LEGO Lab

Project Summary

Our web application is designed to assist users in discovering creative ways to use their leftover Lego bricks. By helping users find new purposes for bricks that may not be part of any specific model, the app encourages creativity and exploration. Whether users have a few leftover bricks or an entire collection, the app aims to inspire builders to create models from what they thought was junk. We want to inspire resourcefulness and promote ideation in users to find originality within the universe predefined Lego Designs.

Project Description

We plan to design our web app to allow users to keep an inventory of all Lego bricks in their possession and enable them to search for potential builds they can make. A user can input a brick either using our custom brick search feature or by uploading a picture of it. Users will then be able to search for a model they would like to build with the parts they have. These results can also be filtered based on many different factors such as part cost, building difficulty, build rating, how many parts are needed, and more. For models that users almost have all the parts for, we plan to give users an optimum cost shopping list to buy those final parts. Lastly, we will create a user profile page where people see each other's inventories and favorite builds to spark discussion and spread ideas.

Distinguishing Creative Component

In order to keep a track of a user's inventory of parts - we will use smart data transformations to convert search queries into database matches that the user can choose from. This will also involve a feature that allows users to submit pictures of the parts and get part details from that - using external API calls. Another part of the key features of our platform will be a Build to Brick Compatibility Algorithm that determines whether a brick fits into a specific Lego build. It will give each part a compatibility score that creates the possibility of using alternative parts that serve a similar purpose in the build. Using this we can suggest builds from an inventory of parts, and do a lot of user-specific idea generation based on filters like - lowest additional cost, build rating and build difficulty.

Usefulness

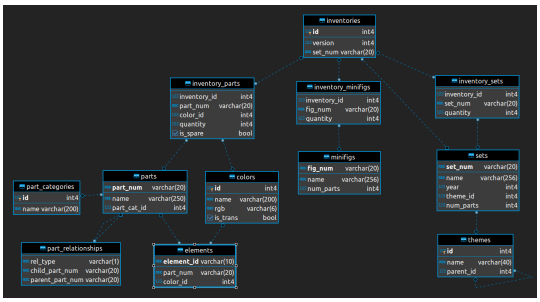
Our application will allow users to input their personal inventory of leftover lego bricks and give them a list of sets or designs they can build with minimal purchases.This is useful to save builders money and foster building creativity. Users can add/remove bricks from their inventory, add sets to favorites, and search sets to build. There is an application called Brickit. This application allows users to scan a pile of bricks and gives them sets to build. This is a similar

functionality to our application, but ours will have a different format. Users will input bricks based on their unique identifiers or qualities using a search function, not with a scan. Ours will be a more consistent inventory that can be updated and deleted when bricks are introduced or in use. Users can post comments on other users' pages if they are interested in a trade/sell or would like to express approval for their builds.

Realness

Rebrickable.com has extensive datasets including datasets that contain data about lego sets and parts. We will be able to use a combination of these datasets to create a comprehensive complete data source. The data is directly from LEGO, there are 23,862 sets and 55,874 parts in the dataset, the data is in csv format. Kaggle has additional data that contains lego sets scraped from the official website which gives information about user rating, difficulty, and descriptions. This dataset is also in csv format. Additionally, we plan to use PNGs for both lego bricks and lego sets that we can display to users.

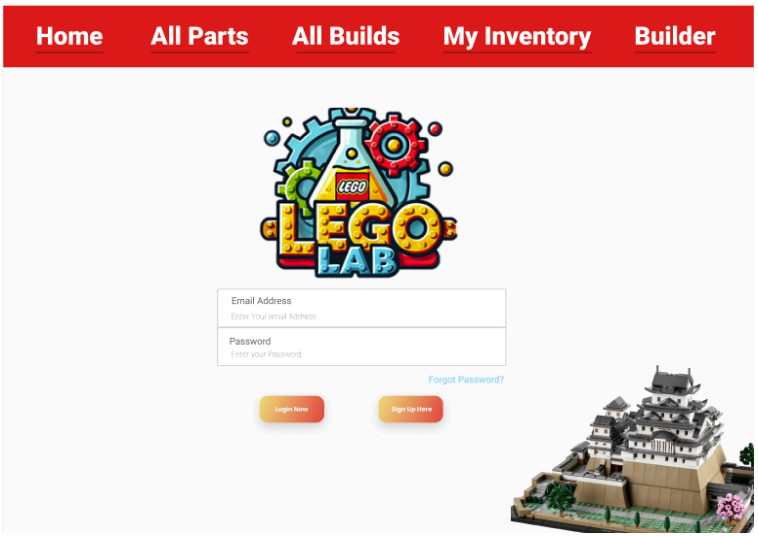
Planned Data Sources & APIs



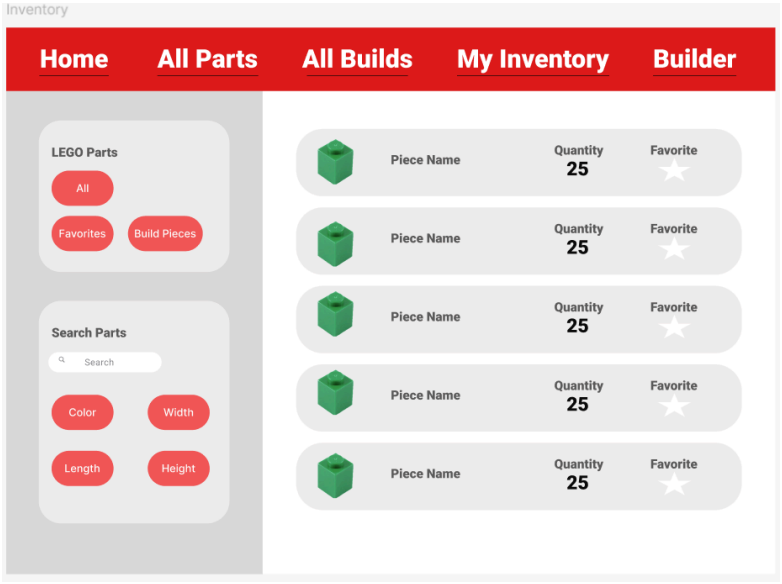
- Rebrickable Datasets - This is a LEGO catalog and community site that offers a range of open-source datasets ranging from part details to set details, and more.
    - This is a schema of what Rebrickable offers and we plan to use some of these datasets
- Kaggle Lego Builds Dataset - This is a Kaggle Dataset that contains lego sets scraped from the official website and hence provides key attributes like descriptions, rating and difficulty.
    - We also plan to use public datasets that include PNGs for both lego bricks and lego sets so that we can show that to users.
- We also plan to use two APIs for more user functionality -
    - Picture to Lego Brick API - To allow users to add parts to their inventory just by uploading pictures
    - Amazon Pricing API which can help us get optimal prices for additional parts that the user may need to buy.

Detailed Functionality

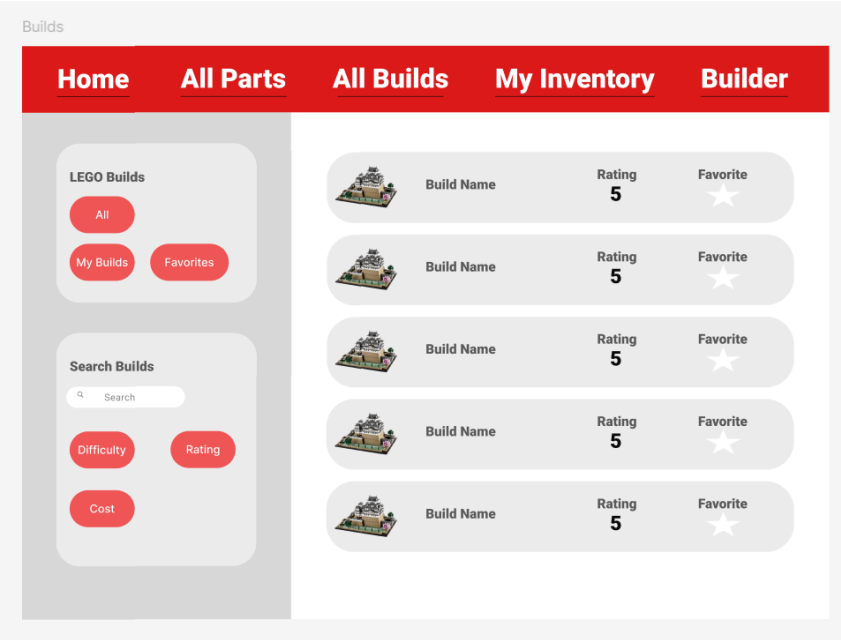
1. User Login/Sign-Up and Profile - The user must have an account on the website and the account will be associated with user specific details like part inventory, wishlist and favorite builds. This will also result in the user having their own profile page with other's can check out and potentially leave comments on.



2. All Parts - When the user accesses this page, they can see a complete list of available LEGO parts. Each part will display its current quantity, indicating how many pieces the user currently has in their inventory. The user will have the ability to update these quantities as they make changes to their collection. Additionally, they can mark specific LEGO pieces to be on their wishlist.

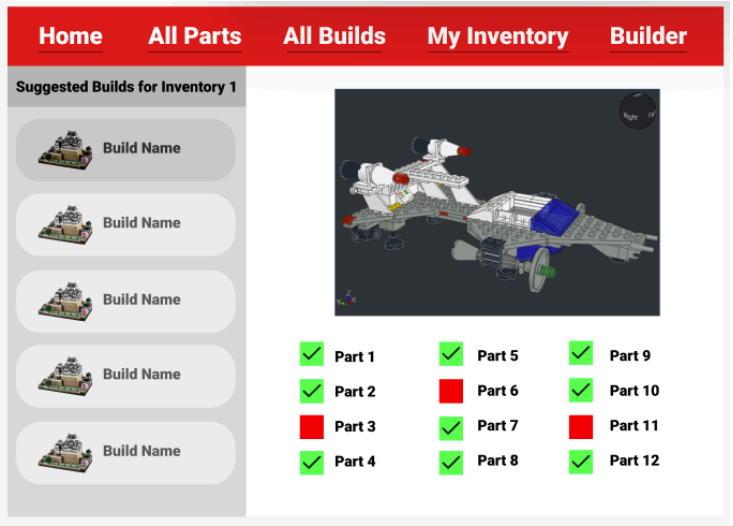


3. All Builds - When the user visits this page, they will be shown LEGO builds, each uniquely displayed with its own image, name, and a detailed description. Every build will have a user-generated rating on a scale from 0 to 5. Alongside each build, the user will find an option to favorite the design, enabling them to quickly access their preferred builds for future reference. Clicking on the build will open up further description on the build, showing how difficult it is to make it and what parts are necessary to build it.



4. My Inventory - This will be a similar page to All Parts but specifically have multiple inventories (Inventory 1, Inventory 2, …) and can interact specifically with their collection of parts. Additionally, this is where they will be able to use the search or upload image feature to add more parts to their inventory.

5. Builder - This will be the main page of the application where all other things culminate into one use-case focused page. The user will be able to select their specific inventory and then see a list of suggested builds based on that. They can also compare their inventory with a specific build of their choice and generate a shopping list of needed parts. Another potential possibility on this page would be to add an interactive visualization of the chosen build and color code parts based on whether they are in the inventory or not.



Project Work Distribution

- Aryan - In charge of implementing the Part Image Upload and also the Build to Brick Compatibility Algorithm that helps with suggested builds and alternate parts.
- Suraj - In charge of the Part Search Logic using smart data transformations. Also, will work on implementing the color-coded build visualization.
- Reece - In charge of the shopping list generation and optimal cost calculations for additional parts that are needed by the user for the build.
- Ryan - In charge of user login, profile pages and individual comment sections. He will also be responsible for the API setup, connection and that type of functionality.

Everyone will work together on setting up the basic framework of the frontend, backend, and database connection for the application. We have assigned each feature to someone so that the person can create timelines for tasks figuring out the overall implementation. We will help each other with all the work and shuffle things as needed.