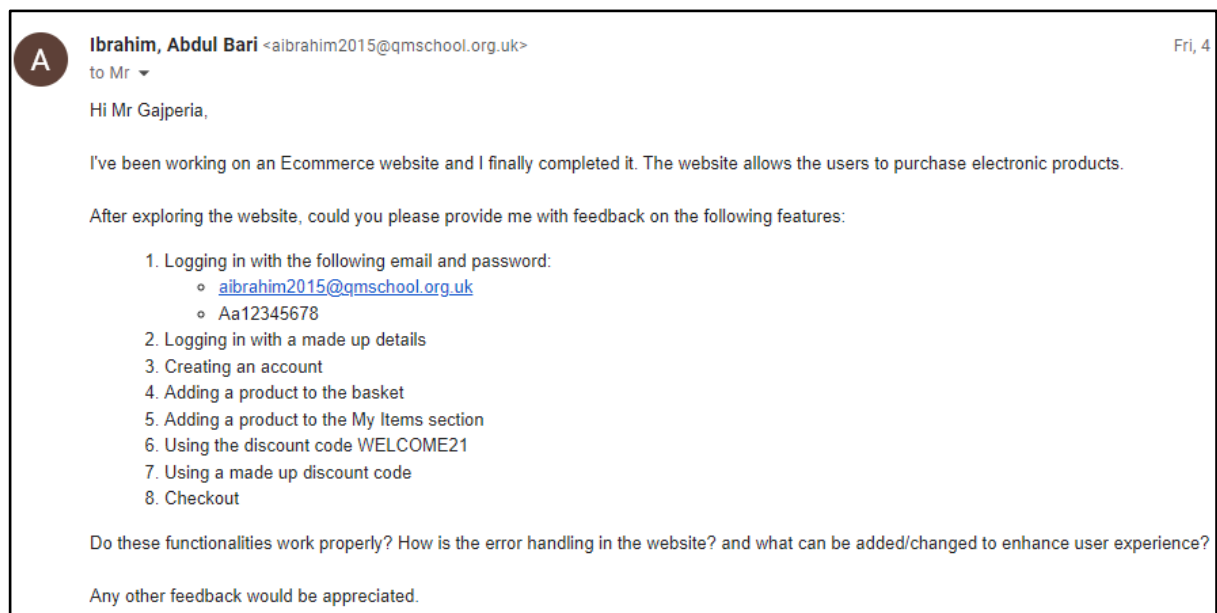


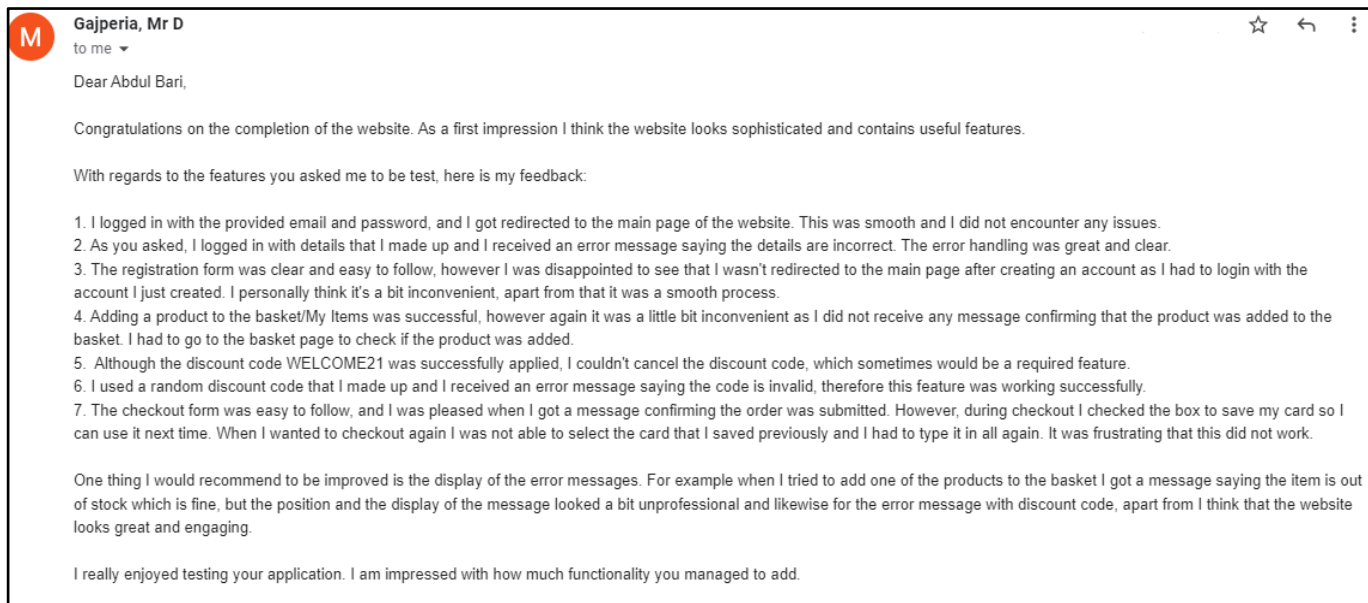
Evaluation

Post Development User Testing:

Functionality and Robustness Feedback:

In order to receive feedback from the client, I contacted them via email. The client was informed about the completion of the website and the purpose of the website briefly. After that, I requested the client to test the website and provide feedback on the core functionality and features of the website, and I mentioned specific points to be tested as shown in the screenshot below.



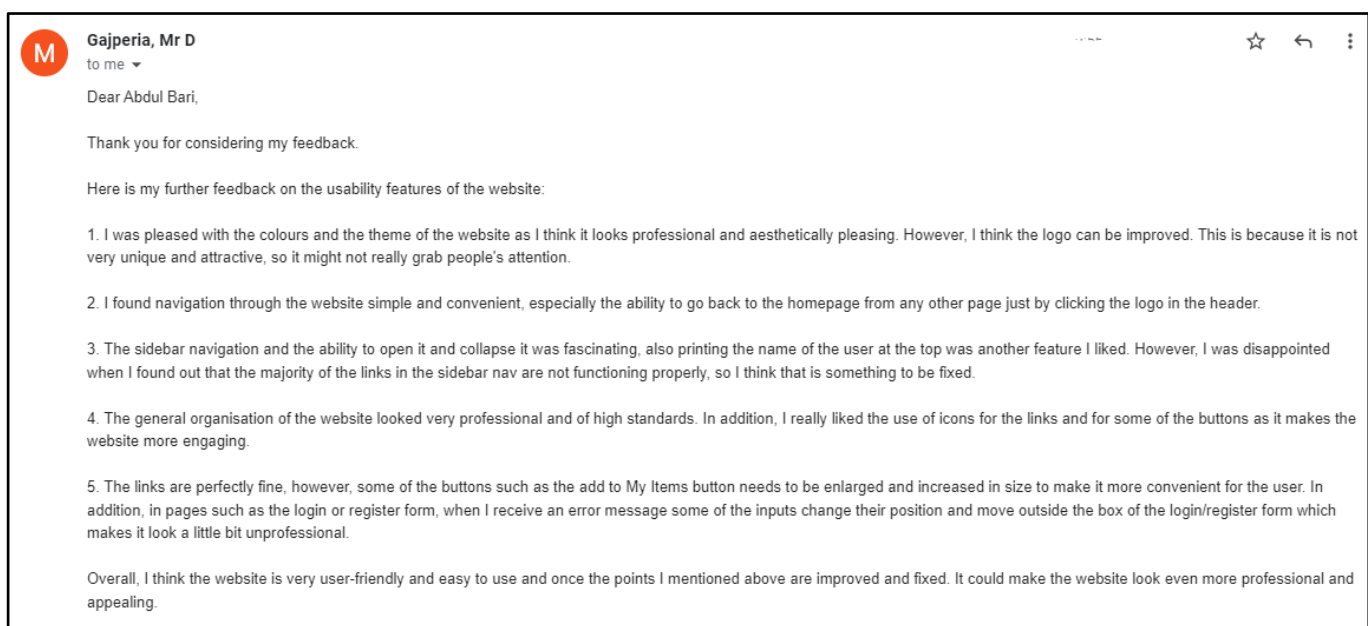
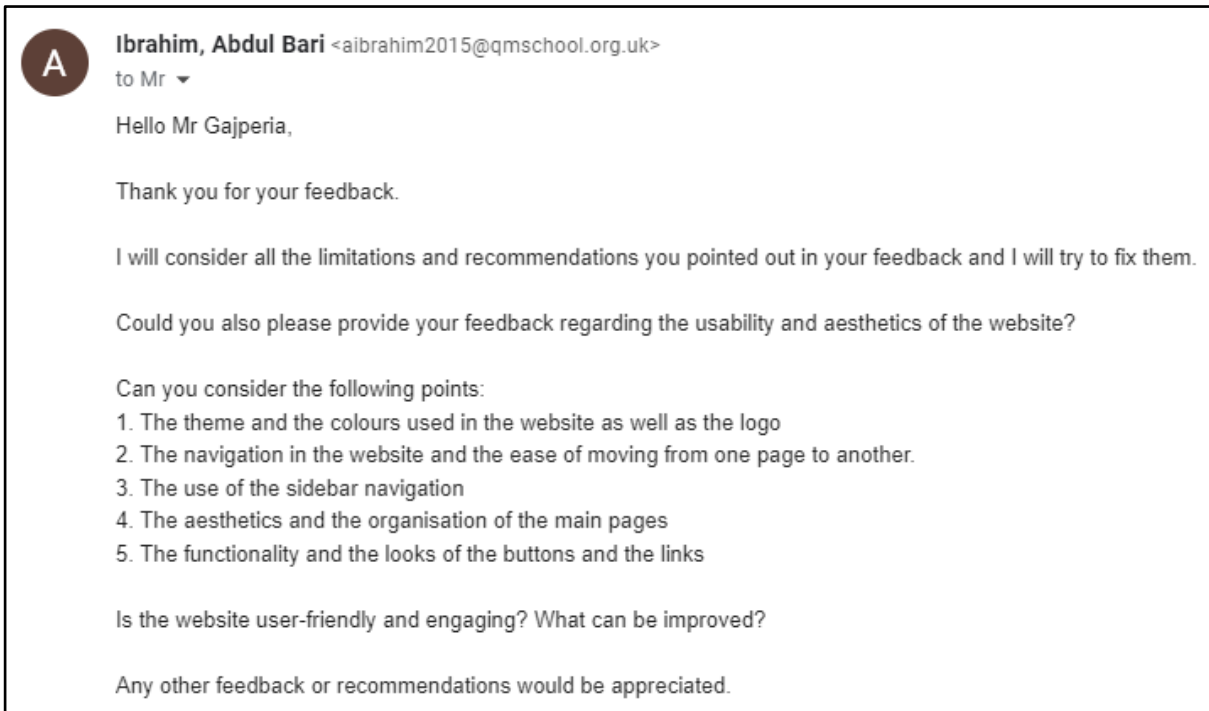


The client has responded and provided detailed feedback on the functionality that I requested to be tested in the first email. The client was satisfied with the login and the registration processes as they described them as smooth and easy to follow. However, having to log in again after creating an account was described as inconvenient by the client, therefore, this is something that I need to fix so the user should be redirected to the home page immediately after registering. The client was pleased with the basket/My Items functionality and adding items to them, but they advised that a confirmation message should appear after clicking on the add to basket button to inform the user that the item has been added to the basket. Another feature that needs to be added to the website and was mentioned by the client is the ability to cancel a discount code after applying it, as the client said it can be required sometimes. Finally, another missing functionality that was pointed out by the client is the ability to select a saved card to submit an order.

Overall, the client was pleased with the functionality and the number of features on the website. However, there were a few issues and missing features mentioned by the client which I explained above. In addition, the client emphasised that the display of the error messages is an important factor that can affect the looks and the convenience of the website, therefore, it's something that definitely needs to be fixed to enhance the user experience.

Usability Feedback:

I responded to the feedback of my client and I started by thanking the client for the feedback and informing them that I will consider any recommendations made. The next step was to get some feedback regarding the usability of the website. Therefore, I requested from the client if they can give their opinion on some of the usability features and aesthetics of the website. To receive more accurate feedback I mentioned specific points to be tested as shown in the screenshot below.



The client's response was positive and generally, he was satisfied with the usability of the website as well as the aesthetics. However, there were some points that the client mentioned that needed to be improved or fixed. For example, the client said that the logo of the website is uncreative and it's easy to copy, which might not make the website stand out amongst the others, and so this is something that needs to be reconsidered. The client was very pleased with the navigation and the ability to manoeuvre the website and the ease of moving around. Specifically, the client found it very convenient to go to the homepage from any other page just by clicking on the logo in the header.

The client was satisfied with the sidebar navigation and the animation of the sidebar(open and collapse). However, he found it frustrating that none of the links or functionalities in the sidebar is working, therefore, he requested that it be fixed.

The client has stated that he was pleased with the organisation of the website and the way the pages are sorted, also the client mentioned that the use of icons made the website more friendly and engaging. Another thing the client pointed out is that some of the buttons are small and the user might not be able to click them the first time, therefore, he suggested that those buttons need to be enlarged to improve the user experience. Finally, the client noticed that when error messages were printed in the login/registration forms, the inputs changed their position and moved outside the box which made the website look unprofessional, and so this is something that needs to be fixed as it's crucial.

Cross Reference Testing with SMART targets:

1. Registration/Login (Fully Met):

This target is an essential part of my website, so in order to achieve it, I created two pages, one for the login form and the other for the registration form. In the registration form, the user is asked to input their details, for example, their first and last name, email address, password and contact details as well as address. If all the details are correct and they meet the validation criteria, the user will be added to the users' table in the database and will be redirected to the login page. However, if the details are incorrect, then a suitable error message will be displayed to alert the user of the wrong input. In addition, if the user used an email address that already exists in the database, they will receive an error message informing them that the email is not valid. The evidence of this can be found in the testing section [Tests 1,2 and 3]. Furthermore, when a user is registered, the password is salted and hashed and then added to the database using sha256, and this can be seen in test number 1. In the login form, the user is asked to only input their email address and password. This information is then compared to the one in the users' table in the database, if they match then the user is logged in, otherwise, they receive an error message. The evidence of this can be seen in [Tests 4,5 and 6].

2. User Management system (Partially Met):

In order to create this feature, I added a field in the users' table in the database that stores the type of the user. In this case, the user's type is 1 and the admin's type is 0. When a user creates an account on the website, the default user type is set to 0 which is a normal user. However, if the user type needs to be changed to admin then it has to be done manually in the users' table. The field user type is used when the user logs in. This works by using server-side processing, in which the user is stored in the session and then OOP is utilised to retrieve the user type from the user's object using the getUserType() function. The user object is created when they make an account and register. In the session, when the user logs in, their user type is

checked and according to that the content of the website is amended. The evidence of this target can be seen in the testing section [Tests 33.1, 33.2, 62 and 63]. The reason that this target was partially met is that I wasn't able to create any features for the admin user type due to time constraints. Therefore, there weren't a lot of differences between the user and the admin apart from the admin link in the header. In addition, in the testing section, the tests [26-28, 30, 38-44] for the admin user type were not completed because those features were not met.

Future Development:

In future development, I will make sure that I add a variety of features to the admin User type to make a significant difference between it and the customer user type. Features includes things such as adding products through the website, editing products, deleting users, contacting suppliers etc.

3. Category selector (Not Met):

The reason that this target was not met is due to time constraints. When I investigated this target, I came to realise that it was time-consuming. This is because I have to first create a search system, after that, I need to add several products to each category to be able to test the target accurately, and finally adapt the search system to work with the category selector. Therefore, if I implemented this feature it could've prevented me from meeting more essential and important features such as the basket and checkout. This means that there was a priority issue as my investigation helped me discover that there are more important features that need to be implemented before the category selector. In the testing section, the tests for this feature and the search system [7-10, 64-72] weren't completed as this target wasn't met. I strongly believe that this feature would massively improve the usability of the website and provide a better user experience.

Future Development:

In future development, I will ensure that I consider this feature as a priority and I will conduct accurate research to determine the approximate time it would take to implement this to avoid ending up in a situation where I run out of time. In addition, another feature that I did not include in my smart targets is a search system. I think this feature is crucial to the website, therefore, in further development, I will ensure I pay more attention to it and add it to the website.

4. Creating a basket (Fully Met):

I started by creating a Basket Object that stores details such as productID, name and price etc about the product that is being added to the basket. When a user clicks on the add to basket button, in the add to basket process page the details of the product are retrieved from the Products table based on the product's ID using a function I created which is called loadProductById(). This function loads the product from the database and creates an instance of that item and then returns all the information

about the product. In addition, I hardcoded the basket page and then used the HTML code to create a function called `printBasket()` in the basket object. Every time a product is added to the basket this function is called to print that product on the basket page using the information in the instance of that product object that has been created. Furthermore, the basket contains other features such as a section that displays the total price and vat, also allows users to add a discount code and finally a feature that gives the ability to delete an item from the basket. Therefore, the target was fully met. The evidence of this target can be seen in the testing section [Tests 13-19, 46, 47, 48]. In addition, it was tested by the user and the evidence can be seen in the email conversations.

5. Sidebar navigation (Partially Met):

The purpose of this target is to enhance the user experience and improve the manoeuvre of the website by making all the pages accessible from any other page on the website. In order to achieve this, the sidebar navigation had to exist on every single page of the website. Therefore, I built the sidebar nav in the navigation bar as it exists on every page. After I designed the sidebar navigation and added all the available links, I created 2 functions using Javascript to open and collapse the sidebar nav by changing its width. In addition, I ensured that the sidebar navigation prints the name of the user at the top of it if there is a user in the session, by using their first name from the user's object. However, if there is no user in the session then it simply says "Hello, Sign In!". The purpose of this feature is to improve the usability of the website and make it more user friendly. The evidence of this can be seen in the [Tests 74, 75, 75.1, 75.2].

Future Development:

The reason this target was partially met is that the majority of the links and features inside the sidebar do not function or the pages do not exist. This is due to time constraints as I wasn't able to add all those features and build all of those pages. For example, I wasn't able to add a currency settings feature that displays prices according to the currency selected. Therefore, this is one of the things that can be addressed in further development.

6. Favourite Items (Fully Met):

The process of creating this feature was very similar to the basket. I used the exact same concept and method to build this feature. There were a few differences between this feature and the basket. For example, the Favourite items section does not have a quantity button or a section that displays prices etc. However, it has a button that allows the user to move the item from the favourite section to the basket. The only common feature between the basket and my favourite items section is the remove button which works the opposite way of adding an item, and I created a function for it in the basket object. The evidence of this can be seen in the [Tests 34-37, 73]. In addition, it was tested by the user and the evidence can be seen in the email conversations.

7. Reviews (Not Met):

The reason that the review's target was not met is due to lower priority. When I investigated this target, I came to realise that there are other targets (e.g. basket, checkout) that have higher priority and importance as they are considered the basic functionality of an e-commerce website. Therefore, if I implemented the reviews feature it could've prevented me from being able to complete the other essential features. Another reason why this target wasn't met is due to time constraints. This is because when I completed the targets with higher priority I was running out of time, therefore, I couldn't start implementing the reviews feature. In the testing section, the tests for this feature [11, 12] weren't completed as this target wasn't met. I believe this target would have a big impact on the usability of the website and the user experience.

Future Development:

In further development, I would make sure that I research this feature thoroughly and find out roughly the time it would take to implement it so I can be able to accurately plan the development process to avoid being in a situation where I run out of time.

8. Checkout (Partially Met):

In order to meet this target, I created a page that contains a set of inputs and the user must type in the details required such as personal information and card details. The next step was validating the inputs and ensuring that the user types in the correct information in the right format. I used regular expressions to validate the card number and other inputs. Then I created 2 tables in the database, one is called payment methods and the other is called Orders. In the checkout form, the user can ask the system to save their card in the payment methods table by checking a checkbox that says "Save Card for future purchases". The orders table saves the details of the customer who made this order and the payment method that was used and it assigns an id to that order. This id can be used in other tables such as the order items table which stores the individual item of an order, or in the purchase history table. After the user inputs all the required information and clicks save, they receive a message confirming that the order has been submitted. If the user did not want to save the card, then nothing is added to the payment methods table, however, only the card number and the other details such as expiry date or CVV are saved in the orders table. The evidence of this can be seen in the [Tests 21-24]. In addition, this target was tested by the user and the evidence can be seen in the email conversations above.

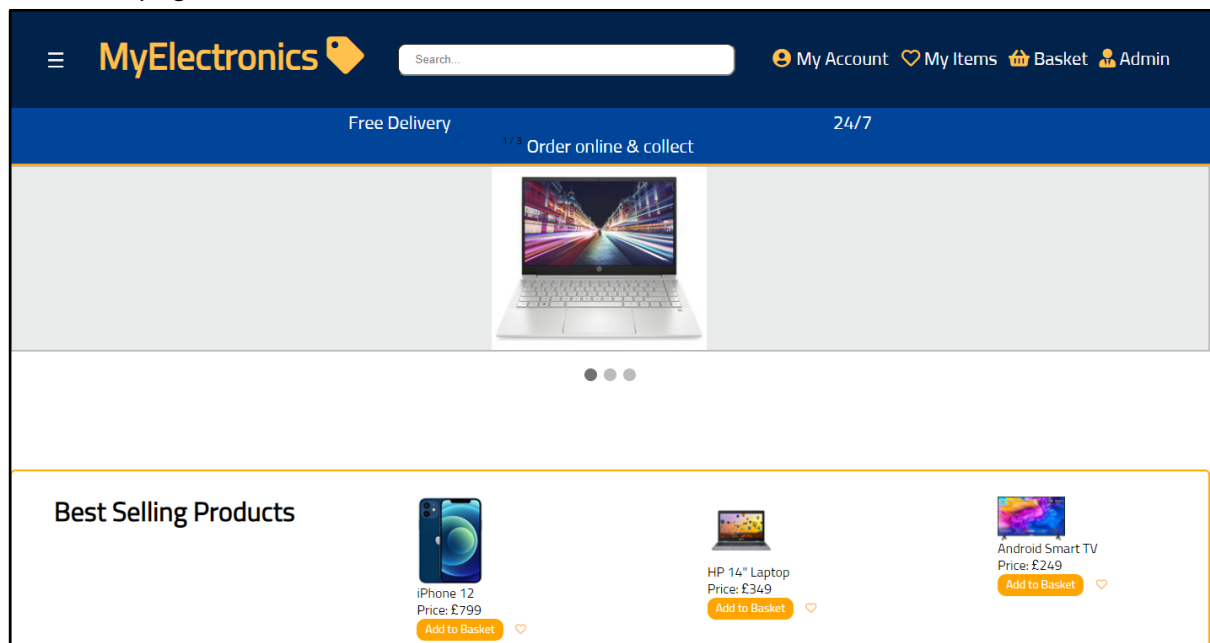
Future Development:

This target was partially met because of a couple of reasons. One reason is that the save card functionality is not fully completed, this is because if the user has saved a card, then in future purchases the system should allow the user to select that card without having to type the details again. However, currently that feature does not

exist. Another reason is that the whole checkout process is missing a major part which is saving the individual items of order in the Order Items table. Therefore, these are features that need to be addressed in further development. In addition, in future development I would set up a relationship with some of the banks to handle financial transactions, also I would set up an HTTPS certificate to ensure that data is encrypted and the website is secure.

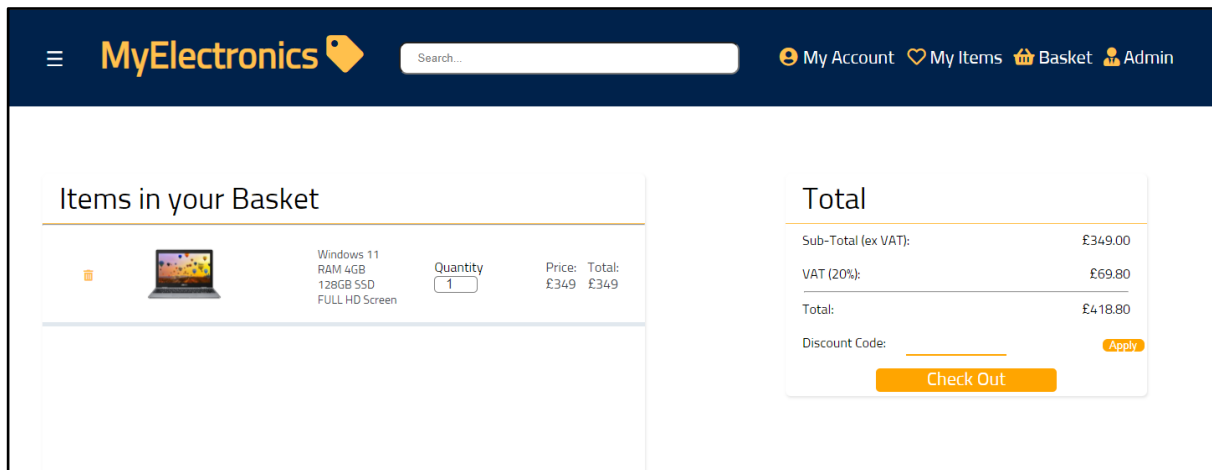
Usability features:

Welcome page:



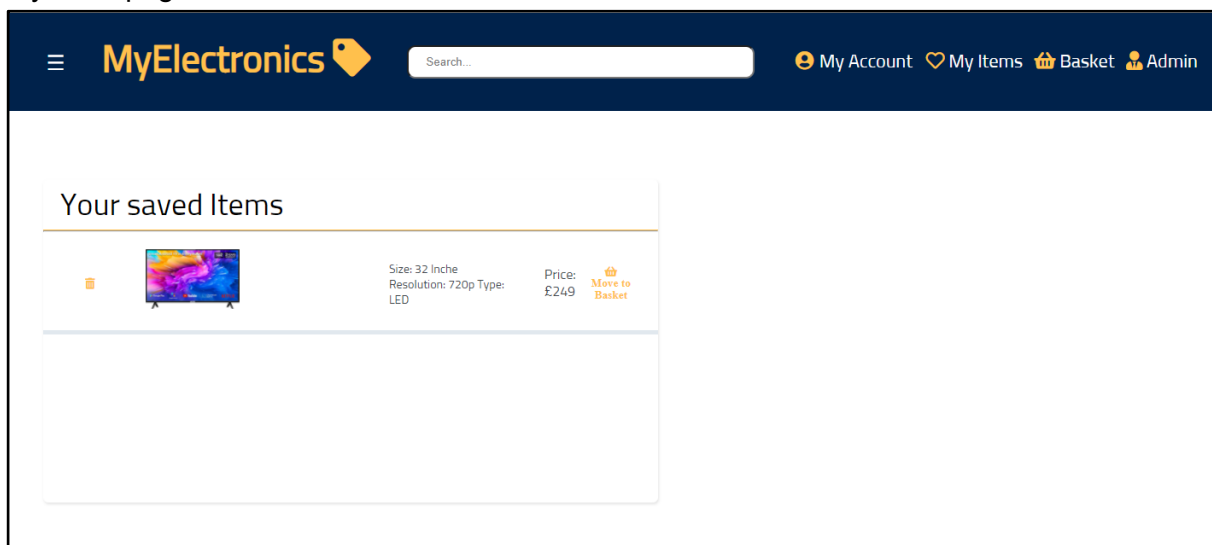
I was able to create the welcome page exactly as I planned in the design stage. I aimed for the welcome page to have a sidebar that displays products, sections such as deals and discounts or best selling products, also a header that contains a logo, search bar and useful links. The purpose of the sidebar nav is to make the manoeuvre and navigation of the website more convenient and make all pages more accessible. As it's shown in the screenshot above, all those targets were met and the welcome page looks as planned. In addition, in the user testing section, they mentioned that they were pleased with the theme and the design of the website. However, one thing I didn't manage to add to the header is the category selector, this was explained in the cross-reference testing section. The benefit of having a category selector is that it will allow customers to narrow down their query, therefore, they can get more accurate and relevant results.

Basket page:



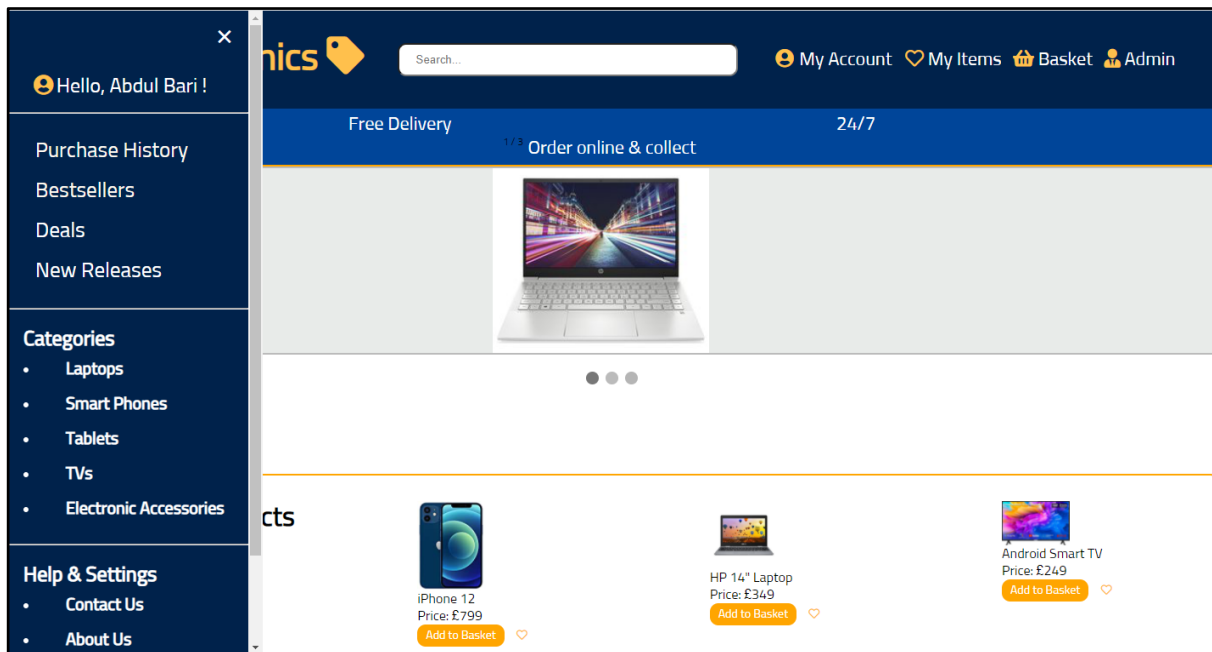
In my opinion, I think the basket page looks professional and I'm pleased with the design. This is because it displays all the information, buttons and inputs clearly. It shows the description of a product, picture and quantity. On the right-hand side of the page, it calculates and displays all costs such as price (ex VAT) and the amount of vat and the final total price clearly and spaced up, so the user doesn't mix up between different pricings. Despite not being able to pre-design the basket page in the design stage, the final result was successful.

MyItems page:



Similar to the basket page, I did not have the opportunity to pre-design this page in the design stage, however, I'm pleased with the design and I think it does the job. On the other hand, I think the page is quite empty, therefore, in future development, I will try and add more content to the page such as "previously saved items" or "products you might like" etc to increase the usability of the page.

Sidebar navigation:

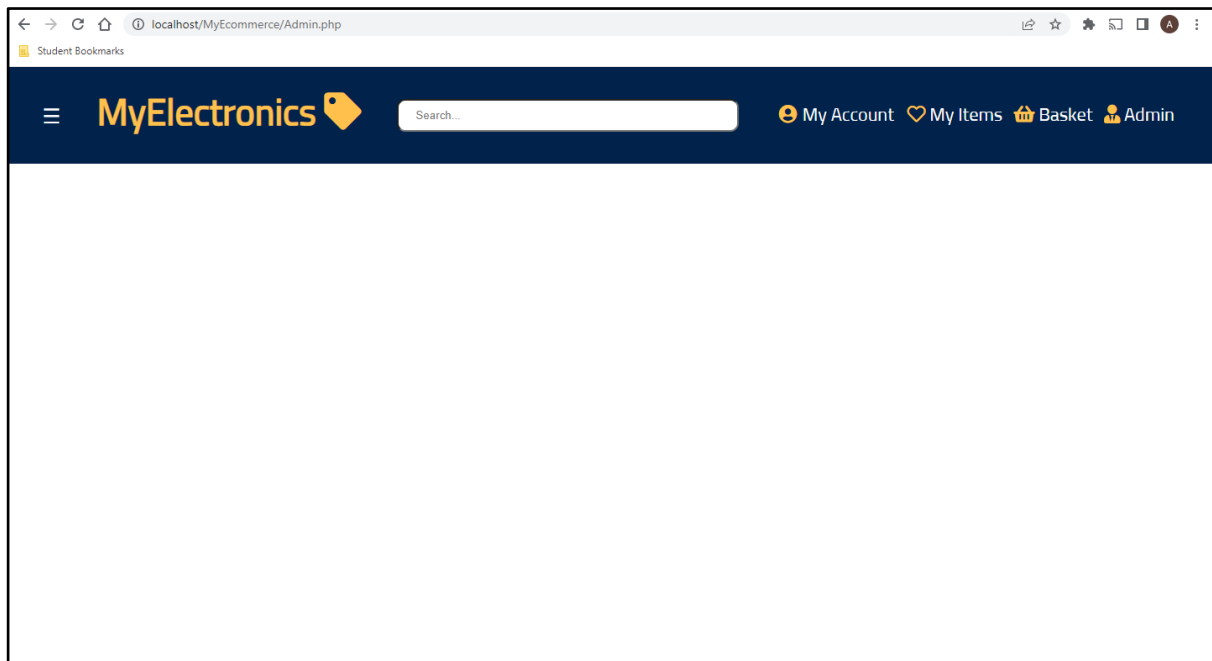


The sidebar was designed and executed as planned in the design stage. The only deviation was regarding the close button at the top right corner of the sidebar. This is because in the design stage I was planning that the user would be able to close the sidebar just by clicking anywhere on the page. However, due to abstraction and the fact that executing the feature was a little bit more complicated than predicted, I ended up using a collapse button.

Checkout page:

The checkout page was not pre-designed in the design stage. However, the final result is acceptable, but I believe that it could have been improved and I could have come up with a more engaging and aesthetically pleasing design as the above design it's too basic and takes up a lot of space.

Admin Page:



The admin page was fully designed and planned in the design stage. However, in the screenshot above we can see that the admin page is empty. The reason I couldn't start building the admin page was due to time constraints and the fact that other essential functionalities took longer than expected to develop.

Maintenance:

The website is very low maintenance, as it will run in the background on many computers without any intervention or needing any changes. However, there are some maintenance issues that need to be considered and updated regularly.

One maintenance issue is keeping products' details up to date. For example, if a new version of a product comes out then the details of the older version need to be updated, or if the price of a product has changed then it has to be updated instantly on the website so the customer can be aware as this will increase the transparency and trust between the customer and the website. Updating and amending products is the responsibility of admins, therefore, they should be able to access these features through the admin dashboard. However, this feature was not met as explained in the cross-reference testing section above.

Another maintenance issue is security. Hackers are always searching for ways to try and break into a website. Especially websites with access to customer details and financial information. My website takes payment methods and card details from customers in order to submit orders etc. Therefore, handling payment methods has to be maintained at all times. This can be done by outsourcing third parties such as banks, to ensure that the process of financial transactions are as secure and smooth as possible. Therefore, in future development, I will ensure that I set up a relationship with some of the banks, and also set up a HTTPS certificate to guarantee secure transactions and encrypted data.

Furthermore, most users would prefer to use and access the website using a mobile phone as it is easier and more convenient. Therefore, one maintenance issue is making sure that the styles and design of the website are dynamic and it changes according to the device it's being used on. This can be done by using CSS media queries.

Limitations:

One limitation of the website is linked to the discount system. Even though the discount system works successfully. However, it has some vulnerabilities. For example, the current system does not have a minimum spending policy or a maximum amount of discount. So even if the customer has spent as little as £1 they can still use the discount code and apply it, therefore, in some cases, the customer can end up paying almost nothing. To solve this issue, the system can be developed so when a customer applies a discount code, it can check the discount amount, and if it's higher than the maximum amount of discount then it prints an error message, also check the sub-total(ex vat) to see whether it's more than the minimum amount of spending or not, if it's not then again the user receives an error.

Another limitation is not having a search system. Despite having a search bar in the header, it doesn't have any functionality and the user is not able to search for any product by name or any other property. At this current stage of the website, this is not a very big issue as the number of products on the website is limited, however, if the website has a lot of products in different categories then this lack of a search system can result in inconvenience and reduce the functionality of the website. This is because not having a search engine will make it difficult for the user to access different products. For example, with a search engine, if the user wanted to access all the Lenovo laptops, they can simply type in "Lenovo laptops" in the search bar and they would be able to see all laptops, however, without a search engine, they have to go to the laptops category and look for each Lenovo laptop manually. In addition, not having a search system means not having a filter feature where you can filter the results based on different criteria, which is another limitation. The reason for this limitation is the complexity of the feature and that it's time-consuming.

In future development, the website can be improved by having a search engine. This can be done by using SQL queries to search for a product. Specifically, we can utilise the wildcards(e.g. LIKE) in SQL to search for different products, also we can do the same for the filter feature.

Conclusion:

Overall, the project has managed to meet the fundamental functionalities of an e-commerce website and the majority of the targets identified in the SMART targets section. It partially but successfully fulfils its purpose of allowing customers to perform actions on products such as adding to a basket or submitting an order and more.

If I have the opportunity to build this project again I would make sure that I manage my time carefully and identify an approximate time of how long each target will take to complete and set exact deadlines for each target. This way I would be able to make an accurate development plan so I can add more complex functionalities to the website.

In addition, these are some of the improvements that I would add to the website:

- Build an admin dashboard:
 - The admin dashboard would contain features such as adding a new product, deleting/editing a product, managing users and reviews, and producing daily reports on sales and visits to the website. This can all be done by retrieving or adding data from/to the database using different SQL queries and prepared statements.
- Search engine as explained in the limitations section.
- The ability to communicate with customers through email(e.g. Sending invoices or confirmation emails).
- Setting up relationships with banks to handle financial transactions.
- Setting up a HTTPS certificate to increase security and encrypt data.