Knight Foundation School of Computing and Information Sciences

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Spring 2021 Capstone 2 Project

BBQUDA

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PROBLEM

The Biscayne Bay Project from the Marine Robotics Lab at FIU needs a web app that can:

- Store and visualize datasets obtained from marine robotic missions for researchers.
- Create custom waypoints for the robots to follow in future missions that can be saved and downloaded.
- Expose a REST API that allows clients to access publicly available datasets.

CURRENT SYSTEM

The current system is a redesigned website that allows researchers to upload, store, and visualize mission datasets all in one place after logging in with an account.

All the pages have been redesigned with additional pages for the API, heatmap, about us, and contact us sections.

Users can create custom trails and generate coordinates in CSV files for later robotic missions.

REQUIREMENTS

The Product Owner determined the following requirements for this semester.

- An additional way to visualize mission data aside from displaying trails on a map via heatmaps.
- Store uploaded mission datasets in a database instead of keeping them in media storage as CSV to improve performance of the webapp
- Create a REST API that allows authorized researchers to access publicly available mission datasets with API credentials automatically generated for them.
- Redesign of the UI to look more professional.

SCREENSHOTS

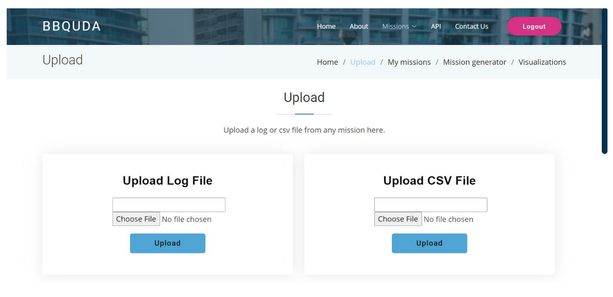


Figure 1:
New Upload Missions page

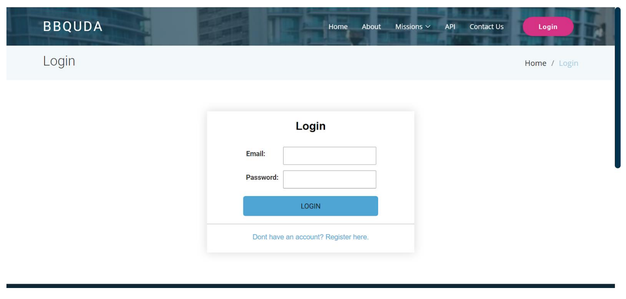


Figure 2:
New Login/Registration

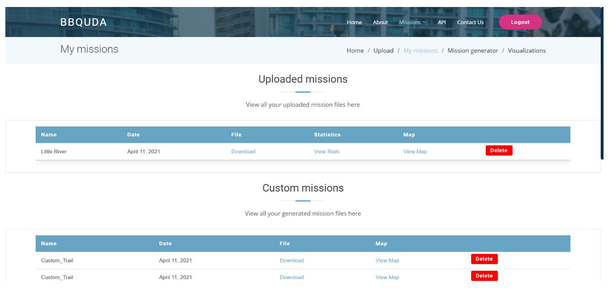


Figure 3:
New redesigned page to view the uploaded and custom missions..

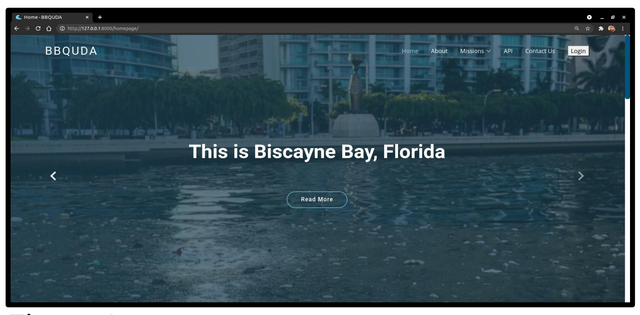
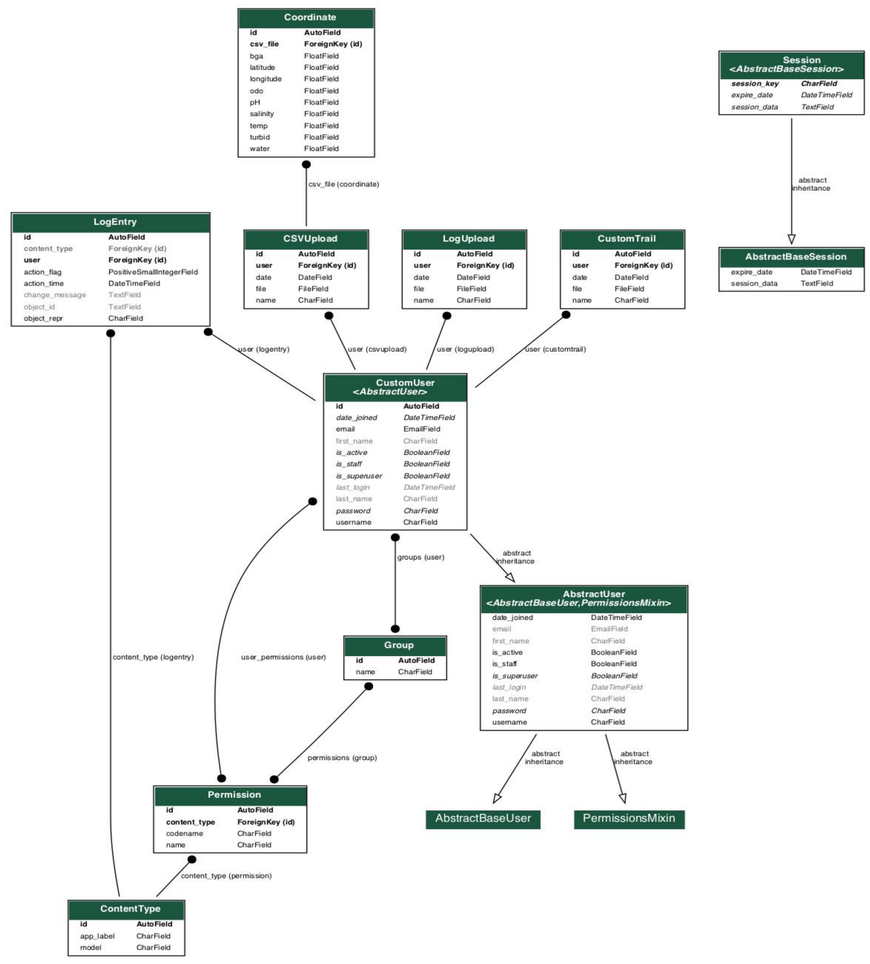


Figure 4:
New UI for the homepage.

CLASS DIAGRAM



IMPLEMENTATION

The web app is built on Python and Django with additional logic from Javascript. jQuery was used to pass data from javascript to the django server.

Creating the API was also done with Django's built-in REST framework. The database used to store datasets was <FIREBASE OR SQLITE>.

Visualizing data via 2D heatmaps was done with an open-source library called WebGL heatmaps which is a plugin for Leaflet.

VERIFICATION

Manual testing was used to verify web app functionality:

Scenario: Clients invoke the REST API by passing credentials to the URL and the response contains a CSV containing mission data.
Status (Fail/Pass): Pass

Scenario: Users can generate 2D heatmaps by selecting parameters for what data to display, clicking and dragging over te map, and then clicking submit.
Status (Fail/Pass): Pass

SUMMARY

The BBQUDA web app now allows researchers to upload mission data and visualize datasets with a tool that generates 2D heatmaps.

The webapp will store mission data uploaded by researchers on a database instead of media storage as CSV files.

Researchers can also access publicly available mission data via a REST API with credentials they receive upon registering for an account.

The UI has also been redesigned to look more professional.

FUTURE WORK

Future iterations of the project would potentially include these functionalities:

- Contact Us form to directly send a message
- More features to visualize the data
- Hosting website on an actual domain.

ACKNOWLEDGEMENT

The material presented in this poster is based upon the work supported by the Biscayne Bay Project from FIU's Marine Robotics Lab. We thank Gregory Reis and Masoud Sadjadi for overseeing the development of this project.