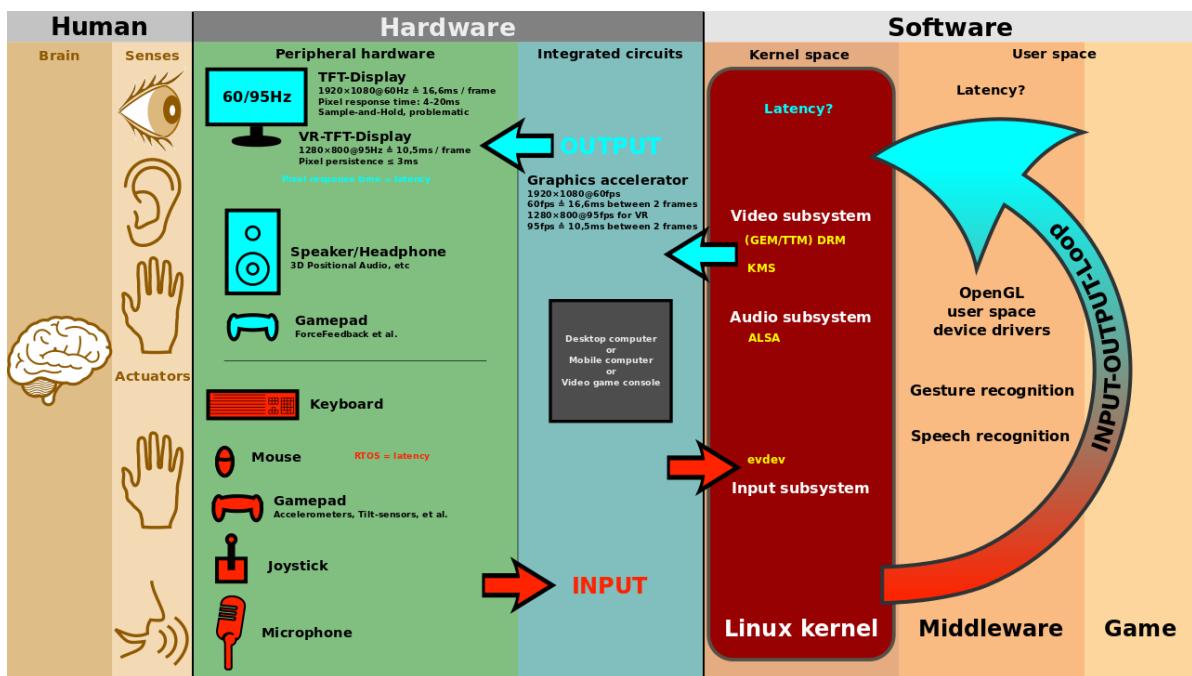
Signature: *Chathuranga Dayasena*

Introduction

History of HCI

HCI has been a term that has been floating around since the early 1980s. Initially, the study of HCI began in factories where there was an emphasis on manual tasks and how humans may interact with machines, where it was initially called human-machine interactions. This then later became Human-computer interaction in acknowledgment of the vast use of computers. Due to the increased use of computers, a large number of people became specialised in the interactions between humans and computers. Another key aspect that helped develop the study of HCI is both information science and technology. These two aspects are very old disciplines that focus on how information may be both influenced and handled in an institute. Although HCI is apparent in many different specialties, the main focus is on computer science and system design. Human-computer interaction looks at how people interact with computers and how humans make use of many computational artefacts. The original form of HCI was the concept of usability and was based around the slogan “easy to learn. Easy to use”. However, it has quickly expanded into the fields of software development and information systems. There is a lot of research on how to improve the interaction with computers by improving the usability of a computers interface.

ScotXW



Project Motivation

I personally chose this project as it seemed as though it would be an appealing project to undertake for a number of reasons. This particular project would allow me to both look into various theories and delve into a number of reports and books in order to gain further background knowledge. The project also allows you take theories and incorporate these using front end programming and bring them to life. By being able to apply the methodologies it allowed me to see what role they play in the software engineering process. One of the most significant aspects to this project was also the gathering of requirements and also the design portion, which included getting feedback from users and developing both sketches and documentation. I feel as though by pursuing this project it has allowed me to explore not only the technical but the software development process as a whole from the design to the deployment. I have explored many avenues of design and the implementations which they have in the world of development. This project will be of great benefit to me in the future as it will allow be to apply the knowledge learnt in my work place as a software engineer.

Aims & Objectives

For this project, I have chosen to focus on both the financial and e-commerce industries. I have a keen interest in both these fields and feel I would learn a lot from pursuing a project in this area. I hope to be working in fintech in the future on similar products as the ones I am hoping to design. Within the e-commerce industry when designing new interfaces and a diverse range of technology, human-computer interaction design keys are an integral part of the development process. They form a large part as to how products are placed in order to attract a customer's attention as well as the usability for those interacting with the website. In general, all of the user interfaces I design will have to be easy to learn, effective to use and provide an enjoyable user experience.

During the project I have designed and produced 3 user interfaces:

- Monochrome(non-interactive) text-based website - I will design a news website that focuses on providing financial news.
- A colourful website including images and navigation – E-commerce website
- GUI built with buttons etc – Data visualisation GUI

The monochrome website has been based on HTML and consists of the main text with very limited interactive components. I have focused on using minimalism as a design strategy when creating this website and explored the various ways in which a successful minimalist interface can be implemented. Essentially during the creation of this, I have adopted Ludwig Mies van der Rohe's motto, "Less is more," in my design. This part of the project has helped me explore how financial news can be effectively portrayed to those working for example as traders without an overly complicated user interface.

For my colourful website, I have created an E-commerce website which sells shoes. The website has various interactive components that will appeal to the customer base. The e-commerce website sells shoes. This is based on HTML using bootstrap to create the interactive elements needed. Django will then be used in order to do the cart and purchases on the website.

My third piece of user interface is a GUI built with buttons. For this, I have decided to create a data visualisation application. These GUIs are typically seen on trading floors in investment banking. I will use a variety of buttons, widgets, lists, etc to organise this data and where it should go on the application in order to provide the ease of use for a user. I have watched a series of tutorials to further develop my knowledge of python programming and the packages necessary to create a GUI. I have used python Tkinter package to create the GUI for the data visualiser app. I have created a data plotting GUI which takes a user's input and then places this into a graph.

In this report I have focused on various theories in human computer interaction and specifically the ones which have been implemented into my designs. I have also provided a number of sketches which I have then gone onto explaining both the design and engineering process behind bringing these to life. Within the report, I have also included a number of additional sections such as a literature review and professionalism section which describes the various ethical issues which arose during the completion of the project.

In the future, I will be working as a software engineer and I hope that by studying HCI it has provided me with an insight into how human-computer interaction will play an important part in how both software and web application are developed. I hope to take the theories and methods learnt during the project and apply them in my future role to create effective and aesthetically pleasing designs and software.

Background Theory

Key HCI Concepts

In order to begin the project, I had to initially conducted research on the various topics of HCI and how I could then relate them to the user interfaces which I will be creating. This meant that I would need to first come up with 3 ideas for user interfaces and then delve deeper into the different HCI concepts which may be relevant to those interfaces and how I could incorporate them into my own designs.

When beginning the project one of the very first books I read was Don Normans “Design Of Everything”. In this book, he describes the designs of many everyday objects and the design principles behind them. He then shows how these same design principles can be applied to technology products. Below I summarise his 6 design principle which I have used throughout my project:

Perceivability –

Within applications, a user must be able to identify if a certain action should be done or not. This means that the design must contain features that give clues as to the action which should be performed next. This is done by using calls to action which can come in many forms such as graphics, text or even sound. By using these visual clues it allows users to save time figuring out what they must do next, which means the perceivability of the user interface is increased. Within my designs, I have tried to do this by abiding with universal standards such as having a menu on the left-hand side of the screen and search bar at the top [8].

Constraints –

When designing it is important to limit how much interaction is possible for a user. This is done in order to make an interface far more simple to use. A lot of user interfaces now provide the ability for voice recognition and commands. However this has meant that there is a lack of constraints, as it is impossible to know what kind of queries are supported by the user interface. This can cause a user to become frustrated as the technology available is still not able to answer all queries as there are endless possibilities.

Feedback –

A key concept within HCI is user feedback, which alerts a user of them processing an action. If there is no feedback function, then a user of an application may not know whether that function has been carried out and mistakenly perform the same action once again which may end up in errors. Feedback can be represented in a number of different ways. Although in an ideal situation when an action is clicked on, it will happen straight away, often some may take longer to process. To combat this humans do not have much patience, most designers will have to add a feature which will give feedback that the action has been performed. In my designs I have incorporated various functions which provide feedback to a user that an action has been carried out. For example in my e-commerce website when an item is added to the cart, a box pops up to notify the user that this has been done. In the GUI when data is added to the graph, It also notifies the user that this has been added as they would not know otherwise as the addition of data is done on the backend.

Consistency –

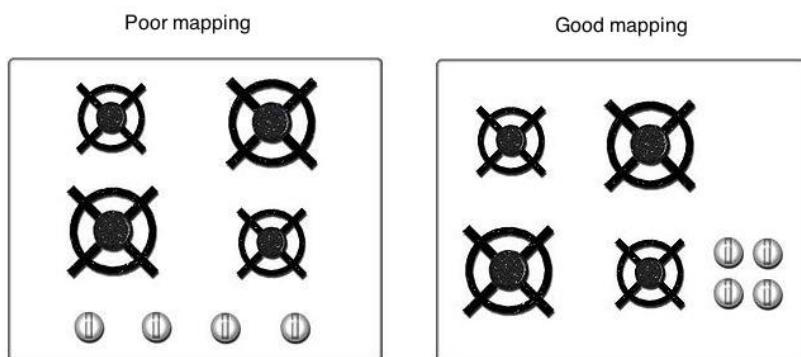
The way we understand the world is heavily dependant on the consistency of certain factors. It is human nature to try and analyse the world and recognise specific patterns in order to try and achieve our goals. This concept can be applied to interactive applications. For example, if someone was to tell us to look for a website menu we would automatically be accustomed to looking at the top of a website. This is because us as humans we have recognised the pattern of most website menus being placed at the top of a website. This highlighted the fact that it is important that it is simply not enough that items are perceivable and has to also be consistent in order to achieve the same outcome every single time. Across all my user interfaces I have followed the conventions of consistency and ensured that aspects such as menus are placed in places which follow normal design standards. If we are looking at a particular example in most e commerce a search bar is placed in the center at the top of the page, and is a pattern which is recognised across a number of websites. I have there also incorporated a search bar in this location so it is familiar with users [6]. I have also kept the main design features of my website similar across all the pages, such as having the same banner and navigation bar throughout my e-commerce website. This allows a user to know that they are still on the same website and lets them become familiarised with the theme of the website.

Affordance –

Affordance is how easy it is for a person to automatically know how to use something. For example if we take a mouse, the buttons give a clue as to that they can be clicked. Therefore if a design has a high level of affordance, it also means that the website is very clear to use. Within the book Don Norman gives the example of many doors, and that it is not clear from the design whether they should be pushed or pulled. A technological example the development in affordance is the example of underlined blue links which was previously used throughout the web. Many websites have now tried to move away from this design to try and achieve a more aesthetic look to the website. Some ways which this has been done is by having the underline appear when you hover over an item.

Mapping –

The principle of mapping explores the view that there should a clear understanding of what a control does and the effect it has on the environment. An example he uses in the book is that of a Stove top and how the placement of each control can either make it very easy or hard to tell what stove a particular control operates.



Therefore in my websites I have tried to make it as clear as possible what action each button will have when they are pressed.

Monochromatic colour scheme

This is a colour scheme based only on one single colour tint. It uses only variations (shades) within a single hue which is done by changing both the saturation and brightness of the base colour. Black and white is also added to this as they are either the brightest or darkest of the actual colour. This results in a coherent design which is comfortable for the eyes as there is no harsh base colours. When beginning to design with a monochromatic design I first chose a shade of colour as the base. I then worked with variations of this base colour. In order to get variations we change the shades by darkening it with black, Tones by desaturation with grey and Tint which lightens with white. There are a number of ways in which monochromatic design has benefited the design project and process [7].

- 1) Consistent looking visuals
- 2) Content is highlighted
- 3) Help connect a brand to a particular colour
- 4) Much quicker and easier as colour matches do not have to be decided

Below I have highlighted some of the main concepts I have researched and focused on while designing my monochrome page:

Overlaying photography →

Colours can also be on top of images and not just on texts and graphics. In order to follow the theme of being monochromatic, images are often overlay with a base colour which is chosen. In particular this is most effective when used with a black and white image as the different shades can be easily seen through the single colour overlay in order to show some colour variation. In photoshop in order to do this I would have to use the gradient overlay and adjust the blending mode, often this can be done by selecting the Soft light function and playing with the opacity. I did not need to start with a greyscale image as by starting with a coloured image it allows you to add depth by simply using the opacity function.



Continuity in Design →

One of the most prominent benefits using just one colour in the actual design is to create the impression that a number of various elements go together. This is both visually appealing and has a functional role within the website. By showing how different features are related allows a user to much more easily understand the particular purpose of a design. Here we can see that there is the continuity of the red design with the use of black and red to split up different pieces of information within the page.

#004D47 peacock blue	#D24136 terracotta	#1E1F26 midnight blue	#FAAF08 citrus	#77262A burgundy	#202D35 deep	#210E3B deep purple	#265C00 emerald
#128277 deep aqua	#EB8A3E honey	#283655 indigo ink	#FA812F grapefruit	#9E2D29 crimson	#OE3C54 stormy	#4B194C eggplant	#68A225 green bean
#52958b lichen	#EBB582 biscotti	#4D648D blueberry	#FA4032 ruby red	#C35D44 faded red	#2A677C ocean	#872B76 lilac	#B3DE81 light green
#B9C4C9 mist	#785A46 stone	#DOE1F9 periwinkle	#FEF3E2 pinkish-white	#F8A573 champagne	#B3C3D3 mist	#C88EC1 violet	#FDFFFF cotton

Text-based Design

When designing my website with a large amount of text it is hard to represent the text in a manner which does not become over-whelming for the user. In order to create an effective content heavy page, some of the following design I have used some of the following:

- 1) **Grids** – Content should be in a grid structure with a consistent flow in order to reduce the amount of processing power required by a user.
- 2) **White space** – This white space makes it much easier on a users eye.
- 3) **Boxes and borders** – Dividing content with borders and boxes help differentiate between different types of content and images.
- 4) **Visual prominence** – Different areas for different types of content must be used, this may be done by using headings, typography, placement and various sizes.

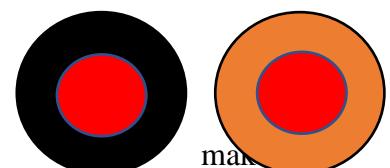
When designing text-based information there is a number of elements key design aspects I had to take into consideration:

- **Left-justify paragraphs →**
 - The left justification of text is good and making text centred is bad. This is because our eyes are accustomed to move our eyes to the left of the page when we are reading. However when the text is centred this could restrict
- **Text on busy backgrounds →**
 - When images are used behind texts it creates a noisy disruption, which disrupts the visual cues of our eyes. If text is places on a solid colour it is then much more readable than when it places on top of a photograph.
- **High contrast between text & background →**
 - In order to improve on readability of text against a background we can use different contrasts and intensity of colours.

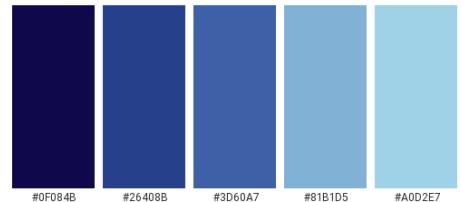
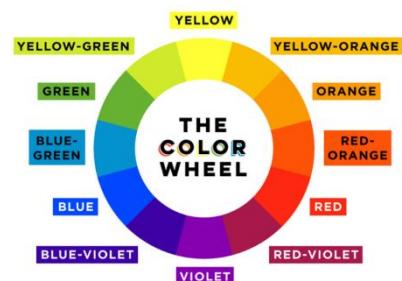
Colour Theory and Perception

Colour theory comprises of a variety of different definitions, concepts and other design applications. The main use of these is to provide guidance on how best to mix colours. Using the theory we are able to see how we can sort colours out on a website and which colours are best matched with another. We must consider how one colour behaves when put in conjunction with other colours and shapes. For example if we take the colour red we can see it is most bright when put against a black background and seems dull when put on a background such as orange. We can observe that the red within the black background also seems to bigger than the one against the orange background.

Colour is an important aspect of design and plays on people's subconscious decision choice with almost 90% of information transmitted to the brain being visual. Visual information is also processed much faster than other types information. People often decisions within the first minute of seeing a product. Establishing a colour scheme across all user interfaces is essential to create trust and ensure that users immediately recognise your website. We must first highlight the demographic we are trying to target and then choose the colour appropriately. There is a lot of psychology behind certain colours which is highlighted by the 'Fast Company' [5].



For my e-commerce taking various psychological aspects into consideration I have decided to use a red-orange and green-blue colour scheme. I will use green for the header, main navigation, and other key areas to build trust with consumers. Green is often used in websites to create a sense of security and trust within a brand. The colour orange within marketing is found in impulsive shoppers and gets actions of buying and selling. If we then look at the colour wheel we can see blue and orange are complementary as they are on opposite sides of the colour wheel. We can pair a hard-hitting orange with a calm blue in order to create a balanced and polished look. This therefore when used in combination has these associations: excitement, friendliness, cheapness, peace, tranquillity, security. Further taking this into consideration I will also be using a green monochromatic palette in my financial news website. This will ensure that the initial representation of the website will be one of dependability and strength. Green is able to connect the gap between warm and cool colours therefore it has the relaxing effect of blue however also portrays stability. Darker shades of green can also be used in my page to portray off more money/affluence feelings [4].



Blue Monochrome Color Scheme - by SchemeColor.com

Visual Hierarchy

A key concept which I had to explore was visual hierarchy and how the human eye perceives information on a webpage. Eye tracking research has highlighted that the way people scan webpages and phone screens differ depending on the type of information and the person. The two most recognisable patterns are the F pattern and Z pattern of information reading. I have tried to avoid the F shape pattern for a number of points which were made prominent while conducting my research. The F-pattern is defined as the following movement in the eye:

1. Horizontal movement across upper part of content area (F's top bar)
2. Move down and Horizontal again although normally shorter (F's lower bar)
3. Then there is vertical scanning on the left (F's stem)

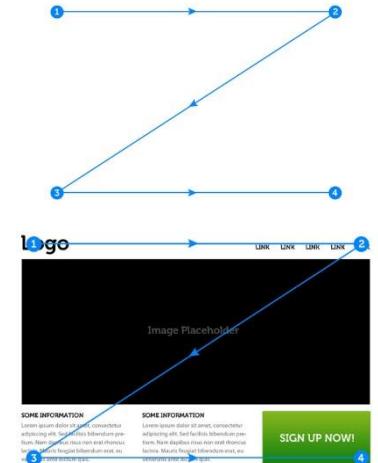
This therefore means that only the first lines of text within a page receives most of the gazes and the lines following from that receive far less. It is also apparent that the first few words get more fixation time than the rest of the words on the same line. Due to these factors I have to try and avoid the F shapes pattern in my webpages. When this pattern is used people often miss out large sections of information and will not realise this as they don't know what they don't see. Therefore if my pages were to consist of large sections of unformatted text then this will most likely be scanned in a F-pattern. In order to combat this I have identified a number of methods which I will use in my webpages. Firstly I will have to ensure each section on my news website has a summary of the most important points. It is also essential that each sections of the user interfaces will have headings and subheadings so that users are able to grasp straight away what each section



consists of. Some other common methods include bolding important information and using lists/bullet points [2].

Another prominent pattern which I will be trying to use is the Z pattern and mainly in the e-commerce website as it consists of mainly images and little text. In designs which consist of a low amount of text, research has highlighted that our eyes follow the following pattern [3]:

1. Scan from top to left
2. Diagonally down to the bottom left
3. Then to the bottom right



In order to ensure the proper use of this pattern I have put the most important information along the Z pattern which the eye movement follows. I can also use the Z pattern for a homepage and then a F pattern for a page more deeper into a website. By understanding visual hierarchy and how the eye focuses on certain aspects I am able to design my User interfaces in a way which will optimally accommodate this [1].

Criticism of Eye Tracking:

Although eye tracking is a useful tool when researching into how someone may interact with a website. We must take this data with some scepticism as past studies have shown concerns of the technical suitability of eye movement as a data measure. Eye tracking may also lead to misleading results as it does not capture our peripheral vision, which accounts for almost 98% of our vision. Therefore we are able to see things without actually fixating onto them such banners and ads on the right side of a page without actually fixating on it. Therefore in things such as the heatmap used above it must not be assumed that areas without a hot spot were not seen at all and take into consideration that fixation does not communicate meaning [10].

Slideshows

In my design I have used a slideshow in order to display various products which are available. When going into user experience and HCI I have realised that there are some draw backs to slideshows. Slideshows are often blind spots and many eye tracking tests have shown that they are often glossed over or get little attention. Slideshows also tend to create apathy amongst users as they disassociate themselves with the slide show as they perceive it as not being relevant to them as well as not being accessible to those with language or motor skill issues.. However during my research I have found various other options as to how to improve the use of a slideshow on the website. Often an image grid may be used rather than a slideshow, this allows for more visual images to be represented in one set space. Another option which I was presented with was the use of Animated or videos rather than a slide show, which allows for a message to be conveyed much easier than using an image. I have decided that in order to display products a slide show is necessary and will have to focus on making it accessible and UX focused. In order to do this I have identified I will need to show the first slide by default and then allow a user to navigate the rest of the images rather than having something which will auto rotate. The navigation buttons which I use will also have to be easily identifiable and be of a size compatible on most devices [9].

Cultural Differences

More than 3.3 billion people worldwide are now online; therefore many websites and apps although not apparent are specifically tailored to the different audiences in various regions. It is no longer sufficient to simply design for optimum accessibility and ease of use; cultural differences must also be taken into consideration. Designers often take generalisations of a culture although it may not represent an entire region. Although many of the views and theories explored here are very opinionated depending on the designer and their perception of a Culture, it is important to explore these designs and evaluate how designs differ in different parts of the world.

Within different cultures information is seen by designer as being absorbed in a variety of ways depending on cultural perspectives. There are also a number of ways in which symbols and colours are interpreted by different people in many different cultures. When coming to a decision about the choice of colour, often colour psychology is the main focus, however in many instances a person's culture may be what truly influences how they perceive a colour. In order to further explore this idea, I have looked at a number of sites and evaluated how the designs differ from region to region.

Site navigation is one of the most important interactions where you have to ensure that it is clear to all users. Our culture greatly influences the ways in which we process and take in information. When we put these various factors together we can see how a user may navigate through a particular page. Communication within culture determines how a group of people may prefer to navigate through a website. For example if we take cultures which are seen by designers as being feminine orientated, we see that there are much more links within the landing page as it is much more preferred to have a large number of options and like to create connections between the various elements. Cultures where there is a push towards long-term orientated (pragmatism and future thinking) cultures are better with content that contains much more images however on the other hand, when we look at short-term orientated (value tradition) cultures we can see that they prefer to have fewer distractions. [21]

Information Processing

As I have mentioned previously the ways in which an individual processes and retrieves information changes depending on the culture. Designers have highlighted two main ways of thinking which is either holistic or analytical and information processing is based on this, although it should be taken with scepticism as it is largely an opinion-based view. When we look at eastern cultures, they are mostly affiliated with the holistic approach where they are more likely to scan through an entire page before they form their final opinion. Therefore taking this into consideration when a website is designed for this target market both the background and foreground information must be neutral. This is due to the fact that we must ensure it is easy for holistic users to scan an entire page without many distractions.

However it is thought that more analytical cultures which are seen by designers to be more western cultures, the design of the user interface must be more structured. It is often useful to have individual content elements to stand out within the design. Therefore this means that information sharing the same common theme should be grouped together, which

would in turn mean that pieces of information can be grouped together so that one piece of information can be processed at a time. Below I have shown how this is represented through the designs of websites for the same company but in different regions:

This is the Philips website in China:



The image below is the Philips website for Saudi Arabia:



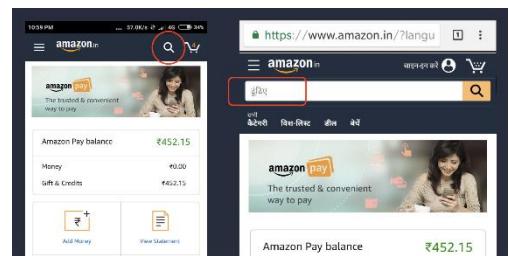
This is the Philips website in the United States:



When for example we take the mozilla firefox landing page, for china and the united kingdom we can see how they are vastly different in design. We can see above that the UK website has been designed to be very minimalistic and only have one option which is to download mozilla firefox, however in contrast we can see the Chinese version has far more content with lots of news and ads which fill up any space which is free. This is due to the designers believing that the two cultures have different levels of individualism within each country. America and the united kingdom are very individualistic countries, where users often know what they are searching for. However eastern societies tend to be more collective where people tend to follow what others are reading. It is a much easier option to follow known UI patterns which are effective in the east than to follow western pattern [20]

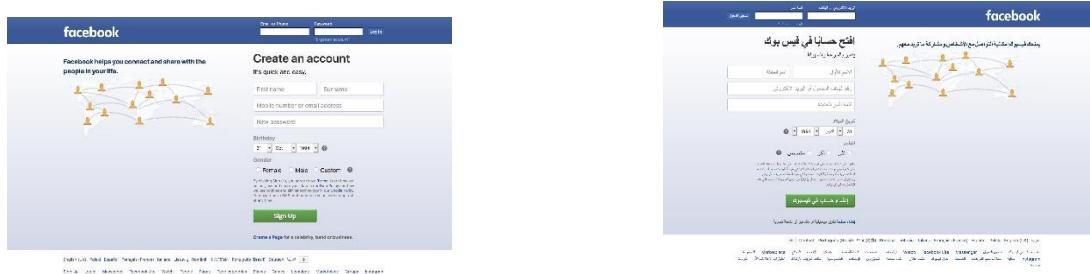
Icons

Another case study which we can look at is when amazon first launched in India in 2018. They encountered a problem in that the customers were not using one of the main primary drivers in revenue which is the searching of products to buy on the homepage. When further research was done into as why this was the case, they identified that the magnifying glass icon was not associated with search in India, and it had made no sense to them what so ever. This then further influenced them to do research which showed that most people thought the icon was a ping-pong paddle. In order to come up with a solution, amazon decided to keep the magnifying glass however they added a search label in Hindi text so that people know that they can search within the text box. This case represents just how impactful a bad design can be on the launch of a website.



Text and appropriate imagery

When designing an interface another factor which must be taken into consideration is the reading direction of different cultures. In some cultures, text is written left-to-right (LTR) and others are right-to-left (RTL). In a lot of languages, designers have to consider mirroring, and other factors such calls to action and navigation patterns.



When using images and products in websites, we must also consider that something which may be acceptable in the western culture, may be unacceptable in others. Another key factor which has to be accounted for is text expansion. For example when we try and convert a website from English to Italian, there is a large expansion of text of almost more than 300 percent. I have only designed my website for the UK markets so have based my website on a left-to-right reading direction.

Impact of not considering cultural differences

In 1999 eBay became Americas largest auctioning site and had its site on expanding into new territories. The japan market was a key target which they hoped to infiltrates, they therefore simply bought a local domain and translated the website into Japanese. However just only after three years of it entering the new market, it was forced to close due to poor performance. Although there was fierce local



competition, another key reason as to why the website failed is due to their failure to understand the various cultural differences between America and Japan. An example of this was the sign up process, Japanese customers were requested to submit credit card details instantly at sign up, which resulted in a high rate of abandonment. When we look at research which was done by Dianne Cyr and Haizley Trevor-Smith, we see that in many instances culture can affect eCommerce trust as well as the UX/UI of a product. [22]

Cultural perception of colour

Designers must be careful when they are using colour as some colours may have an unintentional effect on the readers. Colours have very different meanings in different cultures. Understanding colour is very important when planning a colour scheme for a UX as they can have contradictory meanings particularly within western culture where they are more broad. To gain a better understanding for example if we take the colour red we can evaluate what connotations it has in different cultures.

Western Culture:

- Red is seen as a colour of passion and excitement and has links to danger, love and enthusiasm. Red is also seen to be associated with power and has religious connotations when we mix it with green due to Christmas.

Eastern/Asian culture:

- Red is seen as a colour of joy, pleasure and commemoration. In eastern culture a bride often wears red on their wedding day as it thought to bring good luck. Within India it is seen as a pure colour and in Japan it is associated with life.

Middle Eastern culture:

- Red is considered to portray danger and caution and even considered to be evil

Site Navigation

Almost every website online has to have a form of navigation in order to get through the content on the page. However when we visit many pages it is made apparent that there has been an inherent focus on the design and making it look visually appealing rather than the navigation of the actual website. Although a website might have some form of navigation, it might not always be doing a good job. Navigation is an essential factor which allows visitors to the website to find the information which is necessary. While doing my navigation bar I have incorporated a number of things to try and improve navigation around the website.

- **Consistent Navigation:**
 - Navigation must be kept consistent throughout the website on both where and how it appears. This in turn makes it much easier for visitors to find the pieces of relevant information which they are looking for. If a website has a changing nav bar from page to page then visitors to the page will get confused and will have to reacquaint themselves with how to navigate the page.
- **Divide categories clearly**
 - When we have categories for different sections, we must ensure that they are both visibly and distinctly identified. This should also be the case with category headings which must be separated from all the other sub-categories even if they are links.
- **Using accurate navigation titles**
 - When a user is using a website they should know what a particular page might consist of before clicking the link and being directed to that particular page. If you use ambiguous or deceptive navigation, it may then annoy people visiting your website and may even lead to abandonment.
[16]

HCI and psychology

Psychology is a key part of HCI which influences the design of user interfaces. It allows us to analyse both the thoughts and cognitive processes of other users and what they will do. Human beings have a lot of capabilities as well as limitations which determines how we must design a user interface. When designing an user interface it is important to spend time understanding behaviour, habits and the needs of many users. By studying psychology, I was able to take these into consideration and make more effective interfaces. An example of this is the fact that we are used to using words rather than symbols. Our brains have therefore been hardwired to process word-based documents much quicker than those consisting of symbols which therefore means that it is more beneficial using more words rather than symbols.

Von Restorff effect:

This is also known formally as the isolation effect and states that when multiple objects are present , the one which differs from the rest will be the most likely to be remembered. This is the very reason why calls-to-action (CTA) look very different from the other action buttons. A good use of this is the notification design within our smartphones. The screens of phones are normally pretty static until a notification is received. This therefore means that the pop up instantly draws attention to your phone. I have used this very concept in my own subscription page, where the main subscription price differs from the lower and higher one. This has been purposely designed this way in my subscription page as well to allow for more attention to be drawn to the middle subscription package which I want to be purchased.

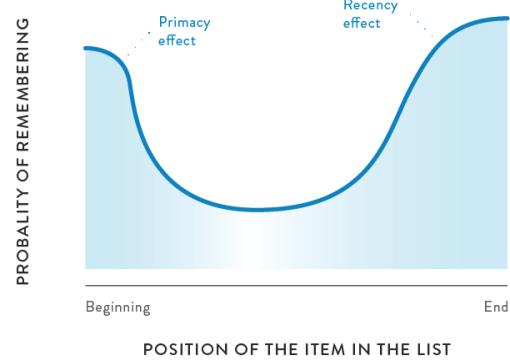
People make mistakes:

When designing an interface we must not automatically assume that users will use the interface flawlessly. Humans often make mistakes when performing functions and tasks therefore within the design we must take into consideration that users will make these mistakes and must have an option to undo them. It is best practise to try and limit how many error messages may appear as it maybe a cause of stress for the users. When I have used error messages in my user interfaces, I have ensured that I have made them very specific about what was wrong and what can be done to correct the problem. In order to combat mistakes people may make, these are a few things which can be done:

- Doing a survey which may will identify the most common problems which people encounter.
- I should add barriers to try and reduce the amount of mistakes which are made
- I should also thoroughly test my product to ensure that I have identified any key issues which may arise with using the programme.

Serial Position effect

This psychological effect shows us that people generally remember the last and first items within a series and that the middle items are most likely forgotten. Therefore by using this knowledge I have tried to put less important content of the pages in the middle section. This was a hard procedure to do as it is hard to get an insight into and decide what content is more important than others.



Nielsens Heuristic Evaluation

A heuristic evaluation is something which is used in order to inspect a piece of software in order to detect any problems with the usability of the user interface. This particular method was developed by Jakob Nielsen using many years of experience in both teaching and consulting usability engineering. Jacob Nielsen heuristics were released in 1994, and are the most used usability's and were made in collaboration with Rolf Molich. By using heuristic evaluation, it allowed me to reduce the number of severe design errors which are discovered by an user. However, one thing I had to keep in mind is that although the evaluation can uncover many of the usability issues , the results are based on my own depth of knowledge of heuristics. Below I have looked at a number of Nielsens heuristics and evaluated them against my own system:

- Visibility of System Status
 - My system should keep the users informed when paying about what stage they are at by using the appropriate feedback.
- Real World Similarity
 - I had to ensure that the website was in the relevant language that are familiar with the user, there should also be a chronological order.
- Control and exit
 - The user interfaces must account for mistakes which may be done, to ensure the there is always an option to exit an unwanted state.
- Consistency
 - I have followed many standard conventions
- Preventing errors:
 - I tried to design the user interfaces to try and prevent problems which may arise before they happen. I had two options of either eliminating the possibility of errors in the first place or having a confirmation option that stops a person.
- Recall:
 - I have made as many options visible to try and reduce the amount of memory a user needs.
- Efficiency:
 - I should try and add shortcuts for more advanced users
- Minimalistic Design:
 - I made my user interfaces as minimalistic as possible and cut out any irrelevant information which is not needed.
- Recognize, diagnose, and recover from errors:
 - When errors occur, I have made sure that there is a precise indication of what the problem is and also suggest a problem.
- Documentation:
 - All my user interfaces have a readme explaining how to use the user interfaces and an explanation about any complex operations.

User Experience Honeycomb

Within the designs I have conducted I have also tried to follow the User experience Honeycomb which was created by Peter Morville in 2004:

- Useful: The content within the page should be unique and deliver a purpose
- Usable: The user interface must be easy to use
- Desirable: It must be appealing to a user and images as well as brand identity evoke emotions.
- Findable: Content in the user interface should be easily navigable and located on the site.
- Accessible: The user interface should be easy to access for any users with a disability.
- Credible: Users must trust and believe what you tell them



Usability Testing

During my report Usability testing was an important part of finding out how effective my designs were and what impact certain design choices have had on the user. This would allow me to implement the necessary changes and help create a better interaction between the user and the system. In this section I will cover the different methods in which I was able to use to do this. I will be covering usability testing and the differences between both qualitative and quantitative testing.

Usability is a measure of how friendly and how easy it is to use a system. In order to do this what I did was, I used a small set of target users that tested the system and highlighted any defects. The testing itself focuses mainly on how flexible the system is and whether or not it meets the objective which it hopes to resolve.

Testing usually consists of observing users while they attempt to complete tasks. One of the main benefits is you are able to identify problems within a design and as soon as possible. It also allows to uncover opportunities to improve and learn about how the target audience behaves as well as their preferences. The main elements of usability testing are:

Usability Testing

determines whether an application is



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- The facilitator (Guide the participant through the test process)
 - Has to ensure that the results which are gained are high quality and valid

- Tasks
 - Realistic activities that the participant might actually perform in real life
 - The questions can be either very specific or open-minded:
 - Your printer is showing “Error 5200”. How can you get rid of the error message?
- Participant (Realistic user of the product or service being studied)

Qualitative vs Quantitative

Usability testing can be divided into either being qualitative or quantitative:

Qualitative → This aims to focus on collecting the proper insight on the specific products and services. Qualitative is seen as being the best when it comes to discovering problems within the user experience.

Quantitative → This focuses on collecting metrics which are able to describe the user experience. Two of the metrics which are normally used is task success and how much time is spent on a specific task. Quantitative usability testing is best for collecting benchmarks.

Some of the main issues which I hoped would be able to be answered by this specific sort of testing is 5 main factors which is useful, findable, accessible, Usable, Desirable.

- Where do I click next?
- Which page needs to be navigated?
- Which Icon or Jargon represents what?
- Error messages are not consistent or effectively displayed
- Session time not sufficient.

	Survey	Strongly Agree		Strongly Disagree			Comments
		1	2	3	4	5	
1	I would like to use the system again						
2	I found the system unnecessarily complex						
3	I found the interface easy to use						
4	Some help from a technical expert will need to support me when using this						
5	The different functionality in the System was integrated well						
6	The colours used in the designs were appealing						
7	I found there was too much inconsistency in the designs						
8	It was easy to navigate the pages						
9	I found the relevant information I needed with ease						
10	A lot of learning was needed to use the system						

When analysing the user testing results, I identified a number of user requirements which would need to be added to the new improved system. I created a list of these and tried to implement it into the final product:

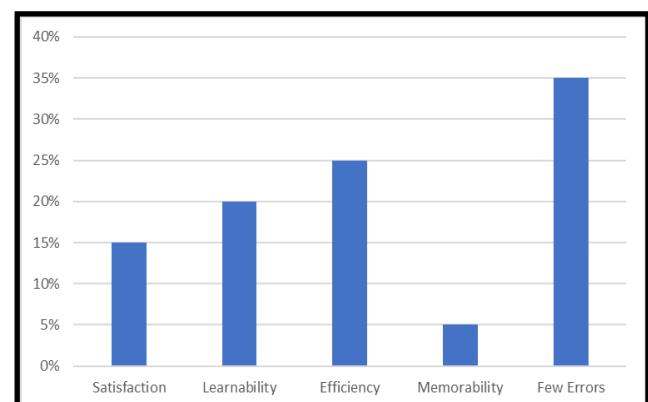
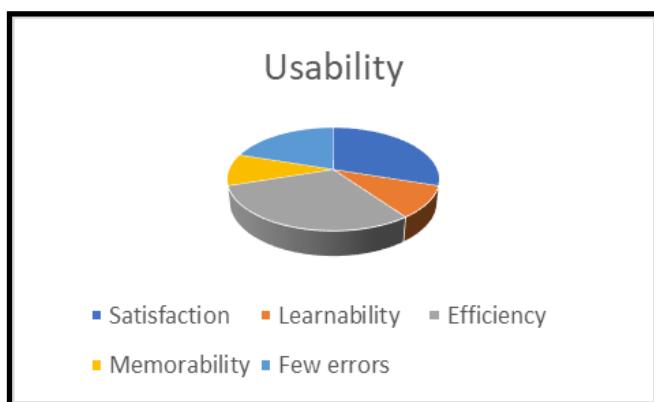
- I want to be able to quickly view a product without having to visit another page
- I want to be able to add items to a basket

- I want to be able to increase, decrease and remove items from my cart
- I want the option of choosing different colours of the same product
- I want to be able to purchase directly from the cart
- I want to be able to efficiently navigate through the

Although surveys would not provide me with the behavioural data which I need, it would allow me to identify the root of the problems which users are facing. By using a survey which is well designed, you are able to gain information which is very similar to usability tests with a number of additional benefits:

- Self reported problems are able to uncover a lot of the same issues which you can uncover in traditional usability testing.
- Looking at the attitude towards the usability of your website are strongly correlated with the likeliness to recommend. I was able to collect a lot of this in the surveys and had a good idea about task completion rates. [19]

By doing usability testing it has helped me uncover any issues in the functionality which has been marketed. Overall it also improves the end-user satisfaction which in turn would make it much more efficient and effective. It allowed me to also get true feedback which was an accurate representation of the system by users whom actually used it and were your target audience rather than random people. I also conducted a survey on what the most important aspect of a websites usability is to a user, which helped me focus on certain aspects of the design. I have presented the results of this in a graph:



Design Process and Patterns

Process of designing

Planning	Goals of website User requirement Identifies users and owners needs
Analysis	Analysing content
Design & Development	Understand how users interact with system Individual page design Adding advanced tech
Usability Testing	Usability testing Performance testing Stress testing
Implementation	Adding all content and files to website
Maintenance	Updating all content Web sites integrity Implementing new technology

Process of Design:

1. Requirements
 - a. Identify what is wanted and what is there
2. Analysis
 - a. Understand and order the design
3. Design
 - a. How to decide and what to do
4. Prototype
 - a. test to see what is actually needed
5. Implementation & deployment
 - a. Producing the design and getting it deployed

Norman's 7 Principles

When I first began the project I read “The design of Everyday things” by Don Norman. In this particular book he discusses many objects such as windows and scales and why they are designed in the way they are. He then discusses how these can be applied to technology products. I have previously described these in much more detail at the start of the report however I have below summarised these design principles into 7 statements.

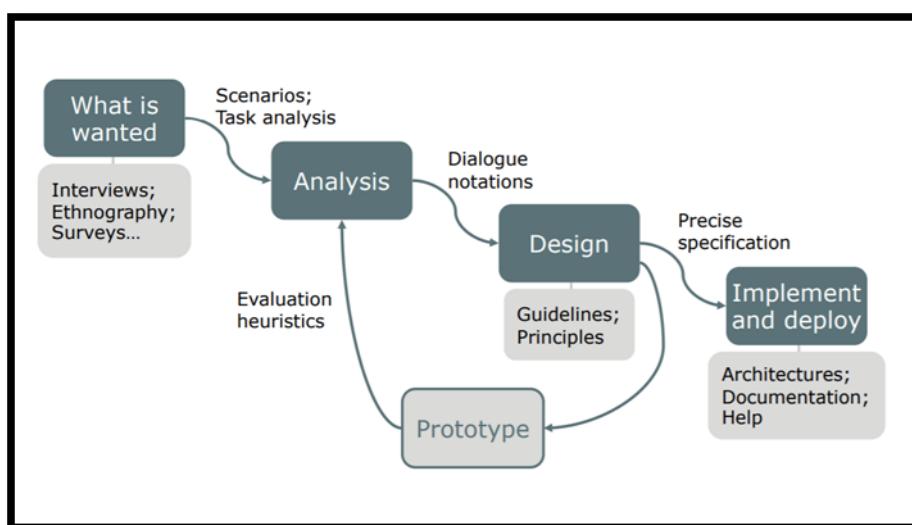
1. Use knowledge in the world and head
2. Tasks should be simplified including the structure
3. Content should be visible and connect both the execution and Evaluation
4. Mappings should be done right
5. Constraints should be used, with both artificial and natural ones
6. When designing an interface you should take into consideration errors will be made
7. Standards should be used when you have tried other options [17]

HCI Design Patterns

Design pattern are methods of re using specific knowledge from design solutions which are already well known. A pattern itself is a solution to a problem with a context. A design pattern is not a finished design which can be transferred into code however it is a description or template of how a problem should be solved in different situations. During my project I also used Shneiderman’s rules for my design process:

1. There should be consistency in the design
2. Users should be prompted to use shortcuts when possible
3. Offer feedback when a process is carried out
4. Closure in the dialogs
5. Appropriate measures for the prevention of errors and simple error handlings
6. There should be the functionality of reversing actions which are made
7. Short term memory load should be reduced as much as possible
8. Internal locus is supported

Steps in Designing:



Interaction Design

Interaction design is used to maximise the usability. There are three main principles I used within my project which were:

- Learnability
 - This is how easy a user learn how to use the system in an effective way
- Flexibility
 - How can the users of my system interact with it
- Robustness

Principles of Learnability

Predictability

- I had to ensure that the users could determine the effects of future actions by having the same sequence of action always triggering the same results

Synthesizability

- There is a way for users to see what effect a past action has had on the state
- This has been demonstrated on my payment page where there is a status bar showing what has been done

Familiarity

- My system has been made to be as similar as possible to the functionality on other websites to make it easier for users to learn the system.

Principles of flexibility

Dialogue Initiative

- I had to try my best to stop the users having any artificial constraints on the input dialogs

Customisability

- Within my GUI you can modify how the graph is viewed and what aspects are customisable [23]

Graphic Design General Guidelines:

Simplicity Guidelines:

Reduction:

In my designs I have decided to eliminate anything which is not necessary, and in order to achieve this I had to:

- The design should be able to effectively convey the message you intend to convey
- Analyse all the elements within my user interfaces to make sure they serve the intended purpose.
- Any parts which were not essential has been removed ensuring that the design does not fall part.

Regularity:

- For any vital parts I made sure that I used regular patterns
- I used similar fonts through out the interface including the colour, line
- Irregularities within the design can be magnified

Whitespace Guidelines

- Whitespace
 - I have left margins around all bodies of text
- I have used a large leading and ensured that the body of text is not overcrowded (125% - CSS line height)
- Columns of texts and content have been kept narrow (around 70 characters)

Font Guidelines

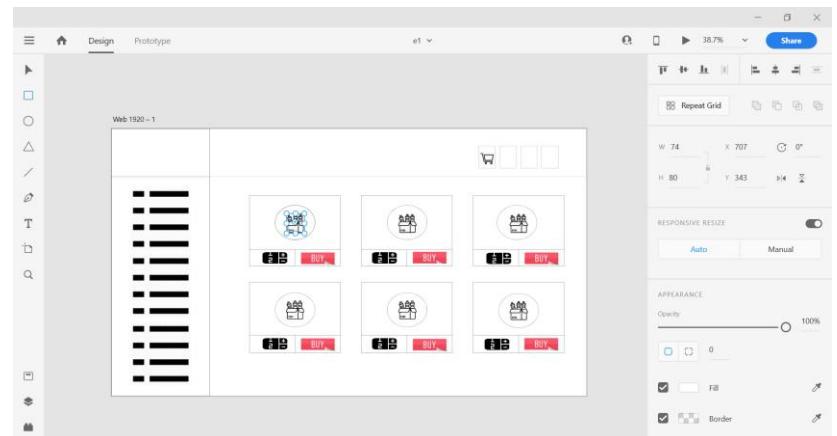
- I have implemented a clean font with distinction
- I only used a maximum of 3 different types of fonts (I used different fonts to differentiate between the title, body text and display text)
- In order to apply some contrast, I have used different styles such as bolds and italics
- I have studied a number of font combinations which are common and tried to use those in my interface

Colour Guidelines

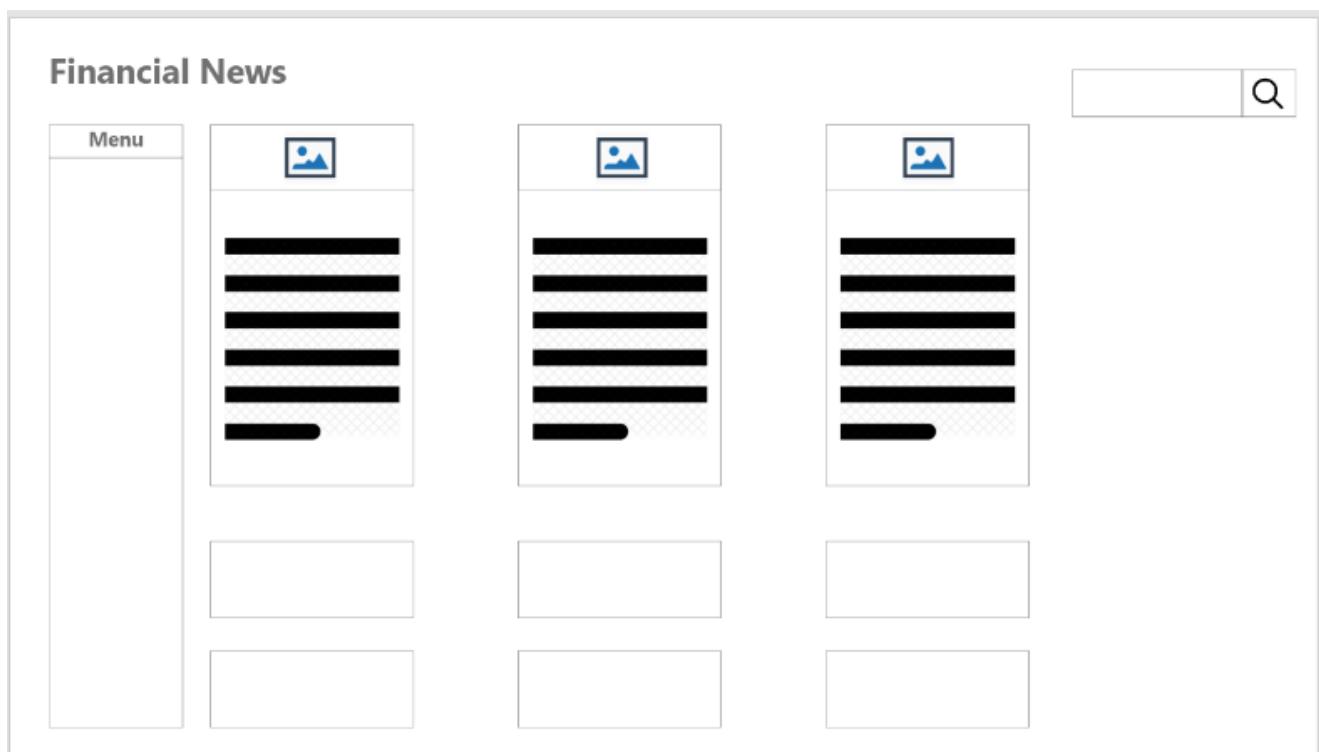
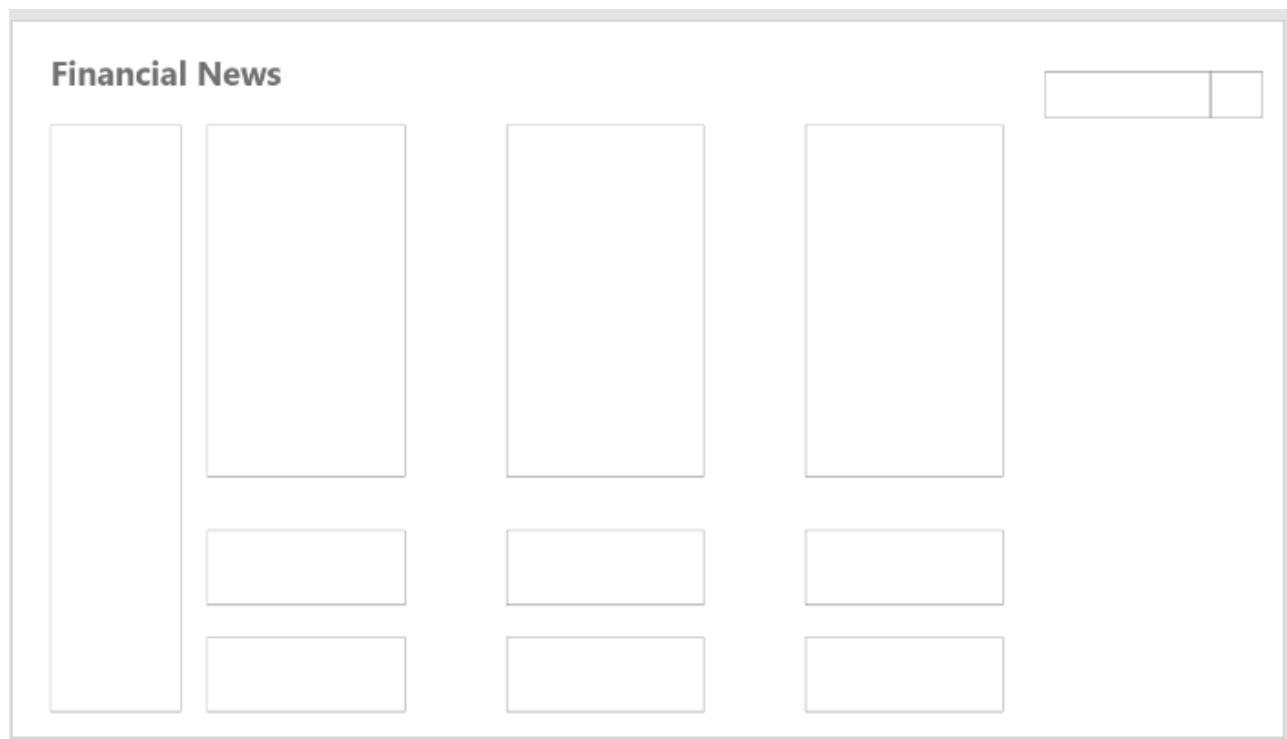
- Colour blindness is very common so I have made sure that I did not depend just on colour distinctions
- I have made sure that I kept the range of colours I have used very simple
- I have tried to use as many shades of one colour rather than a mixture
- I studied other interfaces and looked at the colour schemes to see which would best suit mine

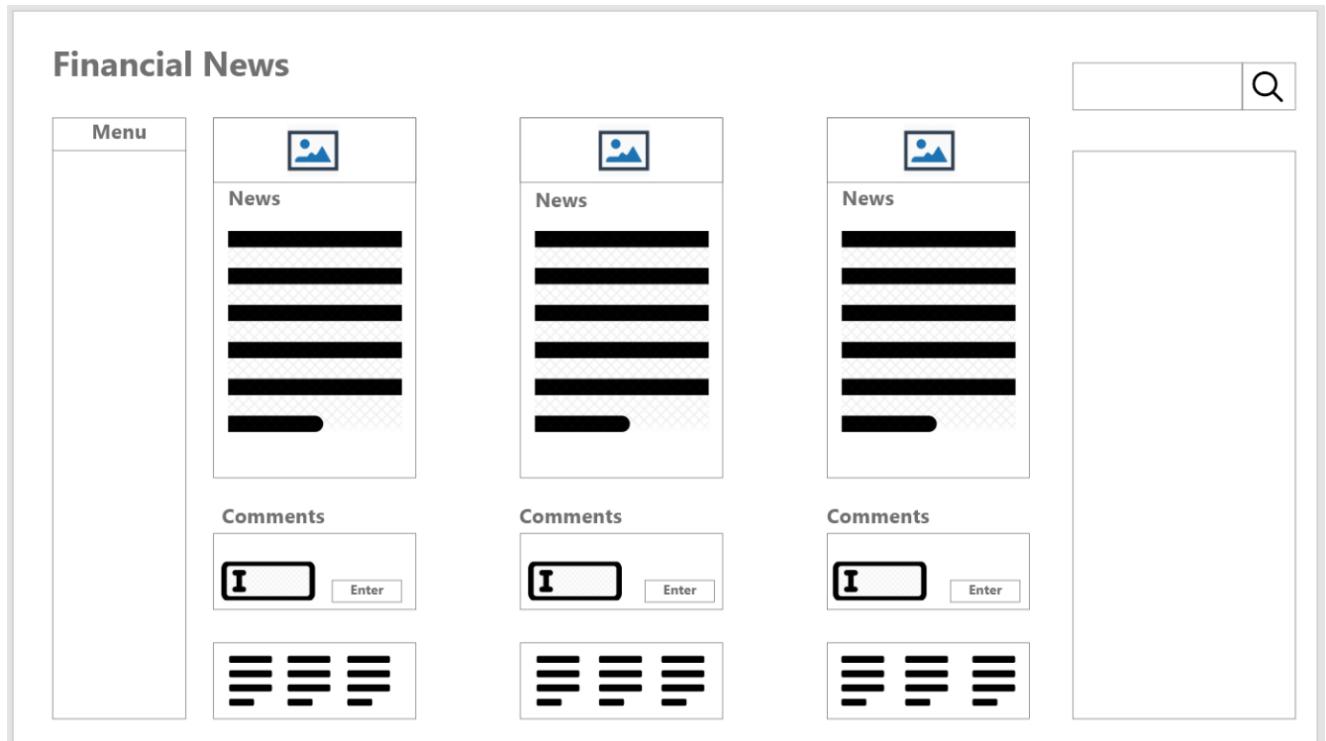
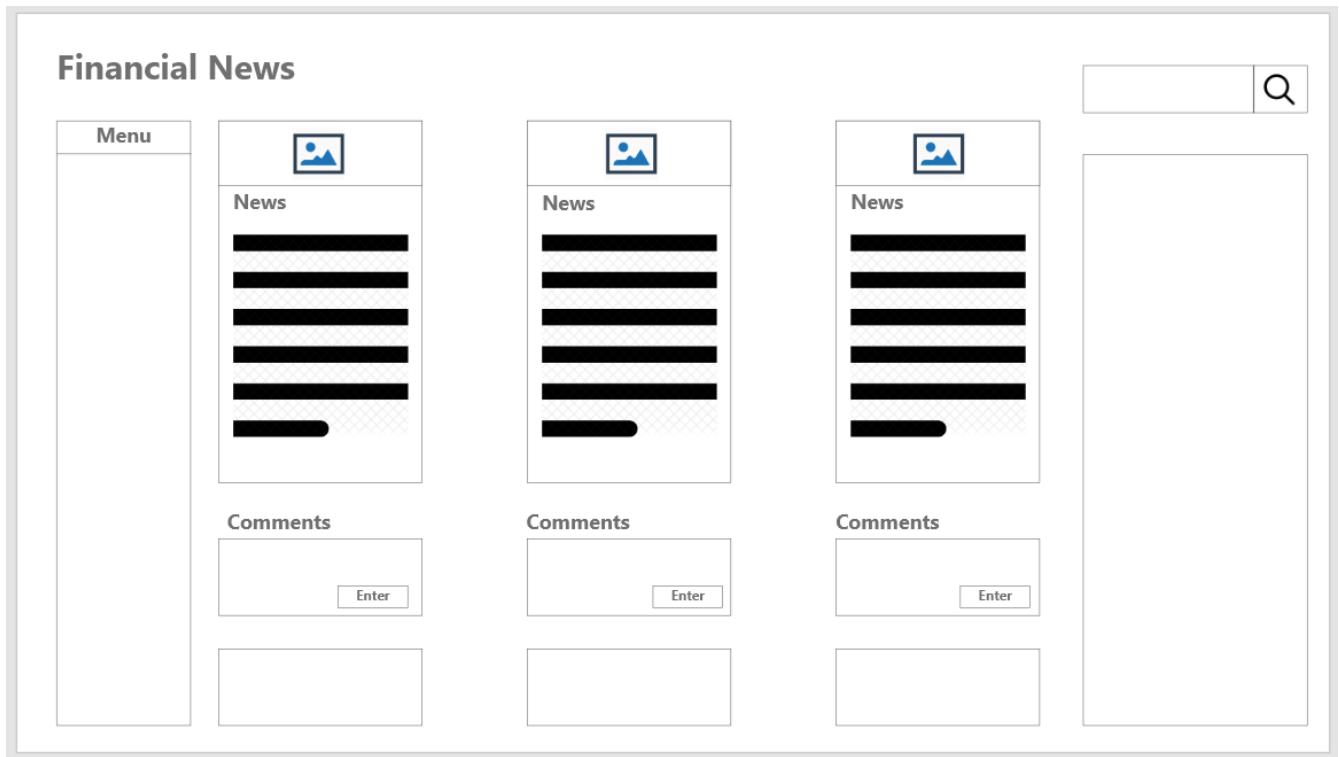
Digital Sketches

For my sketches I will be using the adobe XD software to create professional looking design sketched. There are several reasons as to why I have decided to use Adobe XD and not the other more well established design software which are available on the market. This is a prototyping application where it has layout and drawing tools to design websites and other user interfaces with ease. Unlike other software such as ‘Sketch’ adobe XD is completely free and provides a comprehensive set of tools. Adobe XD also has a useful feature of the repeat grid which helps create adjustable lists as well as grid based screens. Another stand out functionality of Adobe XD is the auto-mode, which predicts how a screen should respond to various device sizes. Sketches and designs act as a form of prototyping as it is both fast and iterative. It also allowed me to visually represent ideas and be able to evaluate designs as whole. I have created a number of sketches which I will use as a starting basis for the development of my products. This required me to initially make a few sketches on paper which I then converted to a digital version on adobe XD. I then used these designs as a reference point on how to layout and design my website.

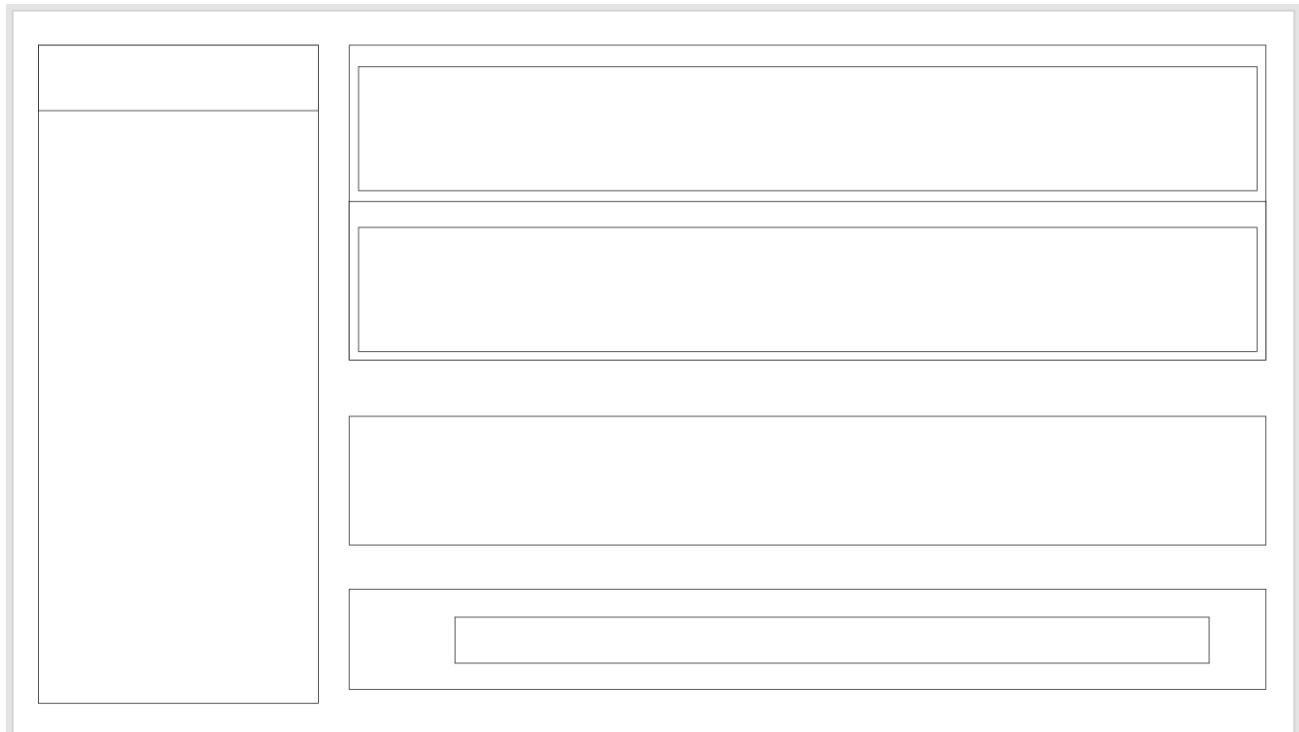


Design 1

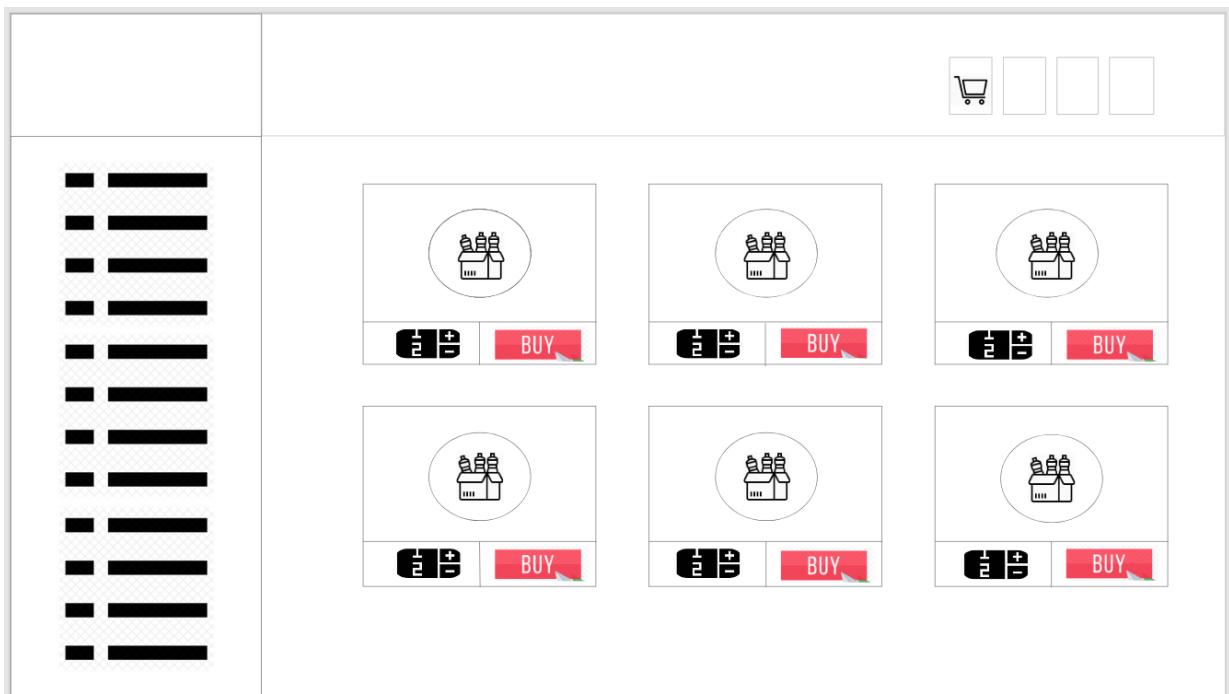
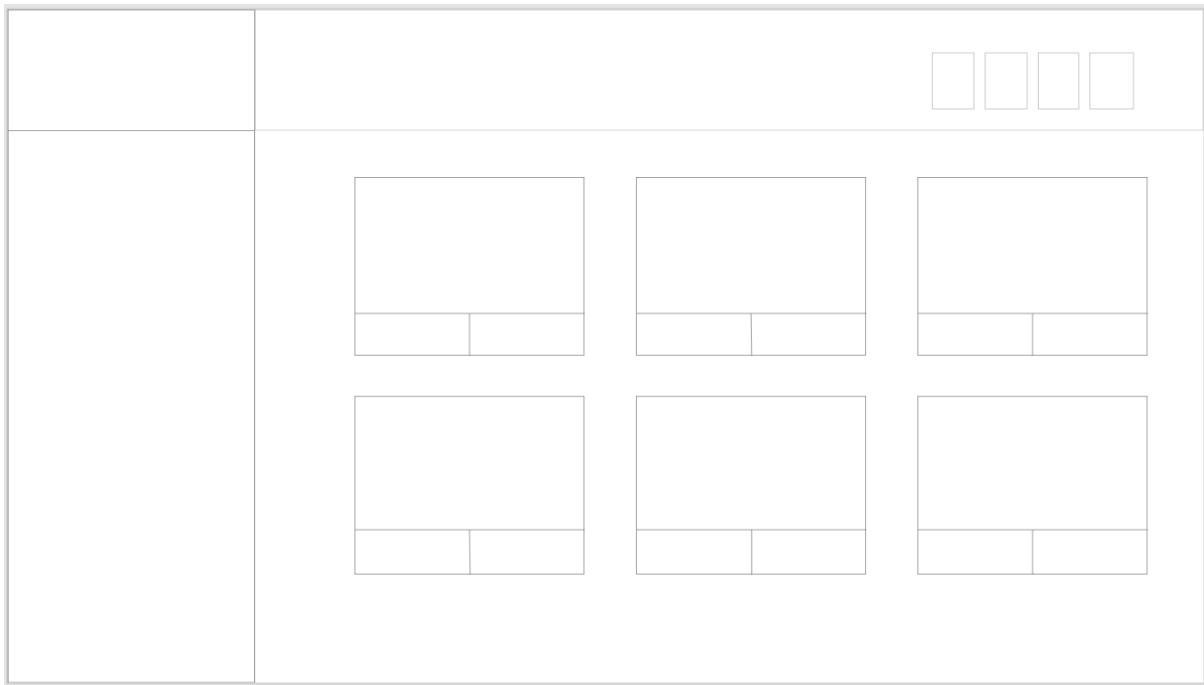


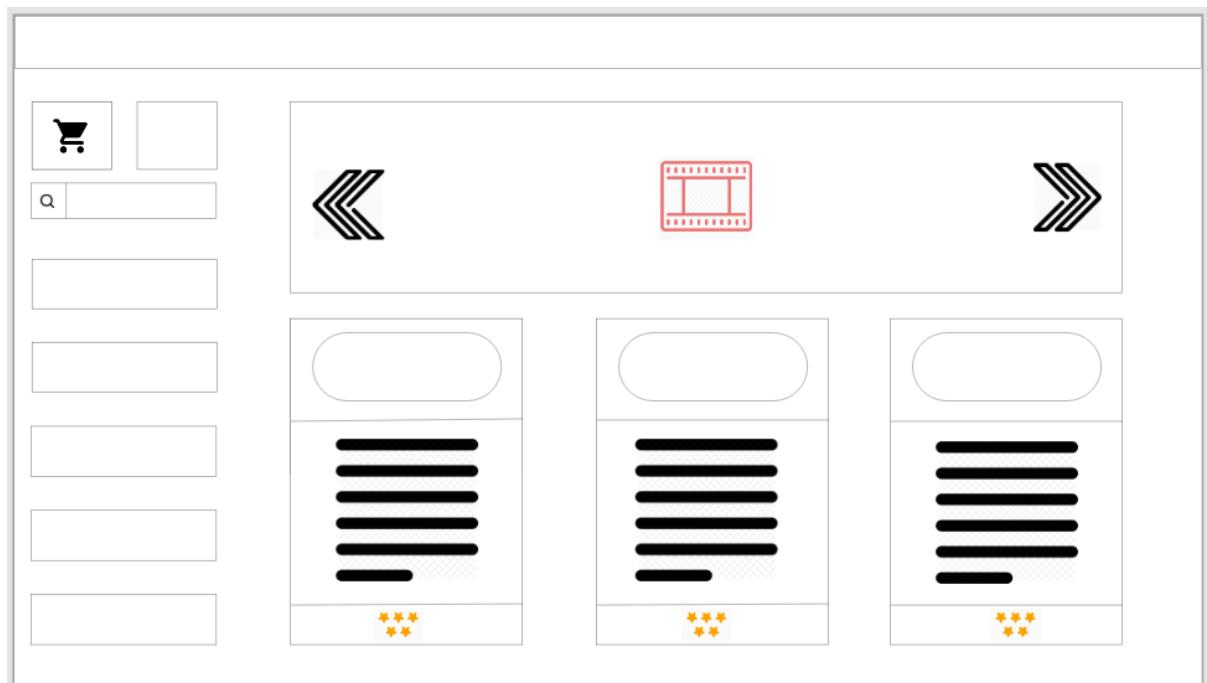


Design 2



A detailed wireframe of a web page. On the left, a sidebar features a title bar with "Title" and a blue horizontal line, followed by five "Link" entries. Below these is a search bar with a placeholder "Search:" and a magnifying glass icon. In the main content area, there are two "Recent News" sections, each with a date input field. A "Comment:" section follows, containing a large input field and a "Submit" button. At the bottom, there is a user profile icon next to a long input field.

E commerce Design 1:

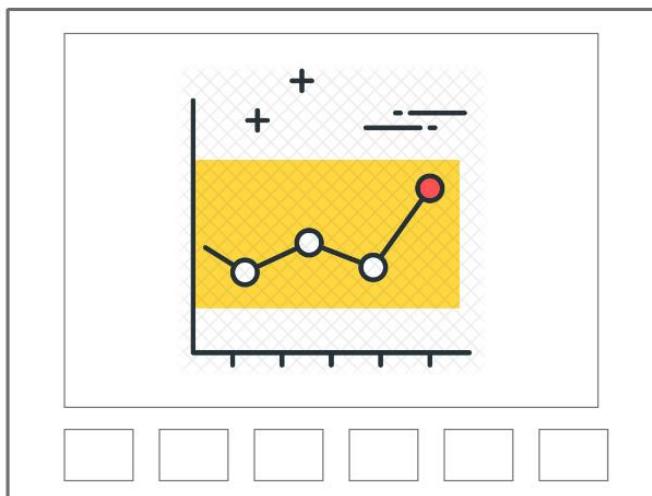
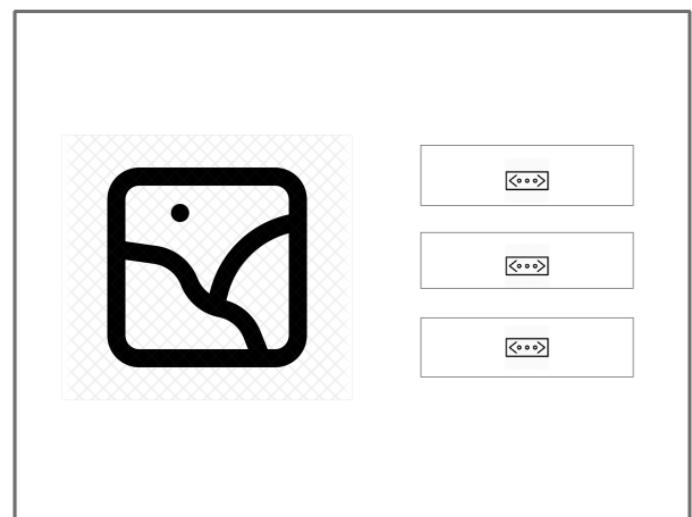
Design 2:

GUI Design 1

Username:

Password:

Login



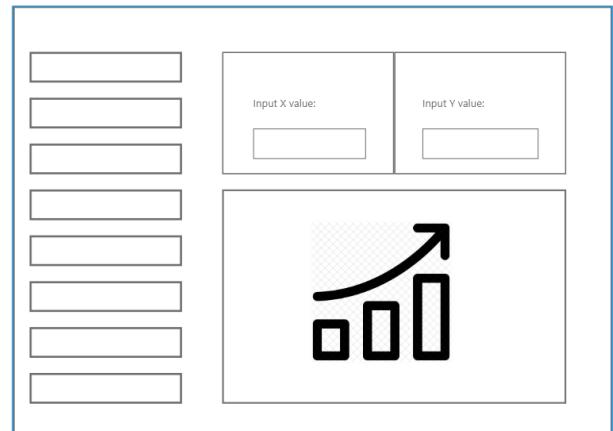
GUI Design 2

Username:

Password:



Login



Software Engineering

Software Development Agile Vs Waterfall

With my project I had to choose between two different development styles being the Waterfall method or the Agile method. Each of these come with both pros and cons which I had to go over in order to decide which would be the most efficient style of development for myself. The waterfall method is followed in a progressive order and you only move onto the next phase of development if the previous steps are completed.

One of the main advantages of the waterfall method is that it is a very easy model to manage due to the fact that each of the phases have very specific deliverables and we are able to review the processes. This however causes the issue of making it very difficult to make changes within previous phases. It also requires for the requirements to be set out very clearly and precisely from the start as it is very hard to change the set of requirements once some have already been implemented at earlier stages. As my project required me to constantly think of new ideas and requirements on a constant scale I decided to use an agile approach when tackling my project.



During my project I used an Agile software development process which was based on iterative development. Both requirements and solutions were added as my project developed. I focused on a specific functionality at a time which included : planning, analysis, design, coding, unit testing, and acceptance testing. This allowed me to minimise the amount of risk and allowed for me to adapt to changes very quickly. One of the main reasons I chose to do the project in an agile manner is that I was able to change my interfaces dynamically to new functionality which is needed and allowed me to test the interfaces as I went along with it.

Development Process

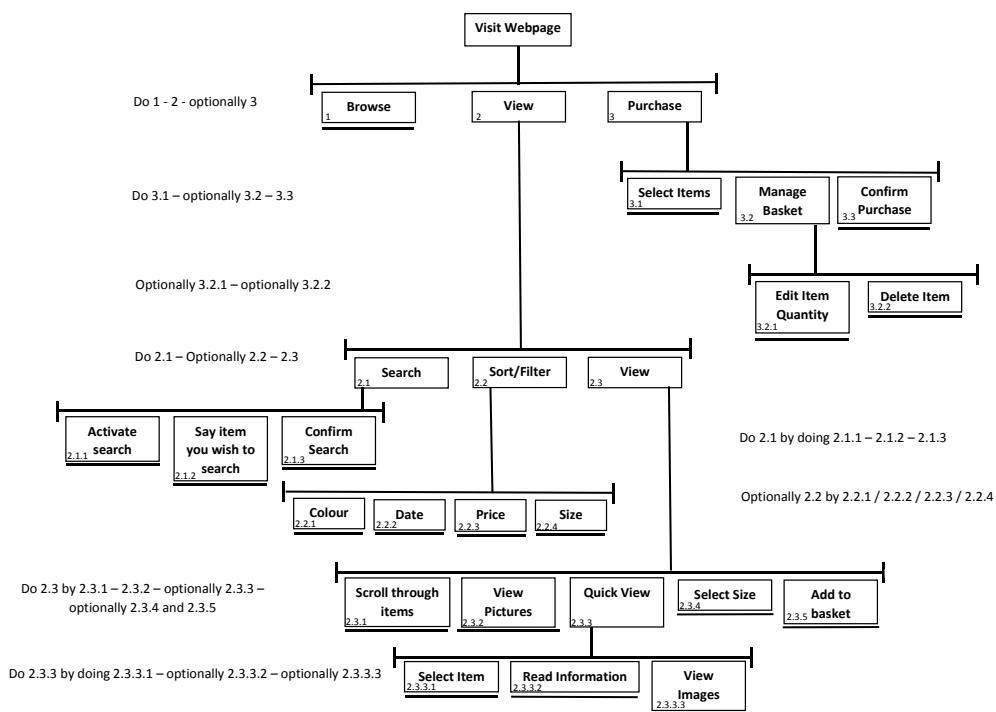
- Step 1 – Understand Requirements
- Step 2 – Research
- Step 3 – Idea brainstorm
- Step 4 – Sketches
- Step 5 – Sketch Code Development
- Step 6 – Revisions
- Step 7 – Completion

When designing my user interfaces, it was key that I first learnt how the development process is carried out. Initially I identified the requirements of each of my user interfaces and this allowed me to focus my research on the aspects which I have identified. These requirements will serve as a reference point when designing. Once these are identified I then had to analyse each of the project target audience and demographic. For the financial news website, I have identified the demographic as being those interested in news and employees of the financial industry. The E-commerce website will be targeted at those

interested in well throughout products and also impulsive buyers. The GUI Market data visualiser will be specifically targeted at those working in the finance industry whom need to . Once this stage is done, I then brainstormed various ideas of different design concepts and those which can be incorporated into my designs. I then proceeded to do my sketches which I have presented below and develop several prototypes from which I can choose from.

HTA Diagram

During my project I initially created a HTA diagram which helped me set out the different tasks which a user may be faced with. HTA is the abbreviation for a Hierarchical Task Analysis, which is a structured approach to describe users tasks in a hierarchical order. This allowed me to identify and understand the tasks which users must do in order to achieve a goal. These can very easily be broken into levels of subtasks as well. It provided a way to explain the interaction of users with the software system itself and how these can be optimised. To begin the process of creating a HTA diagram I had to first identify the users primary goals, the steps needed to perform a specific goal and how these can be improved.



When we go to a shop a customer can browse (1), view (2) and purchase items (3).

When browsing (1) the customer can look around the shop (browse the shop)

When the user is viewing (2) they can first search (2.1) and then optionally apply filters (2.2) and then finally view the products (2.3).

When searching (2.1) the customer activates the search (2.1.1), then says the item you wish to search (2.1.2) and then confirm the search (2.1.3).

When filtering (2.2) the customer can optionally choose to filter by Colour (2.2.1), Date (2.2.2), Price (2.2.3) and Size (2.2.4)

When Viewing (2.3) the customer first can scroll through the items (2.3.1) viewing the pictures (2.3.2) they can then optionally view the further information (2.3.3) and then select a size (2.3.5) if they wish to add to basket.

When a customer wants to view the further information (2.3.3) they first select the item (2.3.3.1) by interacting with the picture, and then optionally read the information displayed (2.3.3.2) or view the clothing (2.3.3.3)

customer selects the size (2.3.4)

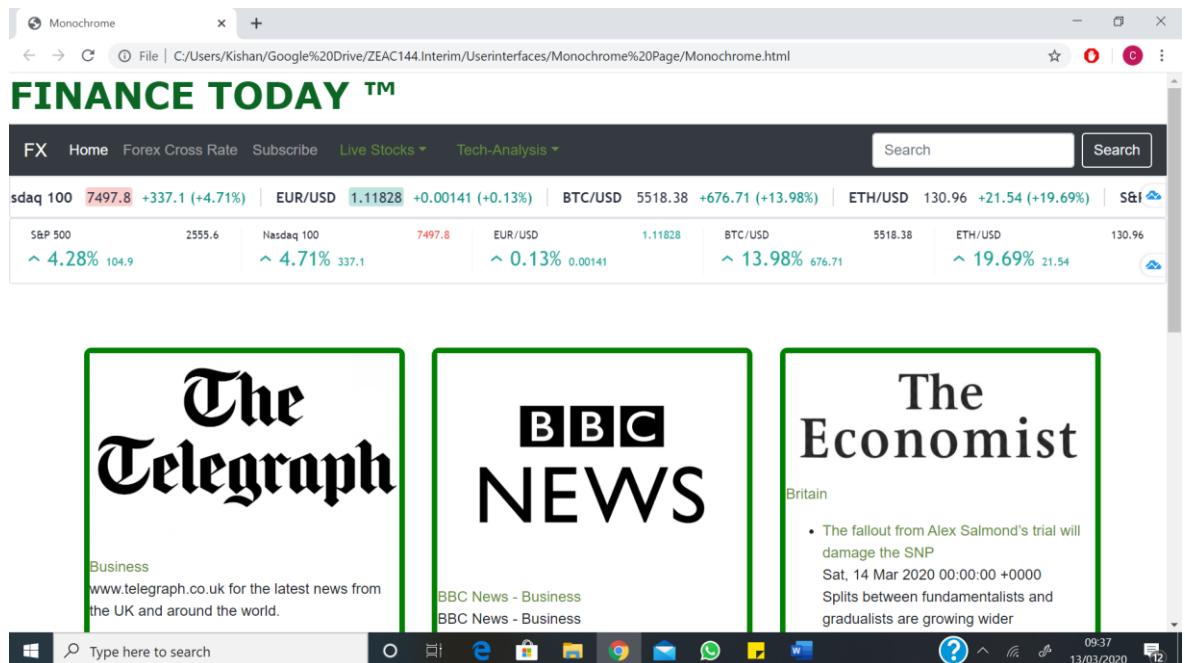
Can optionally add to the basket (2.3.5)

When the user optionally wants to make a purchase (3) they first must select the items (3.1) and then can optionally manage their basket (3.2)

When managing the basket (3.2) the user can optionally add an item (3.2.1) or delete current items (3.2.2) from the basket.

Monochrome Page

My monochrome page has been designed to be a financial news website consisting both of news reports and live financial market data. It has also been designed to follow a very minimalistic design as well as being text based with no images.



As explained previously in my colour and perception section I have used a green monochromatic scheme in order to follow the colour theory principle that green portrays affluence and dependability. I have used green to highlight the borders between the various components on the website. This allowed me to add some structure to the page and separate the different sections of the actual website. The bootstrap Grid I have used also splits the page into three separate sections after the top heading and navigation bar which has been made more prominent from the highlighted borders. In order to add a more modern feel, I have also padded the edges of the containers to give a more rounded design which improves the website for a more modern look.

```
<!-- Creates a container for each of the news blocks -->


<div class="row">
        <div class="col-lg-4"><font color="#4CBB17"><b><p></p></b></font>

            <div class="gallery">
                <a target="_blank" href="https://www.telegraph.co.uk/money/">
                    
                </a>
            </div>
        </div>
    </div>

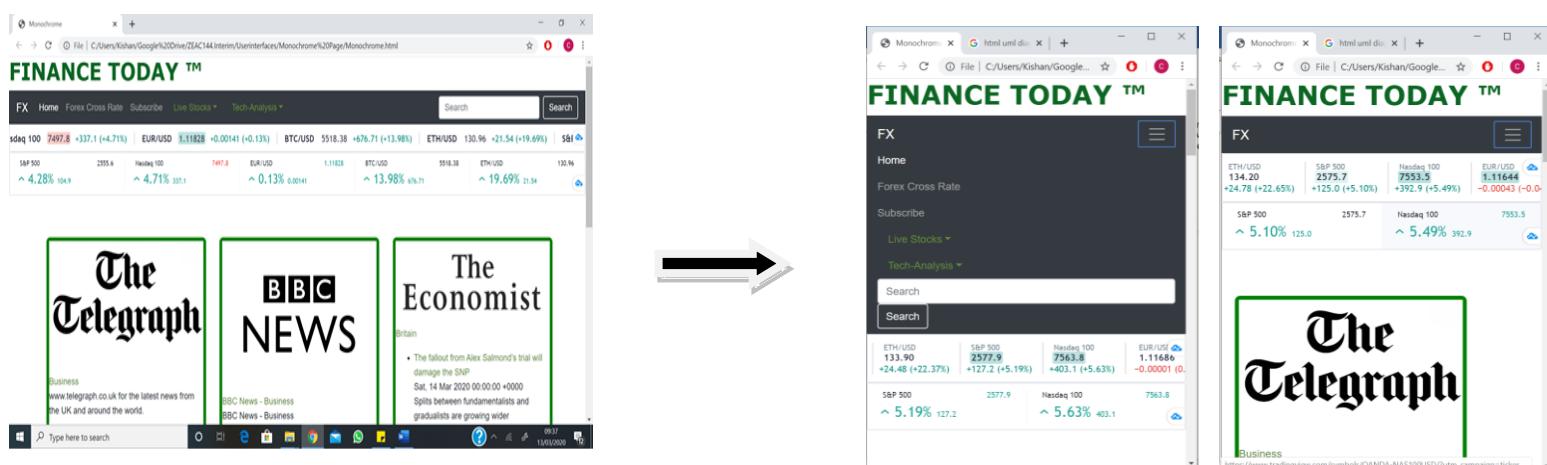

```

The minimalist approach is achieved by using very few pictures and not cluttering the text throughout the website. I have used CSS styling in order to incorporate the green colours into the nav bar and other elements. I have made a separate style sheet containing all the CSS to make the code much cleaner and more organised.

```
.topnav {
    overflow: hidden;
    background-color: #0B6623;
}
```

The navigation bar is able to effectively adapt to screen size and reduces the options to a drop down menu when used on a much smaller screen such as a mobile phone. This has been done by setting all widths within the styling to 100% which allows the bootstrap layout to dynamically adapt to the size of the page present. So for example we can see that the navigation bar moves all the page links to a dropdown menu to accommodate for the reduced amount of width and space on the actual navigation bar. This helps keep the minimalistic look to the website by not having a cluttered navigation bar. This has also eliminated the need for a separate webpage for mobile devices. In order to achieve this we have used the “auto” command within the code for both height and width as follows:

```
div {
height: auto; (If there is addition of info to the page this will result in the page being stretched down)
width: 1000px;
margin: 0 auto; (Move the div component to the centre of the page)
}
```

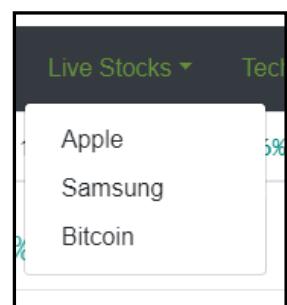


The page contains 3 columns of news which is fed live information from a RSS feed. This has been done by using a RSS xml feed link which can be found on the various news websites. This was then converted using feed2js to extract the news reports and display 5 news reports for each section with a timestamp and date. RSS feeds work by the news

```
<div class="col-lg-4"><b><font color="#4CBB17"><p>BBC</p></font></b></div>
<div class="gallery">
<a target="_blank" href="page1.html">

</a>
<script language="JavaScript" src="http://feed2js.org//feed2js.php?src=http%3A%2F%2Ffeeds.bbci.co.uk%2Fnews%2Fbusiness%2Frss.xml&chan=y&num=5&desc=1&date=y&utf=y" charset="UTF-8">
<type="text/javascript"></script>
<noscript>
<a href="http://feed2js.org//feed2js.php?src=http%3A%2F%2Ffeeds.bbci.co.uk%2Fnews%2Fbusiness%2Frss.xml&chan=y&num=5&desc=1&date=y&utf=y">View RSS feed</a>
</noscript>
</div>
```

websites keeping news notifications in a standard format. By using a RSS aggregator such as I have, you are able to automatically gain access to the RSS feeds and display these notifications on your reader. The RSS aggregator which I have used can be simply thought of as a web browser for RSS files. It checks for updates constantly for new items and displays these at regular intervals. I have displayed a short summary of the news story and a link to the main page where the full story can be found. The RSS is read from a XML-



format file which contains the relevant news story which are updated by the provider.

I have used a number of drop down menus in order to have a more structured and organised navigation bar. For the Live Stocks and Tech Analysis I have incorporated the different pages into a drop down menu. This allows efficient but simple navigation through the pages.

```
<!-- Creates the drop down menu -->
<div class="nav-item dropdown">
    <a href="#" class="nav-link dropdown-toggle" data-toggle="dropdown">Live Stocks</a>
    <div class="dropdown-menu">
        <a href="Apple.html" class="dropdown-item">Apple</a>
        <a href="Samsung.html" class="dropdown-item">Samsung</a>
        <a href="Bitcoin.html" class="dropdown-item">Bitcoin</a>
    </div>
</div>
```

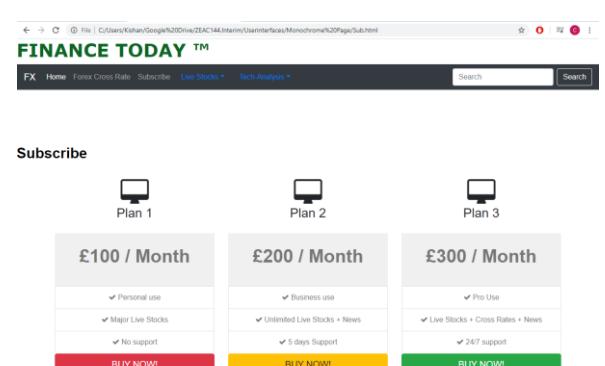
I have also incorporated a comment section at the bottom of the page where you can leave a page. Once a comment is submitted it is sent to a php page which I will incorporate in the final project.

```
<form method="post" action="http://"/>
    <textarea name="comments" cols="99" rows="5" class="html-text-box">Comments here...</textarea>
    <br>
    <input type="submit" value="Submit" class="html-text-box">
    <input type="reset" value="Reset" class="html-text-box">
</form>
```

The Homepage consists of two live Ticker features which display live forex currency rates on the page. This is taken from a direct feed from ‘TradingView’ which displays up to date current currency pricing with very little delay. I have used a white background to keep with the minimalistic look of the page and used dynamic sizing to reduce the amount of currency which is displayed when the screen size is reduced and vice versa. This is an external widget which imports the javascript from a separate file which allows the Ticker to move and slide across the page to add an interactive moving component to the page itself.

```
<!-- TradingView Widget BEGIN -->
<div class="tradingview-widget-container">
<div class="tradingview-widget-container__widget"></div>
<script type="text/javascript" src="https://s3.tradingview.com/external-embedding/embed-widget-ticker-tape.js" async>
{
  "symbols": [
    {
      "proName": "OANDA:SPX500USD",
      "title": "S&P 500"
    },
    {
      "proName": "OANDA:NAS100USD",
      "title": "Nasdaq 100"
    },
    {
      "proName": "FX_IDC:EURUSD",
      "title": "EUR/USD"
    },
    {
      "proName": "BITSTAMP:BTCUSD",
      "title": "BTC/USD"
    },
    {
      "proName": "BITSTAMP:ETHUSD",
      "title": "ETH/USD"
    }
  ],
  "colorTheme": "light",
  "isTransparent": false,
  "displayMode": "adaptive",
  "locale": "en"
}
</script>
</div>
<!-- TradingView Widget END -->
```

The subscribe page allows consumers to subscribe to additional services. As described earlier on in my report I used the HCI methods studied to effectively design a subscription page. This particular page makes use of css styling from the ‘Font-Awesome’ styling sheets which provides a variety of both icons and fonts for use on the page as well as animations and other features which I have imported using the following code:



```
@import url("http://maxcdn.bootstrapcdn.com/font-awesome/4.2.0/css/font-awesome.min.css");
```

Using font awesome when you hover over a particular box it highlights the box with a shadow which adds an interactive element to the page and allows for the contents of the page to be further separated allowing for a more coherent design.

```
.panel-pricing:hover {  
    box-shadow: 0px 0px 30px rgba(0, 0, 0, 0.2);  
}
```

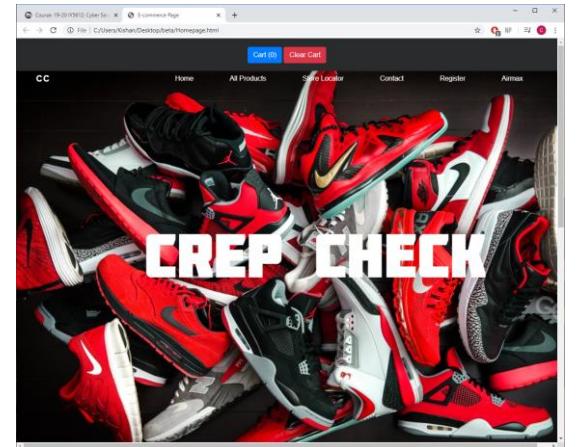
At the very top of the page the navigation bar also contains a search box feature which allows users of the website to search content on the website and find a particular page which they are interested in. Following research into cultural differences I have ensured that I have used the words search rather than a magnifying glass as in some cultures this is not recognised as the symbol for searching.



```
<!-- Creates the search bar -->  
  <form class="form-inline ml-auto">  
    <input type="text" class="form-control mr-sm-2" placeholder="Search">  
    <button type="submit" class="btn btn-outline-light">Search</button>  
  </form>  
</div>
```

E-commerce

The main framework I have used in order to create this page is bootstrap 4. This gives me the template for the page, where I have used the Z shaped pattern which I talked about in my visual hierarchy section. This provides the most effective design pattern for e-commerce and how a user would best interact with a website. All the pages follow a consistent style with a large black banner on the top with a navigation bar underneath it. As discussed previously this is an important heuristic to keep consistency between the pages so users know they are on the same website and familiarise themselves with the design. To create a banner at the top of the page I have created a separate “topbanner class” which assigns the font style and then used CSS styling to assign the padding and the background colour.



```
<!-- BANNER -->
<!-- The banner which is present at the very top of the page -->


<font color="white"><span style="font-family:Impact"><b>Creep Check</b></span></font>
<font color="white"><span style="font-family:Verdana"><p>Sneakers & More</p></span></font>


```

```
<title>E-commerce Page</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link rel="stylesheet" href="https://maxcdn.bootstrapcdn.com/bootstrap/4.3.1/css/bootstrap.min.css">
```

```
.topbanner {
margin-bottom: 0;
background-color: black;
padding: 25px;
}
```

A Navbar has been used which has a fade effect that adds a modern element to the website itself. The Navbar goes from transparent to a black background as you scroll down on the page with a fade transition. The navbar is also attached to the top of the screen so it follows the page as you scroll down.



There is also a slideshow incorporated into the website which I have talked about in the slideshow section. This was developed with various HCI concepts in mind which helped me decide which type to have on the page. I have used a separate class for the different images which then links back to the script which is used to change the image. The slideshow is not animated due to my research and is moved via a scroll bar.

```
<div class="row">
<div class="column">

</div>
</div>
```

```
<script>
use strict;
var slideIndex = 1;
var slideIndex2 = 1;

function plusSlides(n) {
    slides(slideIndex += n);
}

function cSlide(n) {
    slides(slideIndex = n);
}

function slides(n) {
    var dots = document.getElementsByClassName("dots");
    var dots2 = document.getElementsByClassName("dots2");
    var slides = document.getElementsByClassName("slides");
    var dotsCaption = document.getElementsByClassName("caption");
    if (n + 1) (slideIndex + slides.length)
    if (n + 1) (slideIndex + slides.length)
    for (let i = 0; i < dots.length; i++) {
        slides[i].style.display = "none";
    }
    for (let i = 0; i < dots2.length; i++) {
        dots[i].className = dots[i].className.replace(" active", "");
    }
    slides[slideIndex - 1].style.display = "block";
    dots[slideIndex - 1].className += " active";
    captionText.innerHTML = dots[slideIndex - 1].alt;
}
</script>
```

There is a slide show at the top and there are previews of all the images available at the very bottom of the slide show which shows which other images are available within the slideshows.

Each product is placed inside a container amongst the 3 column bootstrap grid which provides structure to the page and separates the different products from each other. I have then used several containers for the products and used an add to cart button which provides the user with feedback that the product has been added to the cart which is an essential HCI concept as discussed before.

```
<div class="pccontainer">
  <div class="row">
    <div class="col-sm-4">
      <div class="panel panel-primary">
        <b>350 V2 Black</b>
        <div class="panel-body"></div>
        <div class="panel-footer">£269</div>
        <button type="button" onclick="alert('Added to cart')">Add to cart</button>
      </div>
    </div>
  </div>
```



Price: £160.0
Add to cart
Quick View

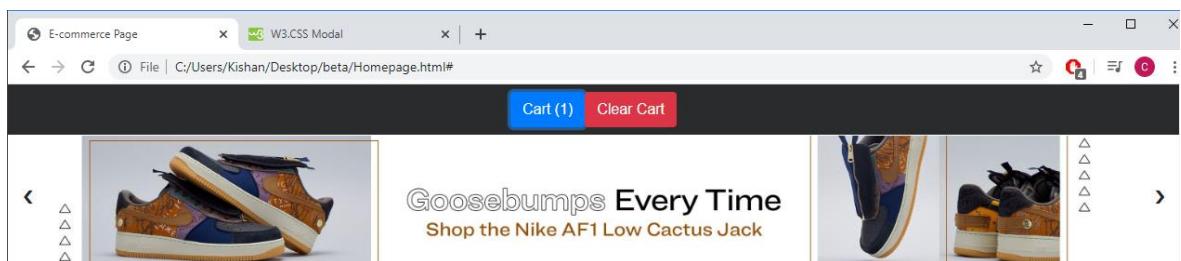
This page says
Added to cart

OK

Once a product has been added to the cart it appears on the cart which I have created using a modal. A modal is either a dialog box or a pop up window which is shown on top of the current page. Within CSS there are two classes of modal windows which can be used which is a modal container and a modal-content which defines the modal content, and I have used both in order to create a cart. In order to open and close the cart I used a document.getElementById() method with a button. The particular JavaScript method which opens the cart is the displayCart() function.

```
<!-- Modal -->
<div class="modal fade" id="cart" tabindex="-1" role="dialog" aria-labelledby="exampleModalLabel" aria-hidden="true">
  <div class="modal-dialog modal-lg" role="document">
    <div class="modal-content">
      <div class="modal-header">
        <h5 class="modal-title" id="exampleModalLabel">Cart</h5>
        <button type="button" class="close" data-dismiss="modal" aria-label="Close">
          <span aria-hidden="true">&times;</span>
        </button>
      </div>
      <div class="modal-body">
        <table class="show-cart table">
```

In order to access the cart I have used a banner at the top which overlays the website and follows the page as you scroll down. I have done this by again using a modal which contains two buttons that link to JavaScript functions.



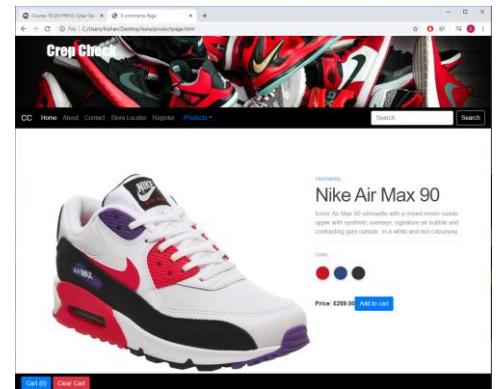
When an item is added via the “add to cart” button it appears within the cart. You are able to change the quantity and also



delete an item from the cart as well as directly order from the website.

This has been made possible by using JavaScript to carry out the particular functions which have been linked to the buttons itself from the JavaScript document. From this segment of code you can see how you can both increase and decrease an item from the cart when the + or - buttons are clicked. The cart saves the products added and remains the same on any which is fitted by caching the data within the browser.

```
// -1
$('.show-cart').on("click", ".minus-item", function(event) {
  var name = $(this).data('name')
  shoppingCart.removeItemFromCart(name);
  displayCart();
})
// +1
$('.show-cart').on("click", ".plus-item", function(event) {
  var name = $(this).data('name')
  shoppingCart.addItemToCart(name);
  displayCart();
})
```



I have also created a product page incorporating a number of design features which I have studied. This page consists of a large image of the product and the ability to change the colour of the product as well as to add the item to the cart. I have used images of the trainer in different colours and then incorporated a fade effect when changing the colour to give a visually appealing look. I have done this using the following code:

```
$(document).ready(function() {
  $('.color-choose input').on('click', function() {
    var shoeColor = $(this).attr('data-image');

    $('.active').removeClass('active');
    $('.left-column img[data-image = ' + shoeColor + ']').addClass('active');
    $(this).addClass('active');
  });
});
```

This particular function allows a user to scroll through the images depending on which one is chosen and also incorporates the fade function to achieve a more smooth transition.

Color



E-commerce Quick View

One of the main goals of e-commerce is to make the users shopping experience as easy possible. This includes lowering the amount of time it requires for a user to add an item to a basket. In order to do this I have incorporated a quick view function in the hopes of reducing the time taken to make a purchase. This function allows a visitor to my page to view the new product with extra details and view more angles of the product itself without the need to visit a brand new page. The product details can be viewed in a pop-up modal window, that rather than opening on a new page, opens the pop-up on the page the visitor is already on. There are a number of key benefits to having this system already implemented:

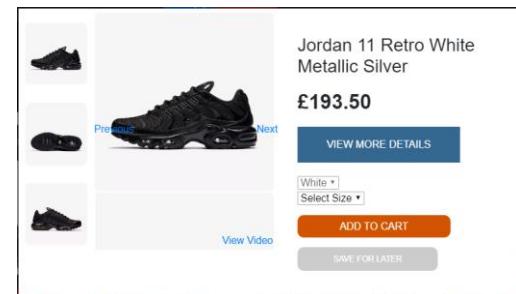
- Reduction of load on server
 - This is due to the fact that the information is already stored within the page in the code and does not need to refresh the page.
- Expedited shopping
 - This makes it much quicker to add a product to the cart without the need for a new page to load. This saves the user crucial seconds from the shopping experience.
- Show additional information

- The quick view function allows for information such as discounted price, and product description to be presented to a user before they go to view the cart.

Drawbacks of Quick view:

One of the major flaws in quick view is that a lot of visitors do not know how the quick view function works. Many of the websites require the users to hover over in order to get the quick view to activate. Visitors are also accustomed to clicking on a product image therefore it was important that I implemented an easily viewable and recognisable button which makes it clear that the option is available. When I implemented my quick view feature I made sure that I included these primary elements:

- Clear call to actions with buttons which clearly activate the quick view modal
- The quick view has been made simple, with less clutter due to the small amount of space available
- I have added a link to the main product page so they can view all the details
- There is a prominent “add to cart” button present
- I have made sure that my image takes up a large section of the quick view



In order to recreate this function I have used another modal element which appears when the quick view button is pressed. This brings up a window which allows a user to further view additional images of the product and also view a video if necessary using the following code:

```
<div class="image-large">
  <ul>
    <li></li>
    <li></li>
    <li></li>
    <li></li>
  </ul>
```

I have also used a drop down menu where a person can pick the size which they desire. This allows the different sizes to be more effectively organised and give a much more minimalistic look to the page. This is done by using the list function to list the different sizes.

```
<select class="size-dropdown" data-bind="options: sizes, optionsText: 'Text', value: selectedSize, enable: sizeDropDownEnabled, visible: displaySizeDropDown" style="">
  <option value="">Select Size</option>
  <option value="">Size 4</option>
  <option value="">Size 5</option>
  <option value="">Size 6</option>
  <option value="">Size 7</option>
  <option value="">Size 8</option>
  <option value="">Size 9</option>
  <option value="">Size 10</option>
  <option value="">Size 11</option>
  <option value="">Size 12</option>
</select>
```

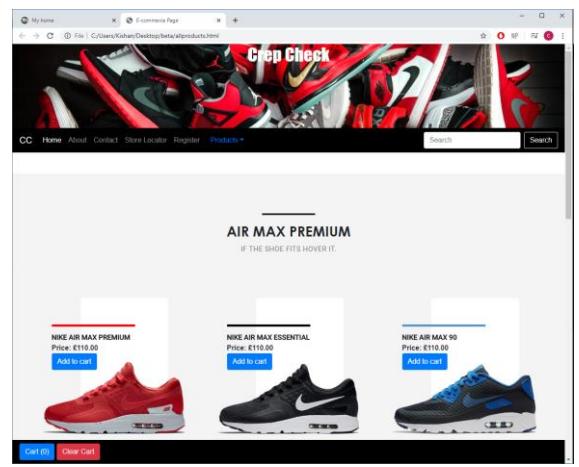


You are able to exit the quick view by simply clicking a section away from the page which causes the close to function to be activated.

I have also made a contact page where a user is able to contact the company and it also has a section for the address. The page uses cards to separate the page and also has a number of buttons for the contact. It uses the Form element which is able to collect a user's input and put it into a specific location.

The all Products page consists of a larger selection of items than the Homepage offers. The user is first met with a choice of 3 shoes which has a slight zoom effect, which creates a more dynamic and interactive feel to the page by using JavaScript. The add to cart button, links to the same cart through out the website.

```
.colors > li:hover {
    -webkit-transform: scale(1.09);
    transform: scale(1.09);
    -webkit-transition: all ease 1s;
    transition: all ease 1s;
}
```

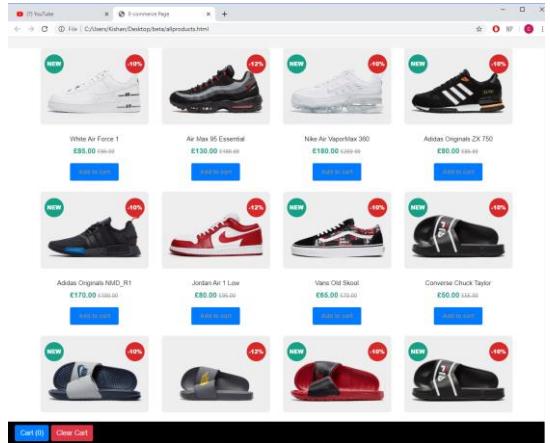


When you hover over one of the images it slightly enlarges and the Add to cart button also changes colour via the following CSS code. Hovering over the image brings up a 3 colour option and creates a much larger imaged. This is contained in one container which is separate from the product containers below. The background is also in grey to differentiate from the rest of the page and the other elements of the page. White has also been used to give a 3d element to the page.

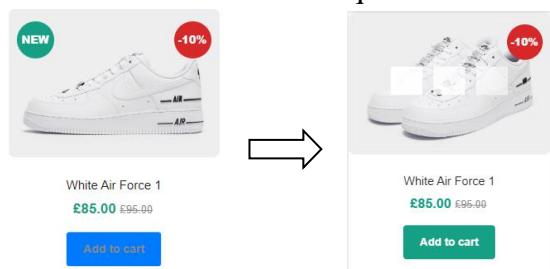
When you scroll further down the page you are then met with multiple products in 3 different rows. This provides users with a greater selection of product choice. Each product has been placed in its own individual container with a grey background to add some separation to the page itself. When you hover over an item the image is transitioned to a second image. The Add to cart button also changed colour to draw the users attention to it and visually

```
.card--style2:hover .shoe--colors .colors {
    opacity: 1;
    -webkit-transform: translateY(0);
    transform: translateY(0);
    -webkit-transition: all 0.33s ease-out;
    transition: all 0.33s ease-out;
    -webkit-transition-delay: 0.253s;
    transition-delay: 0.253s;
}
```

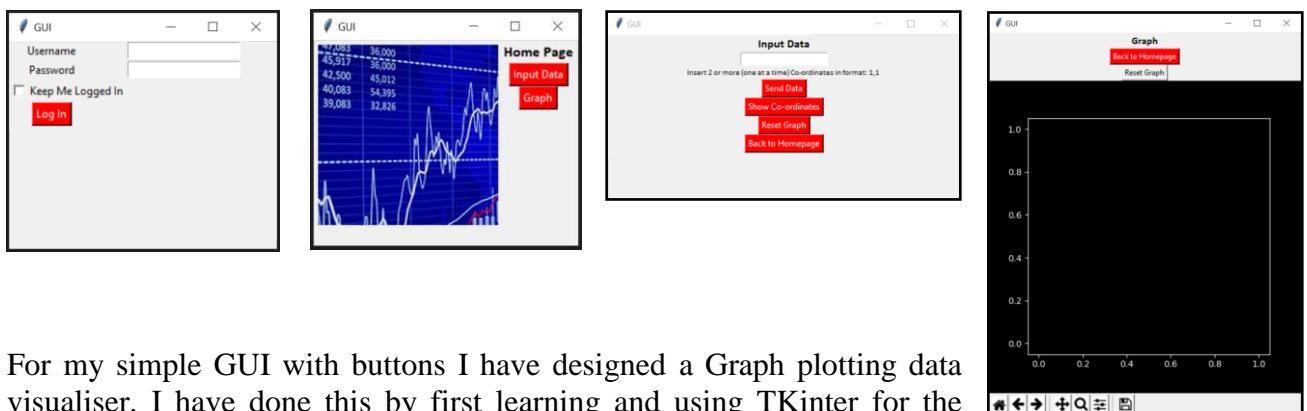
persuade them to purchase the item. This is done using the following CSS code below:



This also creates 3 additional boxes to appear which allows a user to either quick view or add to cart from the picture itself:



Data Visualiser GUI



For my simple GUI with buttons I have designed a Graph plotting data visualiser. I have done this by first learning and using TKinter for the interface and python for the backend functionality. I have also had to use the matplotlib in order to plot the data and visualise it on a graph. You must first log in and then you are presented with two buttons. You can either click on the input data button which then takes to a page where you can input co-ordinates which will then be plotted on the graph automatically. We can then go on the Graph page where we can see the plotted data, zoom, save and alter the graph. The GUI for the homepage has been set up using the Tkinter .grid() function which separates the page into grids and initialises the initial frame for the GUI:

```
class GUI(tk.Tk):
    def __init__(self, *args, **kwargs):
        tk.Tk.__init__(self, *args, **kwargs)
        container = tk.Frame(self)

        container.pack(side="top", fill="both", expand = True)
        container.grid_rowconfigure(20, weight=10)
        container.grid_columnconfigure(20, weight=10)

        self.frames = {}
```

The different pages are then changed using the following code which is in a dictionary:

```
for Page in (PAGES):
    frame = Page(container, self)
    self.frames[Page] = frame
    frame.grid(row=0, column=0, sticky="nsew")
self.show_frame(PS)

def show_frame(self, cont):
    frame = self.frames[cont]
    frame.tkraise()
```

Each page which is Tkinter frame has been based on a separate class which is switched one from the other using the list “PAGES = [PS, SP, P1 , P2]”. For the input data page I have used a write method which takes the input and then writes to a text file where data for the graph is extracted from:

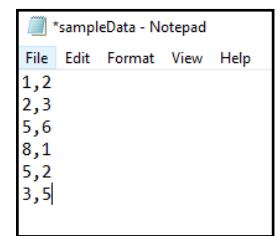
```
def write_file(text_file):
    file = open("sampleData.txt", "a")
    user_Input = text_file.get()
    file.write(user_Input + '\n')
    file.close()
```

The graph is then automatically updated and using the matplotlib canvas.draw() function is able to plot the data to the graph.

```
canvas = FigureCanvasTkAgg(f, self)
canvas.draw()
canvas.get_tk_widget().pack(side=tk.BOTTOM, fill=tk.BOTH, expand=True)

toolbar = NavigationToolbar2Tk(canvas, self)
toolbar.update()
canvas._tkcanvas.pack(side=tk.TOP, fill=tk.BOTH, expand=True)
```

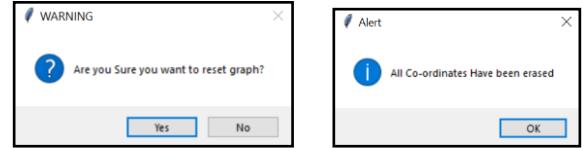
The co-ordinates are stored in a text file named SampleData.txt which is what is accessed by the graph in order to find what to plot and also accessed by both the show co-ordinate and reset button which I will be discussing below.



The ‘Reset Graph’ button is found both on the input data page and the graph page. This button clears the contents contained within the text file which is where the co ordinates are stored. This also resets the graph to default settings and removes the plotted graphs from the display. In order to do this I used the following function:

```
def erase_file():
    res = messagebox.askquestion('WARNING', 'Are you Sure you want to reset graph?')
    if res == 'yes':
        file = open("sampleData.txt", "r+")
        file.truncate(0)
        file.close()
        messagebox.showinfo('Alert', 'All Co-ordinates Have been erased')
    else:
        tk.messagebox.showinfo('Return', 'You will now return to the application screen')

button4 = tk.Button(self, text = "Reset Graph", command = lambda:[erase_file()])
button4.pack()
```



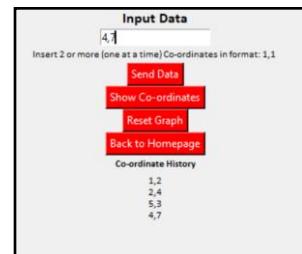
When the button is clicked before anything is cleared it gives the user a warning message whether they want to clear the graph or not. If ‘yes’ is clicked it opens the files deletes the contents using .truncate(0) and then closes the file again. The user is then alerted with a pop up box notifying them the contents have been erased.

I have also included a show co ordinates button which when clicked displays the co ordinates which have been added to the graph.

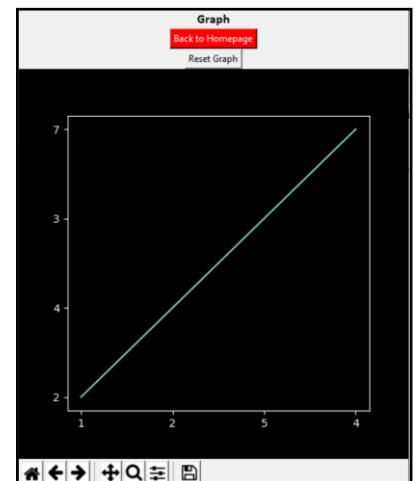
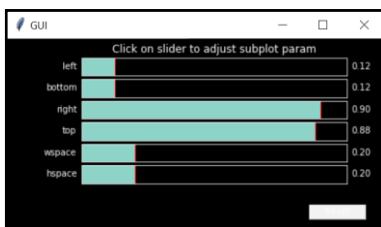
```
button2 = tk.Button(self, text = "Show Co-ordinates", command = lambda: display(), bg="red", fg="white")
button2.pack()
```

This is done by opening the file and reading the document line by line and displaying it in the window as a label:

```
def display():
    file = open("sampleData.txt")
    data = file.read()
    file.close()
    lbl3 = tk.Label(self, text="Co-ordinate History", font=("Calibri bold", 8))
    lbl3.pack()
    lbl1 = tk.Label(self, text=data, font=("Calibri", 8))
    lbl1.pack()
```



Within the graph view you can also move the diagram around and adjust the parameters. You can save the graph you produced as an image file.



Heroku Deployment

I have deployed my webpages onto the Heroku server so that they are viewable online. Heroku is a service which supports several programming languages and is a cloud based platform. This service allows to build, monitor and scale apps in the fastest way possible from an idea to an URL by skipping past all the infrastructure headaches that come with it. You are able to host your website on the Heroku server without having to worry about having infrastructure in place, and it is also free to use. Therefore one of the main advantages of using Heroku is that it is very easy to start and that you can simply deploy your project by pushing commits to a Heroku git repository you set up. Heroku also has over 100 built in add-ons. Firstly in order to deploy my website onto Heroku I needed the following prerequisites:

- Have git installed
- Sign up to a Heroku account
- Install the Heroku toolbelt which allows you to manage Heroku from the command line
- Run Heroku login from within the terminal and insert all credentials

I had to initially go to my project within the command prompt and check that my project was in the state which I wanted. The next step was for me to create an index.php file which would trick Heroku into uploading the static website as a dynamic one. This is done by making Heroku use the php file first and then getting the browser to redirect from the index.php file to my Html file. The php file only needed to be consisted of one line of code:

```
<?php header( 'Location: /index.html' ) ; ?>
```

I then created a version of my project which I wanted to deploy by running the following commands:

```
git init
```

```
git add .
```

The git add . added all my files to the git repository which I then had to commit. The next step I had to do was to create my site on Heroku, by running the following command:

```
heroku apps:create mysite
```

Once this was done I could then deploy my site from within git using

```
git push heroku master
```

I was then presented with the URL which I could visit my website on.

Code Testing

One of the initial ways in which I tested my code was to simply run the code on a browser and check whether all the desired functionality works and the visual components of each page where aligned as I had hoped. This allowed me to identify any errors on my page and then fix the code and check the errors had been resolved straight away. This sort of testing was done very often and throughout the development process in order to both identify and resolve errors at a very early stage. This ensured that errors were not lost during the development process.

Another form of testing I carried out is to ensure my code met the web standards which are set out by W3C (The World Wide Web Consortium). The W3C provide a number of developing protocols and guidelines to ensure the long-term growth of the web which should be followed by developers. Previously there were no standards for things such as coding, page design as well as browser compatibility. However, in 1994 W3C created web standards which allowed for websites to function the same on many browsers. There are more than 90 standards which have been put in place that have been reviewed to ensure the web works in a similar manner for everyone. A website which is W3C compliant are cross-platform compatible and these standards are a big reason as to why the web works well today.

In order to check both my HTML and CSS code followed W3C web standards I used the online checker provided by W3c themselves which is free to use. The online validator checks for the mark up validity of web documents in HTML. There is also an Online validator which I used to check my Cascading Style Sheets (CSS).

The screenshot shows the W3C Markup Validation Service interface. At the top, there's a blue header bar with the W3C logo and the text "Markup Validation Service". Below the header, there are three buttons: "Validate by URI", "Validate by File Upload" (which is highlighted in blue), and "Validate by Direct Input". The main area has a light gray background. It says "Validate by File Upload" and "Upload a document for validation:". Below that is a file input field with "Homepage.html" selected. There's also a link "▶ More Options". At the bottom of the validation area is a "Check" button. A note at the bottom states: "Note: file upload may not work with Internet Explorer on some versions of Windows XP Service Pack 2, see our [information page](#) on the W3C QA Website."

This validator checks the [markup validity](#) of Web documents in HTML, XHTML, SMIL, MathML, etc. If you wish to validate specific content such as [RSS/Atom feeds](#) or [CSS stylesheets](#), [MobileOK content](#), or to [find broken links](#), there are [other validators and tools](#) available. As an alternative you can also try our [non-DTD-based validator](#).

Below is an example of the output when I tested my CSS code specification and it had been validated as being CSS level 3 + SVG for my Homepage:

W3C CSS Validator results for TextArea (CSS level 3 + SVG)

The screenshot shows the W3C CSS Validator results page. At the top, there's a green banner with the text "Congratulations! No Error Found.". Below the banner, it says "This document validates as [CSS level 3 + SVG](#)!". There's also a note: "To show your readers that you've taken the care to create an interoperable Web page, you may display this icon on any page that validates. Here is the XHTML you could use to add this icon to your Web page: [XHTML code]".

Professional Issues

Over the years there has been a large development in graphical user interfaces (GUIs). There has been a massive movement in making the layout of both software and websites appealing to users. Within the UK various components of a GUI can be protected using various copyright laws. When we look at copy right The Copyright, Designs and Patents Act (CDPA) 1988 provides that copyright may subsist in eight types of original work: literary, dramatic, musical, and artistic works; films; sound recordings; broadcasts; and, typographical arrangements of published editions.[13] Due to the fact that copyright protection is generally present automatically and you do not need to register or pay any fees it is a very popular way of protecting your website visuals from getting copied. Certain visuals of a GUI for example icons and graphics can be protected as artistic works. However, when we are looking at copyright protection for the ‘look and feel’ of a particular GUI, it is too abstract and therefore can not be protected. The feel of a GUI can also not be categorised under the eight categories of the CDPA 1988.

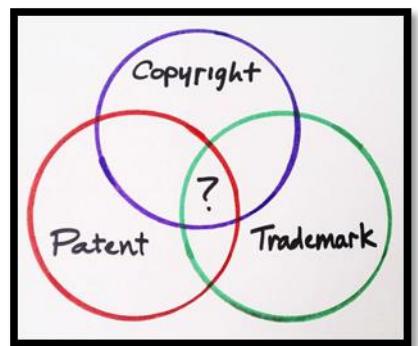
Apple Computer, Inc. v. Microsoft Corporation, 35 F.3d 1435 (9th Cir. 1994) was a court case which tried to stop Microsoft and Hewlett-Packard from using GUI components that were similar to those used by apples operating system. [12] During this time xerox also tried to sue apple alleging that the mac GUI was based largely on xerox’s. [11] The court involved in this case dismissed Xerox’s claim and Apple also lost all the claims against Microsoft except for the trash can icon and folder icons that HP windows application were infringing. The lawsuit was initially filed in 1988 and lasted four years, and a decision was made in 1994, although apple did try and appeal the decision, it was denied by the U.S. supreme court.

A more recent example of this the “look and feel” concept when it comes to UX design the case of Apple Inc. v. Samsung Electronic Co about the designs smartphones and tablets. Apple's evidence submitted to the court included side-by-side image comparisons of iPhone 3GS and i9000 Galaxy S to illustrate the alleged similarities in packaging and icons for apps. Although Apple had won the court case in the U.S, Samsung won the rulings in Japan, and the UK. [14] Apple had patented the designs of its rectangular facing front nd the rounded edges it has as well as having a grid of colourful icons on a black screen. [15]

This was a prominent issue which I had to consider when designing my user interfaces. I had to ensure that logos and icons which were used in my websites were not protected by copy right issues. When using Adobe XD I also had to read the license terms when using certain logos such as the search icon to see if it is protected and whether I can use them in my sketches or not. I have used a number of icons through the user interfaces. Another issue is the copyright of images used, and I had to ensure that the correct licensing was in placed and that they can be used for the products on my websites.

When also looking into the ethics of design, I was made aware from very early that design itself is a persuasive technique. Due to the fact that design is a very emotive process it deals with ethics at a much deeper level. With user interface design there is something called Dark patterns. Dark patterns are tricks which are used within websites in order to make a user do things which they initially didn’t mean to. When designing my own E-commerce website I had to ensure I had the right balance of persuasive design elements as having too much may cause

A particular issue which has been of concern to me is when building my email subscription service in my e-commerce website. A huge ethical issue within e-commerce is the issue of E-mail spamming which involves sending unwanted advertisements to those who have signed up using



their email addresses. Therefore it is essential that those signing up to an email subscription has their emails kept safe and are not sent emails which contain links to fake websites.

When doing front end coding, often code is derived from different sources such as W3 school and other websites providing tutorials on different features. It can be seen as good practise to re use code however copying code without citing it correctly maybe seen as a plagiarism violation.

For much of my code I used Bootstrap 4 as a starting point and as template for the rest of my code. Before beginning to use Bootstrap I had to check the licensing and ensure that you are able to freely use it in your own work. Bootstraps licensing allows you to freely download and use it in whole or part for personal, private, company or commercial purposes. You are also allowed to modify the source code as long as you keep the license and copyright notice included.

When conducting the project as a whole it was important to always keep the BCS code of conduct in mind. This defined the characteristics we should share in order to build a responsible computing profession. The code consists four main principles:

- You make IT for everyone
 - You should uphold standards and conduct yourself professionally and fairly at all times
- Show what you know, learn what you don't
 - You have to show integrity and competence in the work you produce
- Respect the organisation or individual you work for
 - You must work with due care and diligence acting in the users best interest
- Keep IT real. Keep IT professional. Pass IT on
 - Help promote the IT industry in a positive light

Literature Survey

In this particular section I will be explaining a number of key resources I used during my project in order to develop my understanding of key technologies and theories within HCI and development.

In order to learn about the key concepts of HCI I first read the book Human-Computer Interaction (3rd Edition) by Alan Dix et al. This book provided an understanding of how there has been growth in the area of HCI when compared to ten years ago. It provides an introductory course which is split into two parts. One part on interaction design providing details on scenarios and navigation design and part two consists of a chapter on universal design which highlights the emphasis on inclusivity of everyone regardless of age and ability. The book has also provided me with much more advanced material which concentrates on different HCI models and theories. The book is well suited for those pursuing HCI topics at both undergraduate and postgraduate level.

Another key resource has been W3school (<https://www.w3schools.com/>). This has provided me with all the knowledge and templates needed to create effective websites. I have used this for help on Bootstrap 4, HTML, CSS and JavaScript. The tutorials are written in a way where no prior coding experience is needed. It focuses on simplicity and makes for straight forward learning with simple code explanations as well as illustrations on how you can use it. W3school also provides a huge amount of code examples which can be tested on their online editor. This allowed me to experiment with code and see what would work and what wouldn't before actually implementing it into my code.

When starting to learn about tkinter and how to use this to create a GUI one of the main sources of information I used was the book "Object-Orientated Programming in Python" by the university of cape town. This provides an introduction into GUI programming with tkinter and how the core functionality works. It gives key information and an easy to understand tutorial on how to make a simple GUI that is able to handle user inputs and outputs. Once a basic understanding was gained I then used the tkinter documentation in the python library which can be found on docs.python.org/. Here you can find all the different widgets and functionality that is provided by the tkinter module in python.

A vital website I used to learn matplotlib was matplotlib.org. This website provides various easy to understand in depth tutorials on using matplotlib. It has been divided into beginner, intermediate, and advanced sections and also has a range covering specific topics. It has a useful section on how to use pyplot to plot data onto a graph which was extremely useful for the creation of my GUI.

When writing my section on usability a vital book I used was "Usability Inspection Methods" by Nielsen, J. and Mack, R.L. This book provided me with UI strategies, tools, techniques to make them as effective as possible with step-by-step guide on heuristic evaluation method. This book was particularly useful in my Nielsens heuristics section as it provided comprehensive information on the different heuristics and how they can be applied to my designs. This was written by Nielsen himself so allowed me to learn the techniques by the people whom it was created by.

I came across a research paper written by Nah, Fiona & Davis, Sid titled HCI research issues in E-commerce which was published in the Journal of Electronic Commerce Research. This paper highlighted the issues which are faced by users when they visit e-commerce websites and makes suggestions on how navigation and other things may improve these. It also contains a large section on the importance of trust within the online environment, exploring a few case studies.

Another useful research paper which I used was the paper titled psychology as a science of design which was written by Carroll JM. This paper explores a number of psychological theories and how they relate to a user interface and what impact different features have in terms of psychology.

While carrying out my project I have used a variety of sources ranging from books to journals, published papers and websites. The different sources have allowed me to get a range of expertise and also understand various topics at different levels. I have also ensured I have explored various sources for a particular topic to ensure the reliability of the information I am including in the report.

Self Evaluation + Critical Analysis

For the project there were many pieces of technology I had to learn which included Tkinter, HTML, CSS and JS. This required me to watch several tutorials that taught me the fundamentals of bootstrap and web based technologies. I had underestimated the amount of time that this would take and had planned for it to take far less time. This in turn delayed my project as I had spent an extended amount of time trying to watch a number of videos learning the different technologies which I needed. When looking back at this I realised that I should have researched into how long things may have taken to learn to create a more accurate timeline.

For my proof of concept programme I had to create a simple GUI, which I chose to do in Tkinter. I initially anticipated that Tkinter would provide me with all the functionality that were necessary for my application. When I began the development process it became apparent that I was only able to create an application that visually looked very old fashioned due to the old styling options which are available. A lot of more complex functionality was also not available to me through the use of Tkinter which limited how much I could do with the application. In hindsight I should have first looked into the different levels of functionality and how the app would look visually if the GUI was based

in tkinter. This would have allowed me to identify that another programming language maybe more suitable for the functionality which I required. In the future I will have to move this project to a more interactive and dynamic modern looking interface development language.

During the project one of the main things I have learnt is the importance of stringent planning. I had to decide and scope out exactly what is necessary and I spent a considerable amount of time figuring out what was required by the end users. All of the necessary requirement I documented and included in this the expectation from the user and identified a clear vision on how to make that a possibility. When detailed plans were not made with the appropriate research done, it often caused delays in the future due to unforeseen hick ups. I also saw how following a design process, by creating sketches of different GUI designs prevented creative mind block and allowed me to accelerate the process of development as I already know how I want it to look. Proper planning also allows the work process to be more structured and predictable as well as being more efficient. By planning every aspect, it allows you to make incremental improvements which leads to major progress.

I feel something that went really well during this project, was time management. Within software development there is two main parts which is the coding itself, and also the second is in the aspect of project management. I ensured that before beginning the project I read all the documentation which outlined how the project should be laid out. I then set out a time scale for each part of the project as it is multifaceted. I also set out priorities for each task which helped me have a coherent process in my development.

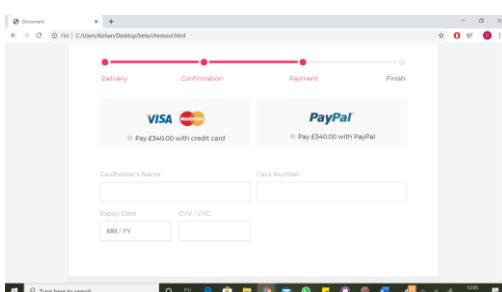
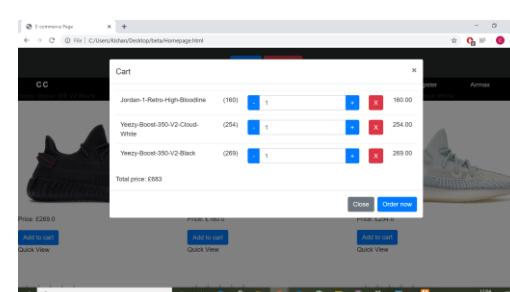
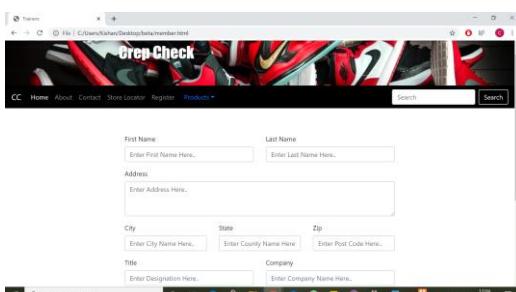
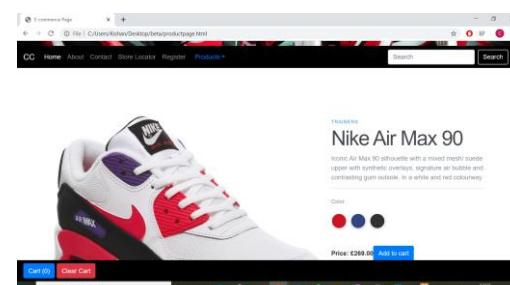
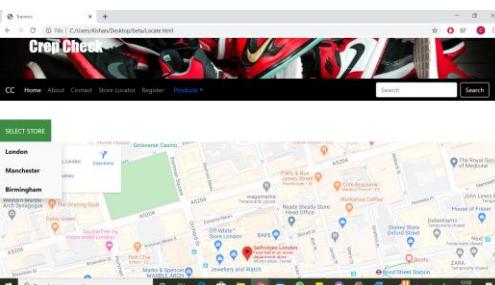
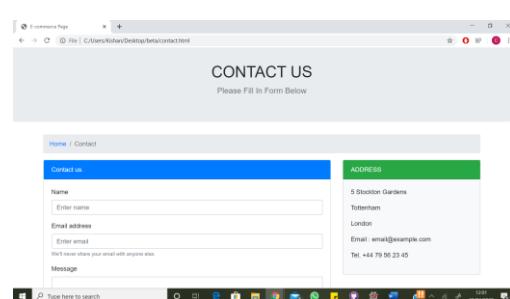
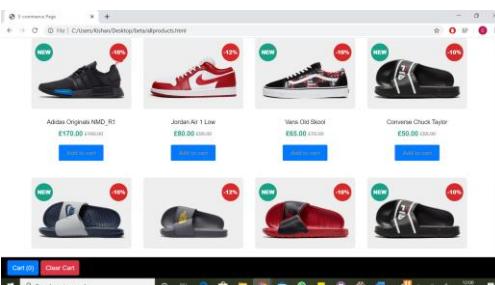
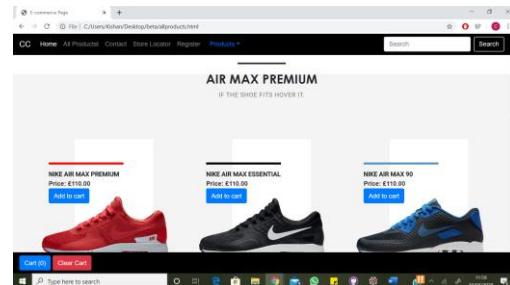
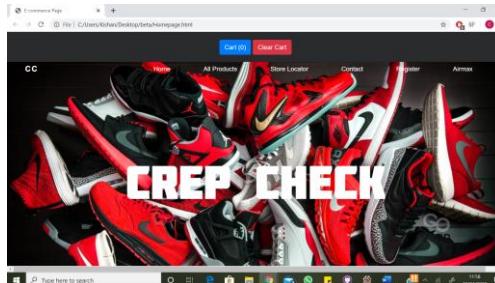
During this project I was able to learn many new skills which I did not have prior to beginning this. An example of this is the development of my Front-end coding skills in HTML, CSS, Javascript and python. I had to watch many tutorials and code examples in order to develop my skills. I also learnt how not only to code but document things so they are easily readable by others and organising code into good formats. Initially I was unaware that certain things I did such as having my CSS code in line with html code was bad practise. I was able to develop my understanding as the project went on and has separate stylesheets as well as java script.

In the future I hope to develop the interfaces further. I would have to learn how to implement an actual payment server rather than having a hard coded payment system. It would also be beneficial if my e-commerce website was connected to a database which stored information such as carts to be revisited. This would also allow for a log in system to be put in place that users were able to register to. With my monochrome news website it would also be useful to have a working subscription system where users were only able to access certain components

In conclusion I feel as though I have successfully achieved what I had aimed to develop for my project. I have explored many avenues of HCI and applied them appropriately to actual interfaces which I have developed. I have focused largely on the User interfaces and will further develop the back end of the websites in the future.

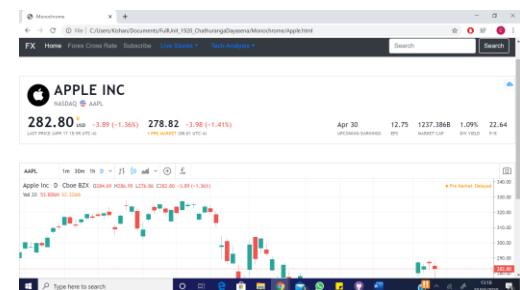
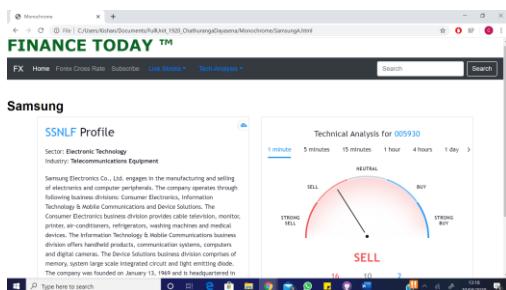
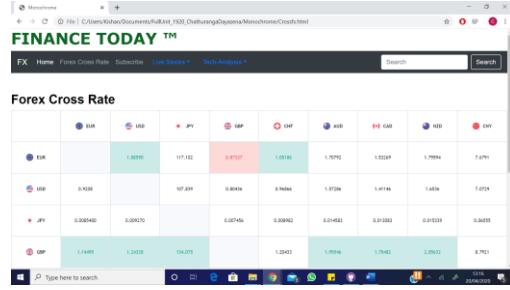
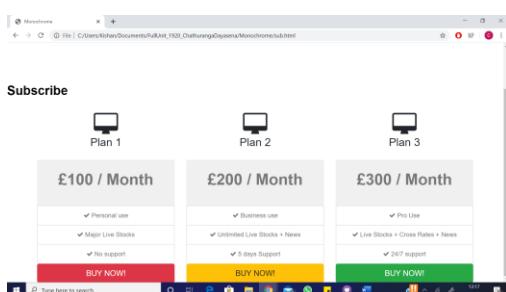
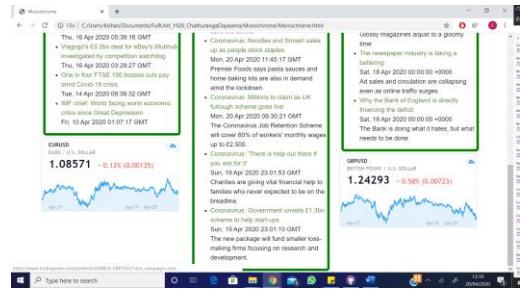
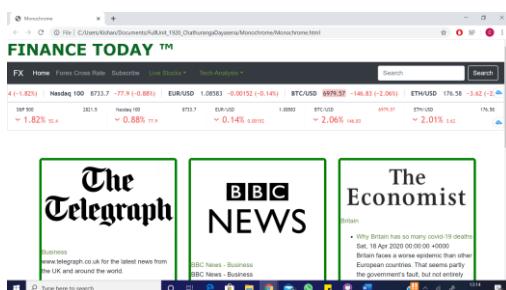
Screenshots

E-commerce:

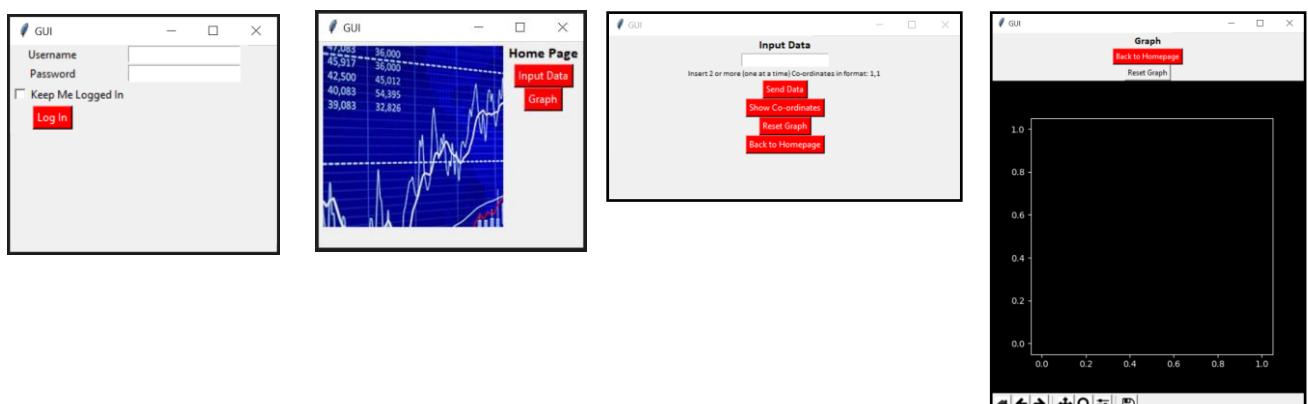


[Click Here to go back to HomePage](#)

Monochrome News site:



Data Visualiser GUI :



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Appendix

GUI Instruction Manual

1. Download the appropriate python IDE - I would recommend "Spyder 3.6"
 - a. <https://www.spyder-ide.org/>
2. Open the GUI.py file in Spyder
3. Ensure sampleData.txt and 1.jpg is in the same folder as GUI.py
4. Compile and run GUI.py
5. At the login page simply click log in as no log in details have been set
6. You are presented with two buttons for "input data" and "Graph"
7. Click on the "Input Data" button
8. Insert a coordinate in the following format: 1,2
9. Click the "Send Data" button
10. Go back to the homepage and then click the "Graph" button
11. Coordinates should now be plotted on the graph
12. You can move, zoom, or save the graph by clicking the buttons at the bottom of the graph.
13. Clicking the reset graph button resets the graph and deletes all coordinates from the data file
14. If you wish to see what coordinates you have entered into the text file simply click the 'Show Co-ordinates' button

Monochrome Instruction Manual

In order to run page simply click on Monochrome.html

The first page you are presented with 3 news feeds and live forex clicker information at the top of the page

The Forex Cross Rate page contains live information on currency exchange rates

The subscribe page has options for an individual to subscribe to different levels of membership

Live stocks pages have current live Stock prices

Technical Analysis Page has profiles on companies and also whether to buy or sell

E-commerce Instruction Manual

To Run the Webpage simply click Homepage.html

Homepage consists of a slide show and 3 products which you can add to cart

Underneath each product there is a quick view function which allows the preview of an item

Once an item is added to cart it appears in cart where you can change quantity

Click Order now button which will take you to a payment page

Click Order which will confirm your order

Locate Page has stores locations

All products page consists of a number of products and links to Airmax shoe page

Contact Page allows a user to be able to contact us

Register Page allows subscription

Air Max page consists of one product