# Online Auction System
# For Rocket League



# CSE3001 - Software Engineering J Component

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# 1.  Abstract

Rocket League is an exciting online multiplayer game with millions of players worldwide. It is also an established ESports title. The game has recently gone free to play and is expected to draw even more players to it. A multitude of items exist in game, and are used for cosmetic purposes, to enhance the uniqueness of the gameplay. These items include cars, wheels, paints, boosts, goal explosions and much more. The frequency of obtaining them is determined by their rarity, and they may even have special characteristics such as goal tracking, or may be of different colours.

The large range of items possible to obtain makes it necessary to have a system in which players can trade with one another to acquire items suited to their taste. The in game currency called "Credits" may be used or items themselves can be traded. Even with its massive player base, Rocket League has no reliable way of allowing players to contact other players to trade with them. To trade items with other players, you need to know their username, and invite them in game to begin the process. However, players have no way of knowing which players to contact, as currently, the only ways to view products that other players want to sell include specific social media channels, or using rigid and non intuitive websites.

By targeting this niche, we've built a website that will provide users with a medium to view items that have been put up for auctions, bid on these items, and communicate with each other to make the trade final once the bidding is over. By listing the player's Steam usernames on the website, potential buyers only need to search for the product that they want, and can send messages to the poster through Steam. Our website streamlines the trading process, providing convenience and enhancing the player experience.

# 2. Introduction

Rocket League is currently one of the most popular games on the internet. Recently having gone free to play, the player base expanded beyond expectations, with the game even reaching 1 million concurrent players. The popularity of the game has made it an esports title as well, ensuring that pro teams are competing in numerous tournaments around the world, with millions of viewers watching and attending these events. The massive appeal of the game lies in its easy to learn yet hard to master gameplay mechanics, and continues to draw newer players to it.

However, like any video game with a massive player count, Rocket League also offers options to customize your vehicle and profile, in order to introduce a sense of uniqueness and to allow players to express themselves in game in a personalized manner. This helps differentiate players from one another, and adds a sense of individuality to those playing the game. The in-game items include a variety of cars with different hitboxes, wheels, decals, and paint finishes to customize the aesthetic aspect of the vehicle, boosts and goal explosions which are visually pleasing and can be changed to suit a certain theme, hats, antennas and even player banners and titles, offering an incredible amount of cosmetic options for players to choose from.

These items can be acquired by simply playing the game, levelling up, and obtaining loot crates, which are then opened and give the player an item of random rarity. Items vary in their rarity, colour and characteristics. It is evident that for a single item, there are numerous combinations that can be produced and as such, the occurrence of certain cosmetics dropping with specific qualities would be a lot lower, increasing their demand.

Rocket league current offers players the ability to trade through their in-game trading interface, which is only useful if the username of the other player is known. Outside of the game, the only other methods of contacting other players for trades is through public servers on popular apps like Discord, or through websites[1][2] that allow users to list their products. Currently there is no way for players to list the products they want to sell, have them auctioned upon by other players who are interested in it, and contact each other when the amount is finalized.

The game made upwards of $70 million in revenue, and now that a new free to play model has been implemented, a greater portion of this revenue is dependent on players purchasing in-game items and loot crates. This has created a requirement for a medium through which players can reliably view items that other players want to sell, bid for them, and contact each other to finalize the trade. The demand for such a medium is well documented in the rocket league communities, yet so far, a solution has not been offered.

The existing systems do offer a model from which we can build on. Often, players join public servers on Discord, to find out what other players are selling, and to list their own items. However, the drawbacks of this include having to search through text listings, and not having an easy to use user interface. Another popular method involves certain websites made for this purpose, the two most popular being rocket-league.com/trading and www.rl-trades.com. While they serve their purpose, their individual drawbacks make them less than optimal for use by the player base. The former has an intuitive user interface, but lacks freedom in the way it lets players list their products. It does not allow players to "auction" for products as such. The second website simply allows players to list the name of the product and their ideal trade. However, the interface is clunky and unappealing, and also doesn't allow players to bid either.

# 3. Literature Survey

Online auction systems massively improve efficiency and convenience of trading over other methods of trading items. For a seller it is a one and done process as it enables them to list their items and not have to constantly have to interact with potential buyers. Rocket league has an ingame trading feature that has led to the creation of a virtual economy with reference to cosmetic items and their rarities. Many players are willing to pay real money to purchase in-game cosmetics for a game that they have invested time in[3]. Rocket league does not possess an in-game marketplace which has led to creation of third-party marketplaces such as rl-trader and rocket league garage. Players also resort to listing their items on group chatting platforms such as discord. These methods can be tedious and repetitive.

Bernhard Rumpe and Guido Wimmel, A Framework for Realtime Online Auctions[5] describe a framework for the creation of a robust and flexible online auction system. They used the XtremeProgramming approach which is an AGILE software development method as it provided enough flexibility and adaptability to the changing requirements. They also highlight important functional requirements such as login feature, auction time extension, backup bidder list in case of highest bidder refusing contact.

As security is a crucial requirement we can refer to Secure Login Authentication System, Chow Wen Chai[7] and Online Identity management and Identity Verification,Hue Rhodes[6] which details the current security systems for login and identity verification and potential improvements. Hue Rhodes explains how we can consolidate user data from credible sources. We can apply this by integrating user account details from their Steam or Epic Profiles by using their respective APIs. Existing use of One Time Passwords(OTPs) and Two factor authentication is also mentioned for securing the login process.

Online Auction Mini Project, Rohit Mohal[8] and [Online Auctioning Systems, Borella Michele[9] provide a reference for projects of this nature and identifying functional and technical requirements. Issues faced during the development of these projects and methods used to solve them help us to prepare better.

# 4. Proposed Method

We proposed a real-time web-application to create an online auctioning website for rocket league. Players must first create an account to be able to access the features of the website. Once a profile has been created a seller can create a listing for their item by specifying its details and selecting a minimum bid price. If the user wishes to search for an item instead they can view all the existing listed items in the LIST page. By clicking on VIEW MORE on any listing they will see the extended details of the item along with the current highest bids. If the user is interested they can bid on the item as well. Once the auction is concluded the seller can contact the highest bidder and complete the transaction in-game.

**Login/Signup:** Input: Email id/ Password/ Associated rocket league account name. This is where the user will start. The user needs to provide a valid email address and password to be able to access their profile and create listings or bid on an item. If the user does not have a registered profile they will be redirected to creat one.

**VIEW LISTINGS:** Input: Select an auction listing
This page is where a user can view all current listings. Users can interact with a listing to be directed to the bidding page where they can view all the item details. Users can select a category to filter visible listings by that category.

**BIDDING PAGE:** Input: Bid price.
This page will list all the details for the item. If the user is interested they can create their own bid. Sellers can view this page and close the auction. Once a user enters a bid amount the input is verified and the database is updated with the new highest bid amount.

**AUCTION CREATION:** INPUT: Item name, Item details, Category, Price.
The auction creation page allows the user to create a listing that will be visible on the website. The user must enter the item name and details, select the category of the item and add any additional descriptors. Lastly the user must add the starting bid price. Once the form is submitted the item details are validated and sent to be added to the database. The item will now be visible when viewing the Listings page.

**VIEW PROFILE:** INPUT: Select listing, Logout
This is the user profile. A logged in user will be able to view and edit their own profile. The user can see all the listings that they have posted and view them. By switching tab, users can also view any other listings that they have participated in. A user can view listings created by another user if they view the second users profile page

Data Flow Diagram
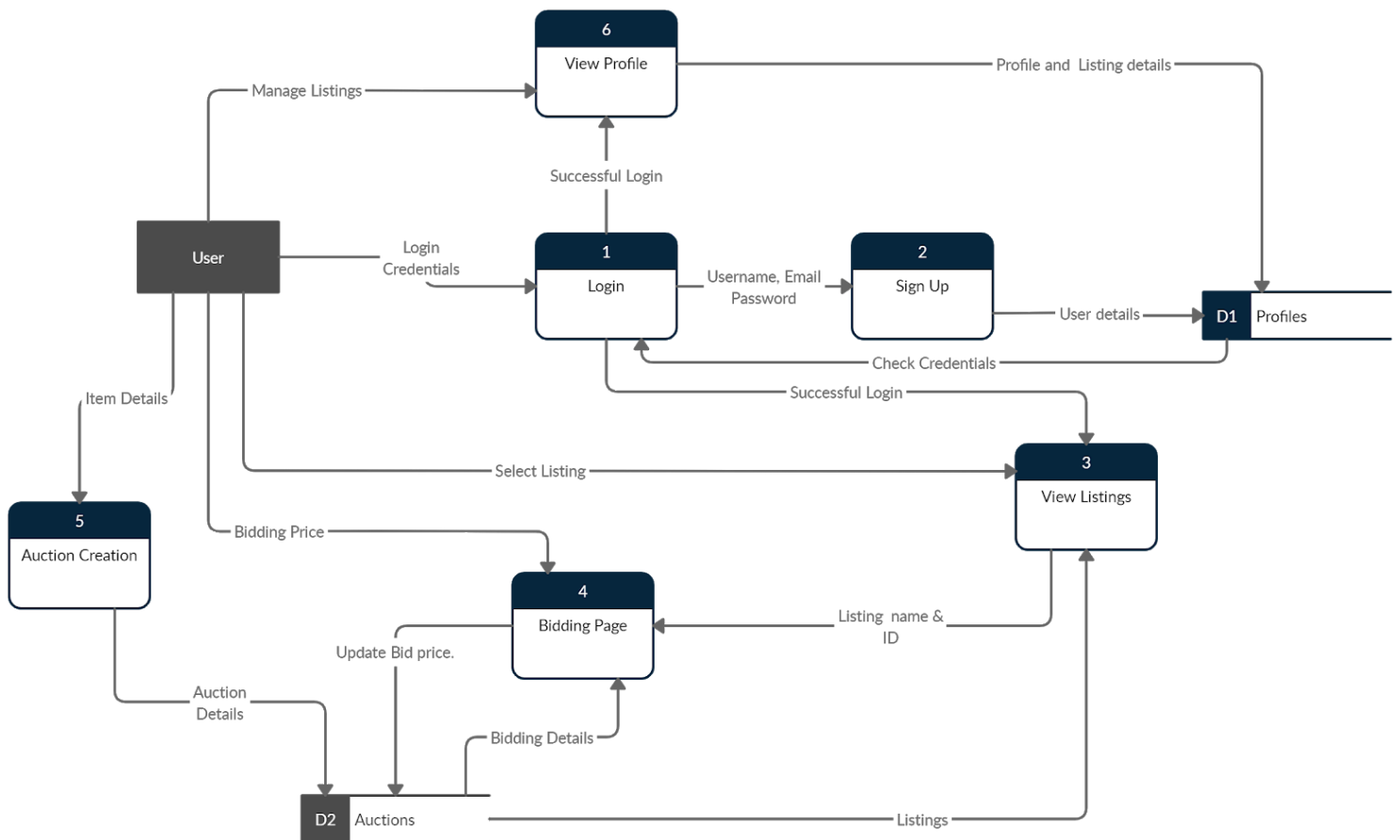
## System Architecture Diagram
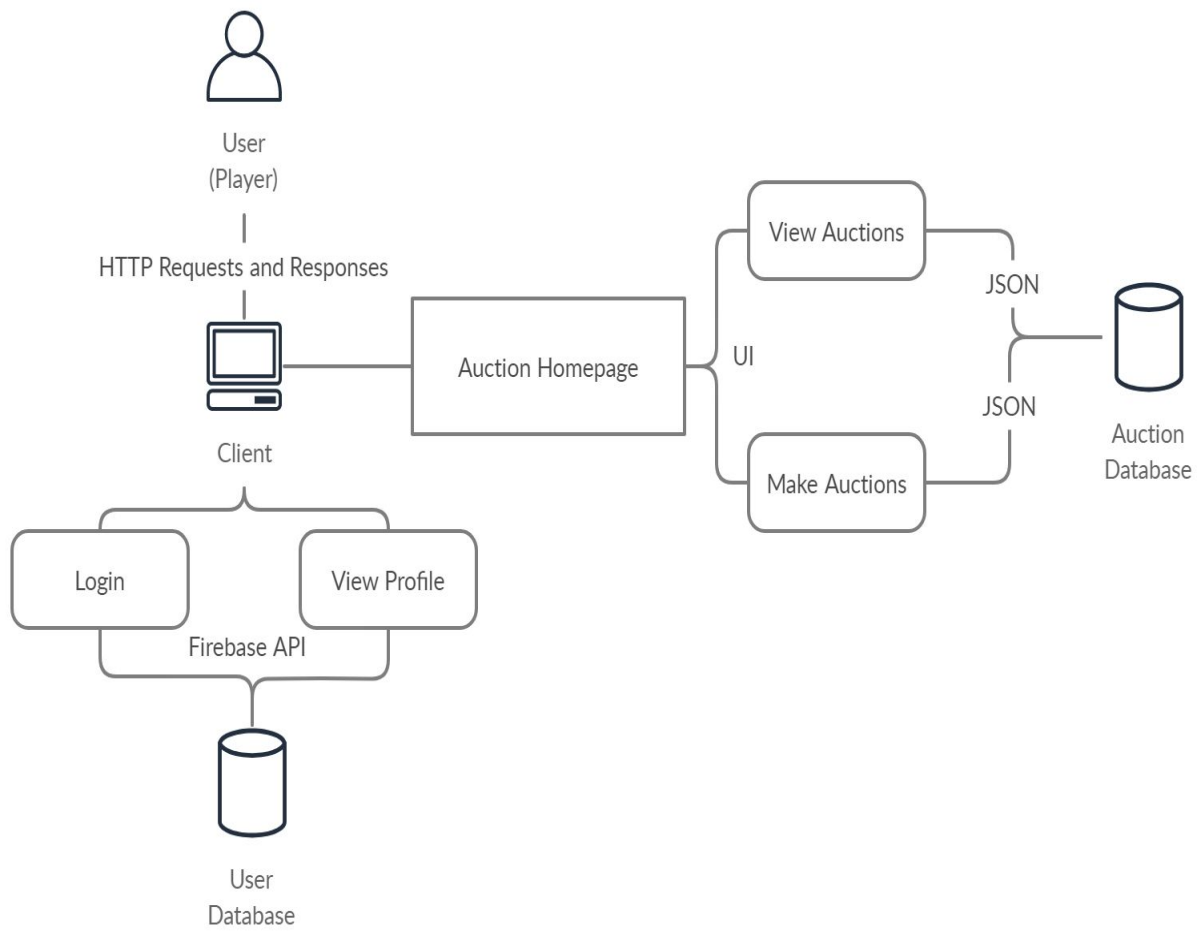
# 5. Modules

1. Sign In
2. Sign Up
3. Homepage
4. Bidding
5. Auction Creation
6. User Profile
7. Other User's Profiles

**SIGN IN**

Existing users who have already registered their accounts on our website can directly log in using the sign-in module. They are prompted to enter the email address they used to register, and the associated password. This data is stored locally, and the email is used to find the user details in the Firebase database. Once a matching email is found, the respective passwords are also checked. If both of them match, the user is considered as logged in and are taken to the homepage where the current auction listings are shown. In case the password or email does not match any of the data stored in the user database, the user will receive an error message indicating that one of the fields is wrong, and will be prompted to re-enter their details. Authentication can be further enhanced by using data encryption or Firebase authentication, in order to provide users with greater security.

*Algorithm:*

1. Input username and password
2. Make get request to "User" database
3. Fetch username password combinations
4. If input username and password match fetched username and password
5. Redirect to homepage
6. Else if none of the combinations match given input
7. Display "Username or Password may be incorrect"
8. Redirect to Sign In page

**SIGN UP**

Users that are new to our website will require an account to access the features of our website. Here they will need to enter their email address, username, and set the password for their account. The username will have to be unique, and they are asked to set it as their Steam account name/ Epic account UserID so that other users can use it to contact them when the auction is finalized. Once the details have been entered, a GET request is made to the database using the Firebase API. The database then returns all the usernames that are already stored on the website. If the username selected by the user already exists, they will be asked to enter a different one. If the details entered pass all the checks, the data will be stored in the user database, and the user will receive a confirmation message, after which they will be redirected to the sign in page.

*Algorithm:*

1. Input Username, Email Address, and desired Password
2. Get request made to Firebase API
3. Fetch existing usernames from User database
4. If username already exists
    a. Display "This username already exists, please select a different one"
5. Else
    a. Make Post request to Firebase API
    b. Store user details in the User database
    c. Confirm successful sign up
    d. Redirect to login page

**HOMEPAGE**

This is the main page in our website where we expect the user will spend most of his/her time. The users are introduced to the navbar, which will be present in all further modules. The navbar contains the "Home", "Profile", and "Add Item" options. Selecting these will take them to the respective module. The homepage is also where all the current auctions are listed. Each auction has the name of the item, the category to which it belongs, the current highest bid and the name of the seller. Clicking on the bid button will take users to the bidding module. The user also has the option to search for items in a specific category, reducing the time required for them to find a product to their liking. If the user has created an auction, it will be visible on this page as well.

*Algorithm:*

1. Get request made to Firebase
2. Auctions database accessed
3. Fetch auction information from Database
4. Display formatted auction information in a procedural manner

**BIDDING**

Users will be sent to this module once they have selected an auction item they want to bid on. Here the information is presented in a manner similar to the homepage listing, with the exception that only the selected item's details will be shown. An input of type number will be present below the item information. The user can enter their desired bidding amount. It must be greater than the current highest bid. If the user tries to enter a value lower than it, they will be asked to enter an amount that is greater than the current highest bid. If their bid is valid, then the data gets updated in the Firebase server, and the user is listed as the current highest bidder. Once the bid is complete, the user is taken back to the homepage.

*Algorithms:*

<u>*Product Display*</u>

1. Post id of the product
2. Store id of product
3. Render bidding page
4. Fetch product using its ID from Auctions Database
5. Display product information

<u>*Bidding*</u>

1. Get user bid amount
2. Check if bid amount is greater than current bid amount
3. If yes -> update value of current bid amount and display success message
4. If no -> display error message

**AUCTION CREATION**

This is another core module in our website. Users can use this feature to create listings for the products they own and want to sell. Currently, the user only has to specify 3 fields in order to list the product. These are, the name of the product, the base price they want the bidding to start at, and the type of product that it is. The type is essentially the category of the product, and helps us to categorize it for users to be able to search for the product they want easily. It has a dropdown menu that lists the current types of items in-game, and can be updated whenever new items are introduced. Users can also enter their own type, providing versatility and greater item description features. Once the item has been entered, the program will automatically assign other values to the object before pushing it into the "auctions" database. These values include the name of the original poster, the current price, and whether the auction is open or closed.

*Algorithm:*
1. Input ItemName, Bprice, and select one of the predefined categories
2. Make a post request to the Firebase API
3. Store the data into the auctions database and automatically assign it a new, unique ID
4. Display success message as confirmation to the user
5. Redirect user to the homepage

**USER PROFILE**

When the user clicks on the "Profile" option in the navbar, they will be taken to the user profile page. Here, their basic information will be listed, such as their username, and email. They will be given the option to add a textual description as well, where they may describe the ways potential buyers can contact them, or even highly specific products that they are looking for. The user profile also has two tabs, one that will display all the auctions that the user has listed, and another that displays all the auctions that the user is participating in. The user can switch between these tabs to see this information. A log-out button is also present at the bottom. Clicking this will end the session for the user and take them back to the sign in page.

*Algorithm:*

1. Select "profile" in navbar
2. Make get request to firebase's user database
3. Store information of user who's username matches the current user's in a local variable
4. Display the formatted information
5. Make get request to auctions database and userbids database
6. If poster == curuser || bidder == curuser display the formatted auction information

**OTHER USER'S PROFILE**

The implementation of this module is similar to the user profile module, save for a couple of exceptions. Other player's profiles can be viewed by selecting an auction they have listed and clicking on their name in the bidding window. This takes them to their profile page, where they can see the username and text box containing the description if the user has set it. They can also view the auctions that the other user has listed and taken part in. The logout button and the email address are not displayed here, to maintain confidentiality and not overlap session closures. As expected, the algorithm used here is the same as the one used for the user profile.

# 6. Requirements

**Software**
As our application is web-based, the user will need a suitable browser to access it. The browser also needs to support HTML and CSS along with javascript and nodeJS. Any version of Chrome after V12,  Firefox version 50+, or recent iterations of Microsoft Edge, are all supported. Recommended operating systems include Windows 7, 8 and 10. Most versions of Linux that support the browsers above will also work. MacOS 6+ is preferred for stability and speed.

**Hardware**
Due to the lightweight nature of our project, powerful hardware is not necessary, and older processors and ram cards are sufficient. However, for the optimal experience, the recommended hardware requirements are as follows: any intel processor that's more powerful than an Intel Pentium 4 is sufficient. Minimum 2GB of ram is required, however, as some browsers may be resource hungry, the recommended ram amount is 4+ GB. Also, in order to use the application, the user needs a constant and consistent internet connection. As numerous queries are made to an online database, a reliable connection of minimum speed 500kbps is necessary.

# 7. Performance Analysis

Code optimization techniques such as reducing the number of database request calls, minimal font and image usage, as well as implementing simple temporary data structures in order to store user data for easy access later on have all been applied to ensure users experience a faster and responsive website.

The current limitations of our project lie in our ability to handle large amounts of user traffic. This drawback stems from using the free version of Google's Firebase API, which only allows 10,000 authentication requests a month. Moreover, the real-time database only allows for 100 simultaneous access requests, thereby decreasing the overall capability to handle multiple users on our website.

Loading times, and the time required to place a bid or create an auction is dependent on the user's internet connection. A basic connection such as those offered for user's with mobile data would be more than sufficient to use our website. Speed of 1Mbps and above are recommended.

As more users begin to use our application, we can utilise the revenue generated from advertisements and donations in order to improve our capability to handle network traffic and provide a more seamless experience.
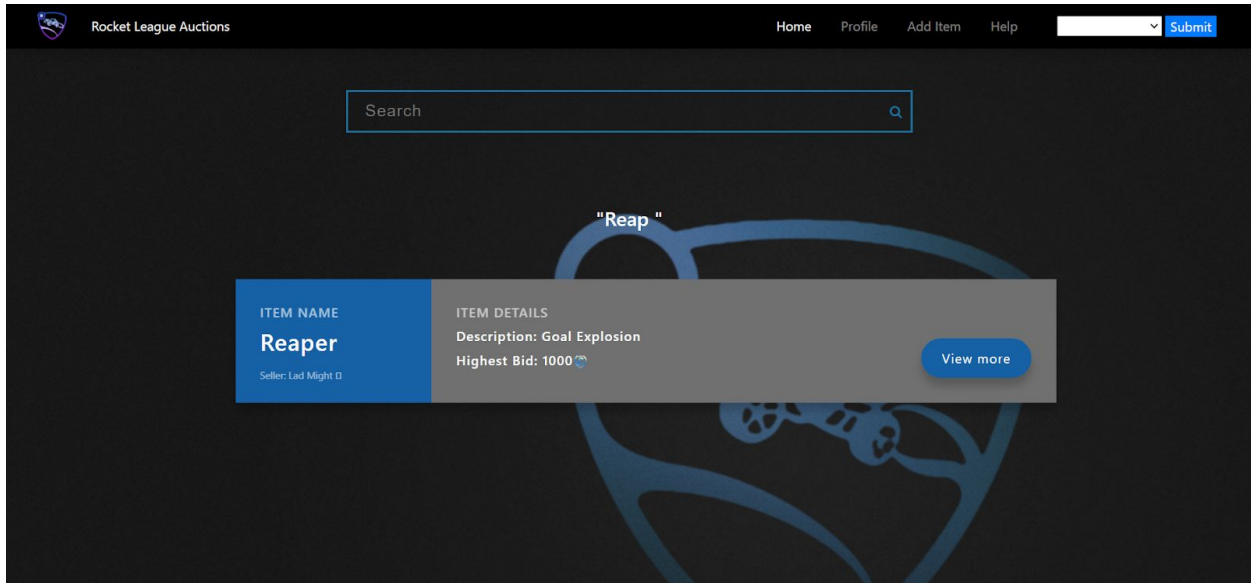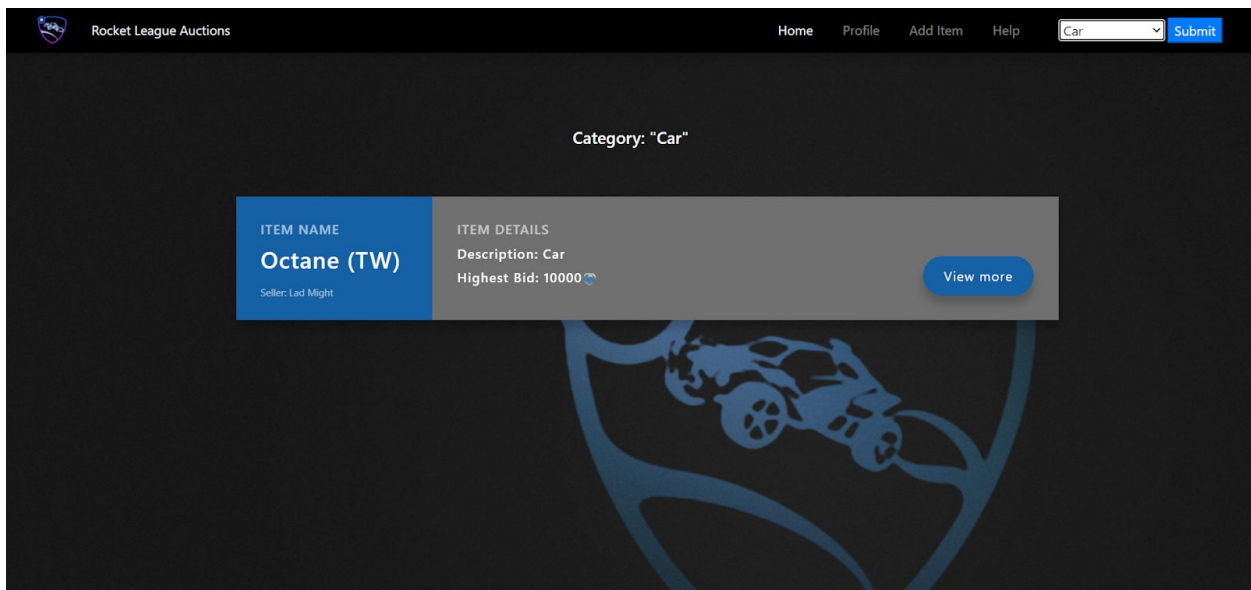
# 8. Experimental Analysis
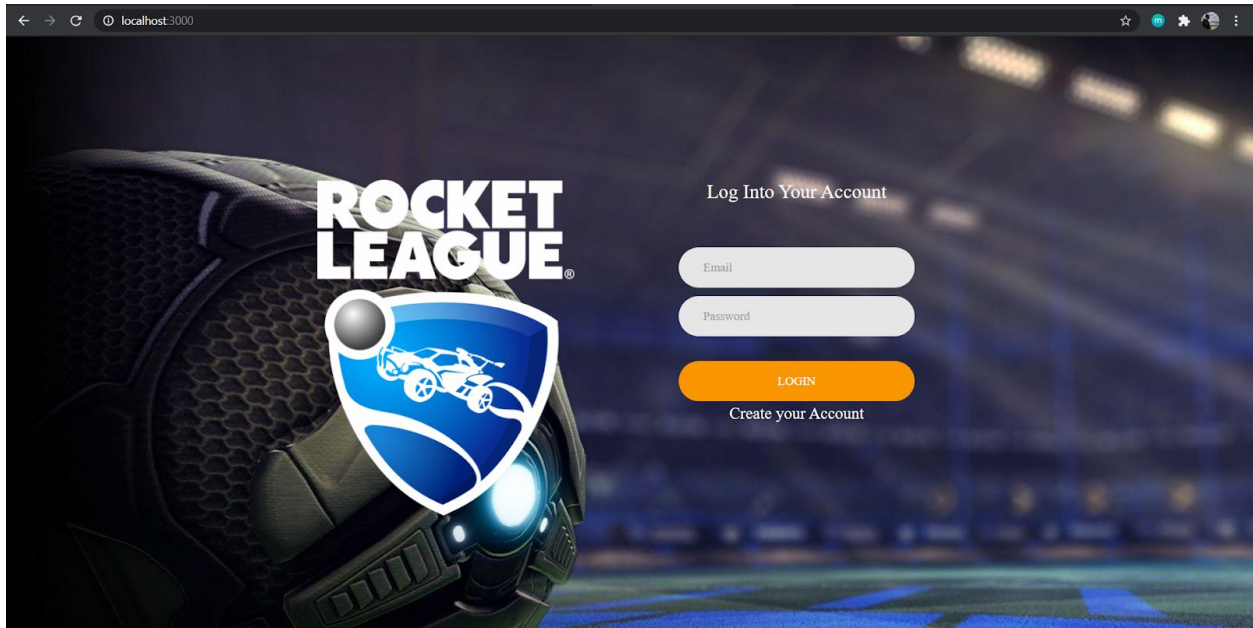


Login Page: First page visible when a user accesses our site.
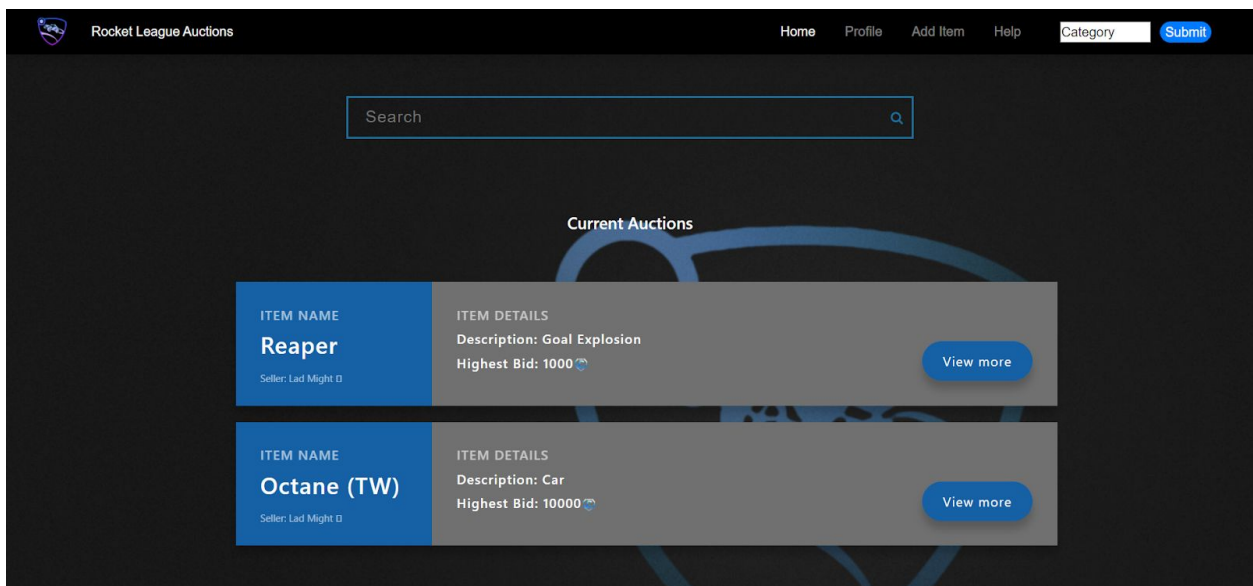


Listings page: Displays all the current active auctions. This is the home page.
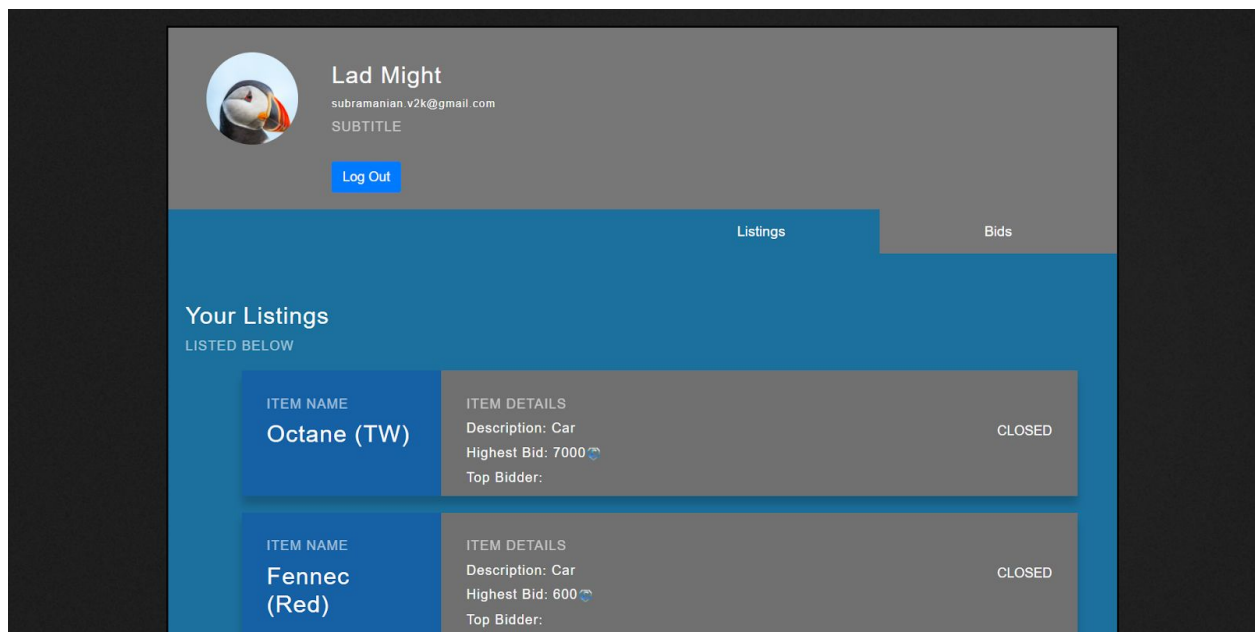
Search: Allows you to search specifically for the item you want. Uses Dice's coefficient, which is an improvement over Levenshtein's distance.



Category Search: Users can search by predefined categories to explore auctions of a particular type of item.
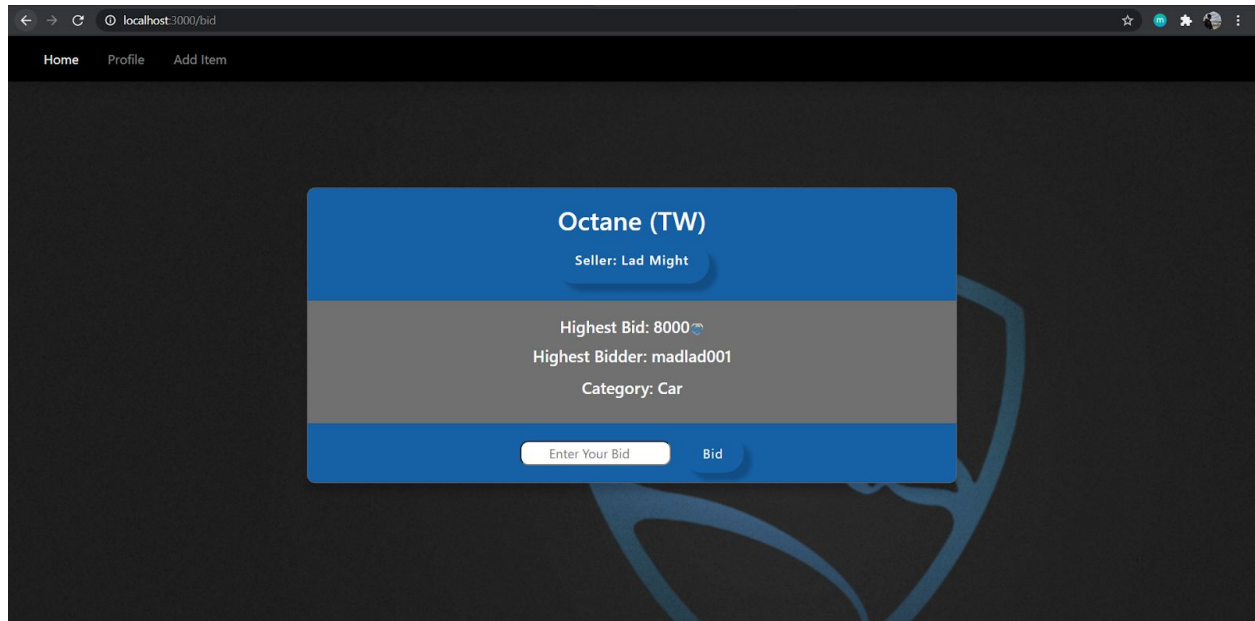
Bid Page: Displays auction details, with the facility to post bids.



Profile page: View profile details and view auctions you are part of.

| ITEM NAME | ITEM DETAILS | |
| --- | --- | --- |
| **Fennec (Red)** | Description: Car<br>Highest Bid: 600<br>Top Bidder: | CLOSED |
| **Blackhole** | Description: Goal Explosion<br>Highest Bid: 2000<br>Top Bidder: | CLOSED |
| **Reaper (Blue)** | Description: Goal Explosion<br>Highest Bid: 1000<br>Top Bidder: | Delete |
| **Fennec (TW)** | Description: Car<br>Highest Bid: 1000<br>Top Bidder: madlad001 | Delete |

Auctions can be closed from the profile page



Bid Page: Shows the current items that the user has auctions on, and allows them to visit the page if they have been outbid and would like to rebid.
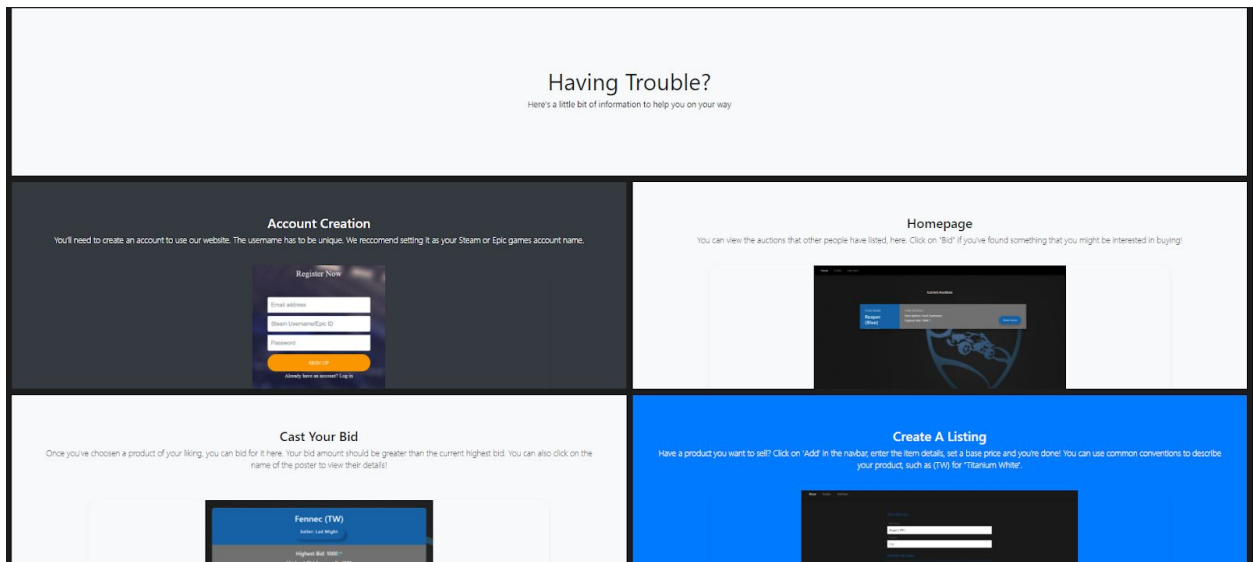
Add Item: Create an auction listing from this page. Listing will then be made public.



Help page present to help new users get accustomed to the features of the website.

# 9. Future Enhancements

With the core features of our project completed, the application serves as a gateway for users to auction and purchase items from each other. However, there are numerous enhancements that can still be applied in order refine the user experience, and expand the site's features. These include:

1. **Two Factor Authentication**: Providing the user with greater account security through a two factor authentication system will allow for a more secure login, ensuring user profiles aren't compromised and reducing the risk of hacking. This could be implemented through either a key sent to their email or using existing authenticator applications such as the one offered by Google.

2. **Steam/ Epic Games Account Linking**: Users can associate their auction profile with their ingame profile to streamline the process of in-game trading. By having their usernames listed, players can be contacted by potential customers while in game, if they wish to do so.

3. **Profile Comments**: Players can leave reviews and comments on other player's profiles in order to increase credibility/ identify and warn other players of potential scams. This would also incentivise users to offer prices that are satisfactory and ensure that trading occurs in a manner that is comfortable for both parties.

# 10. References

[1]https://rocket-league.com/

[2]https://www.rl-trades.com/

[3]https://www.forbes.com/sites/ilkerkoksal/2019/11/08/video-gaming-industry--its-revenue-shift/
#2b41f45663e5

[4]https://search.proquest.com/openview/bc822b41022ddc28901005accb4d337b/1?pq-origsite=
gscholar&cbl=18750&diss=y

[5]Bernhard Rumpe, Guido Wimmel, "A Framework for Realtime Online Auctions "

[6]Hue Rhodes, "Online identity management and identity verification"

[7]Chow Wen Chai, "Secure Login Authentication System"

[8]Borella Michele,"Online Auctioning System"

[9]Rohit Mohal, "Online Auction Mini Project Report"

# 11. Conclusion

      Our application provides a medium for millions of aspiring rocket league players to trade, earn, and enjoy the game they love a little more. While not perfect, with continuous user feedback, we can employ more features and provide a user experience that suits newer players as well as veterans. Overall, the usability and accessibility of our website offers a unique solution to the trading problem faced by a majority of Rocket League players. We hope to keep improving upon and refining the Rocket League Auction System and to produce a greater outreach and invite more players to use our platform.