

# ALKALYTICS

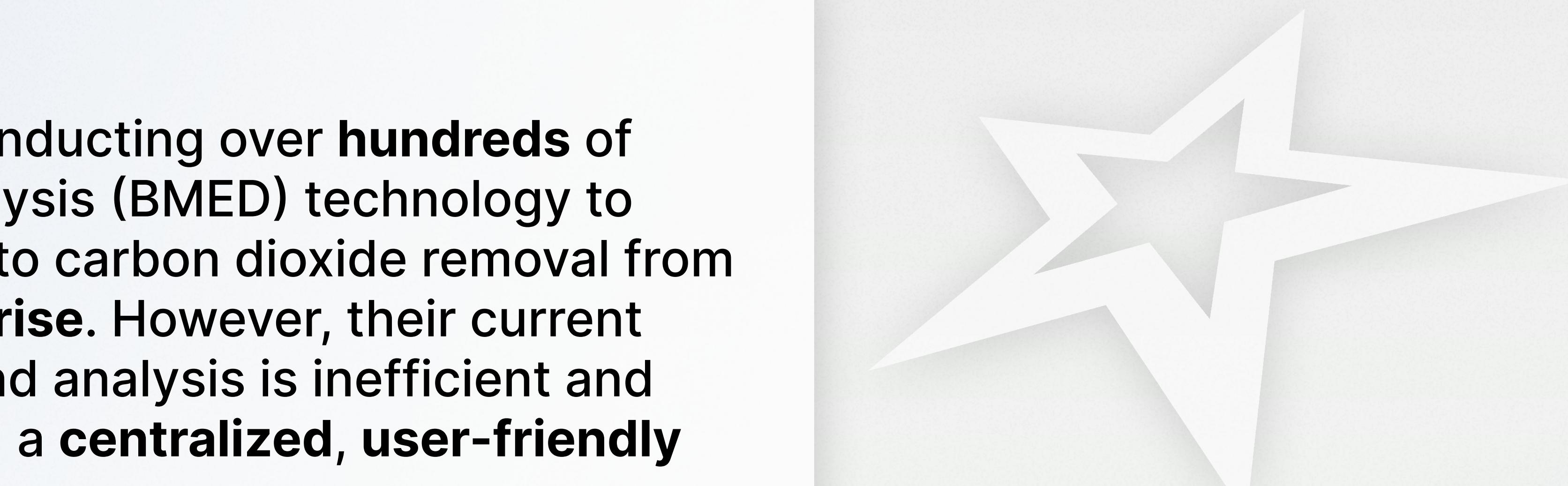
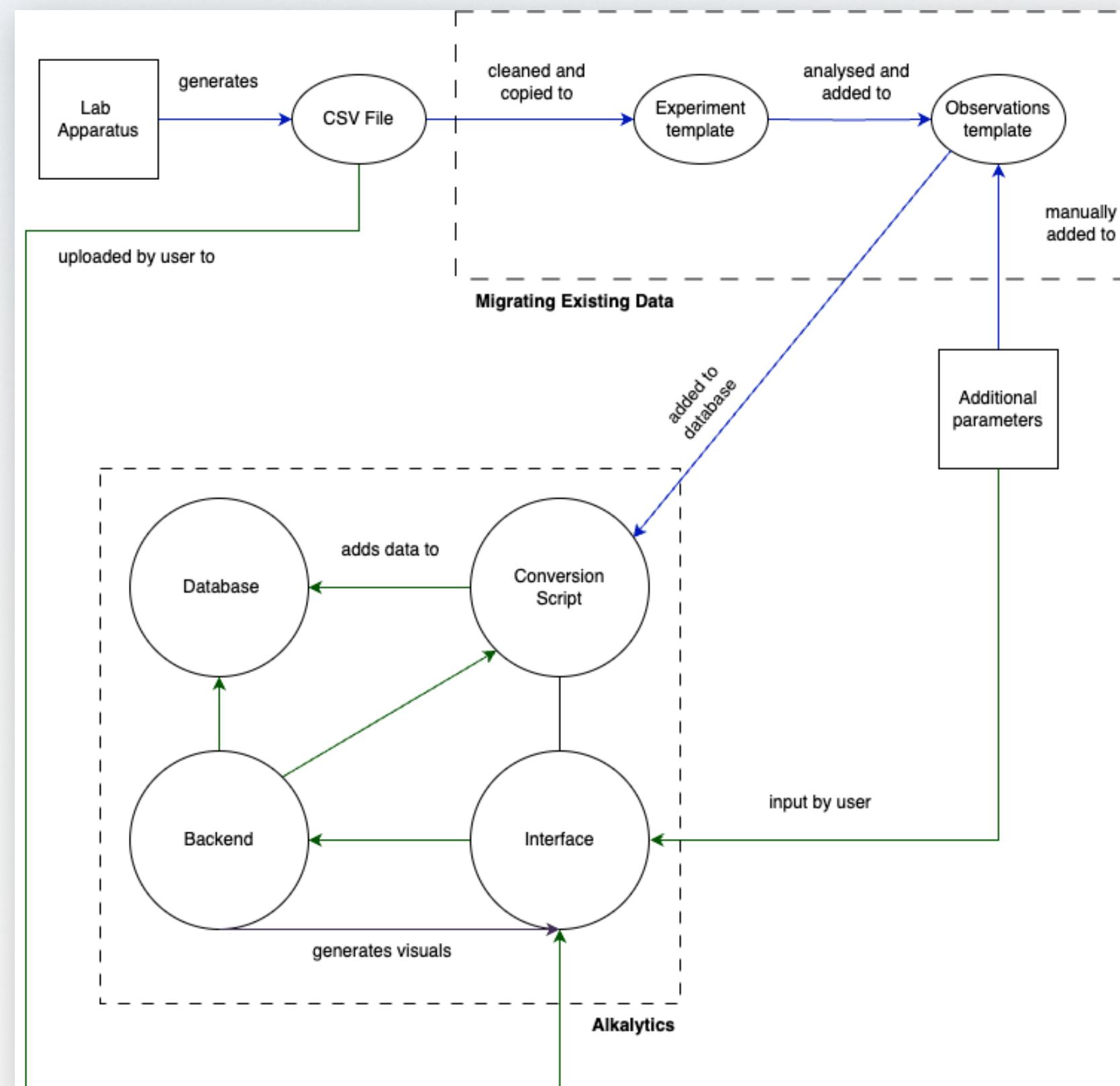
A data management system to support ocean alkalinity enhancement research for climate change solutions

**Our Team**  
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 Jennifer Ye

## Context and Motivation

Researchers of the *de Lannoy Lab* have been conducting over **hundreds** of experiments using Bipolar Membrane Electrodialysis (BMED) technology to enhance ocean alkalinity, a promising approach to carbon dioxide removal from the atmosphere to **mitigate global temperature rise**. However, their current reliance on Microsoft Excel for data collection and analysis is inefficient and unscalable. To support their research, they need a **centralized, user-friendly** application for monitoring and analyzing the data.

## System Overview

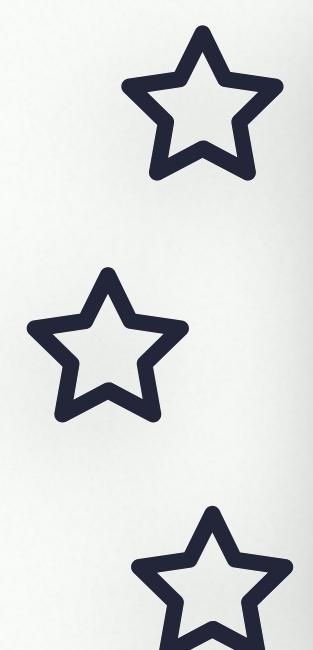


## Impacts and Key Benefits

**Increased Research Efficiency:** Reduce reliance on manual Excel based workflows enabling faster, more reliable data processing

**Improved Data Accuracy & Integrity:** Centralized data management ensures consistency and minimizes errors

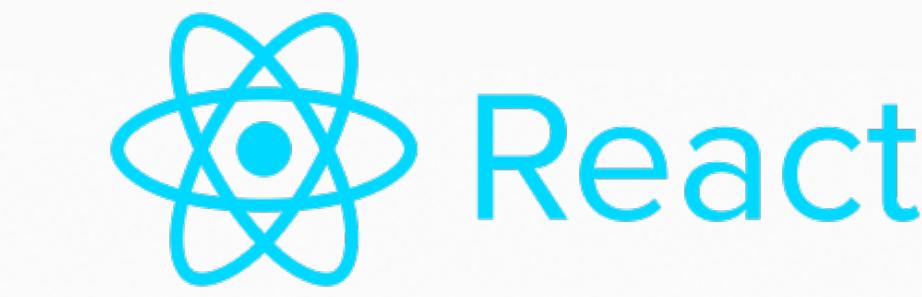
**Provides Scalability for Future Research:** Supports large datasets, making it adaptable for expansion or future experiments



## Acknowledgements

We kindly acknowledge and thank Dr. Charles de Lannoy, head of the research lab, Bassel Abdelkader, and Meghna Saha for their expertise and supervision over this project.

## Tech Stack



TypeScript

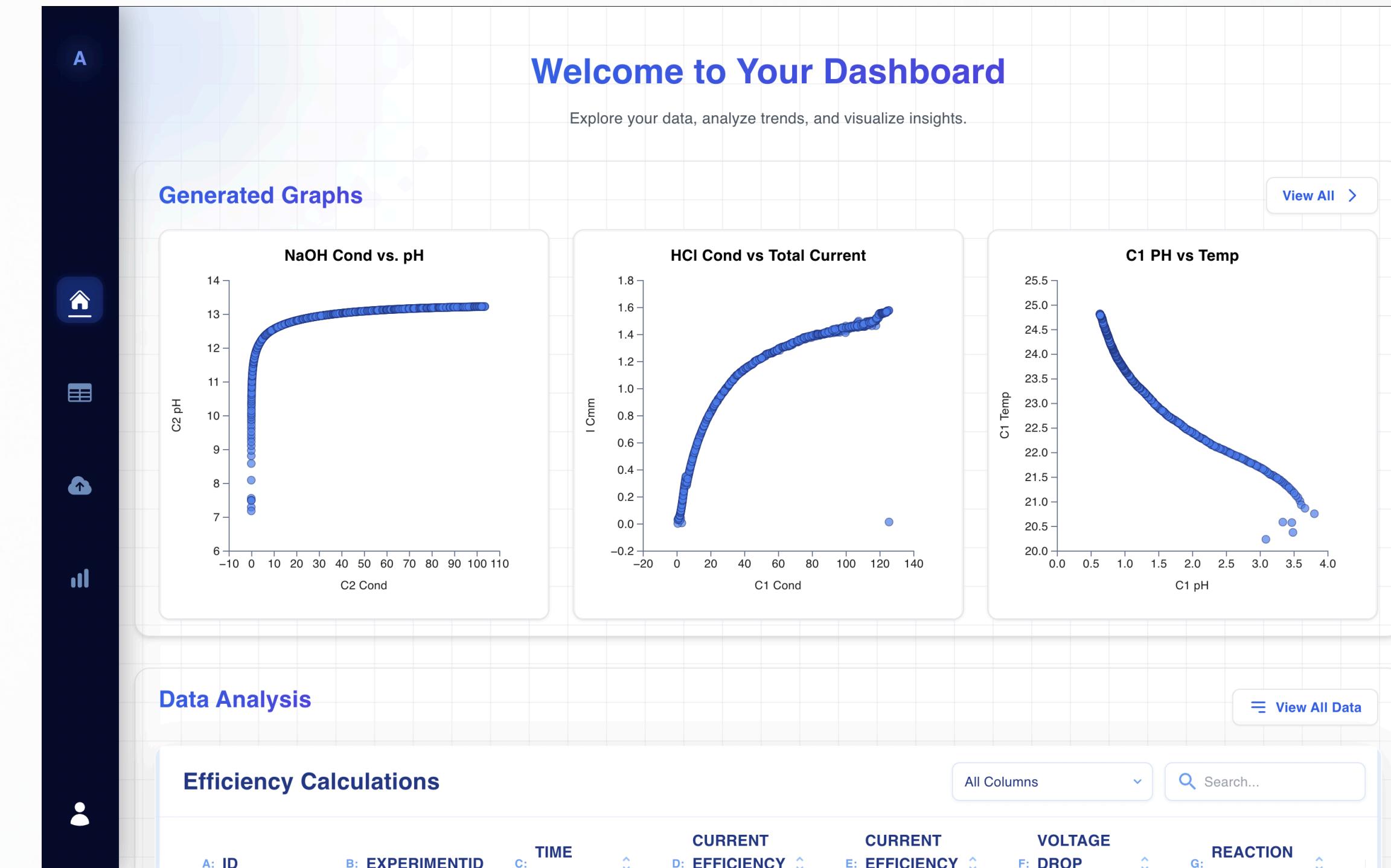


mongoDB®

python™

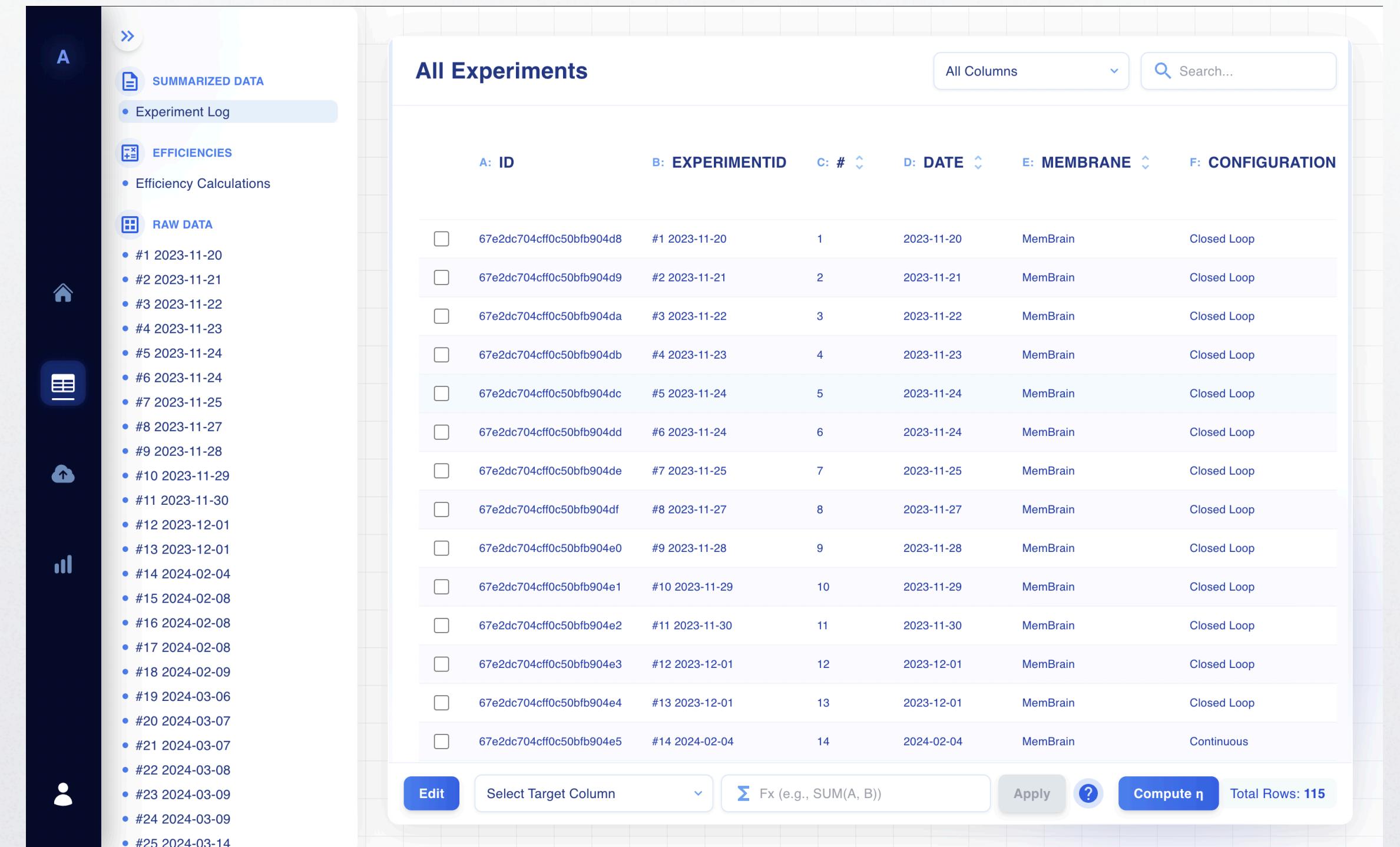
GraphQL

## Key Features



### Dashboard Overview

Centralized data management with previous insights

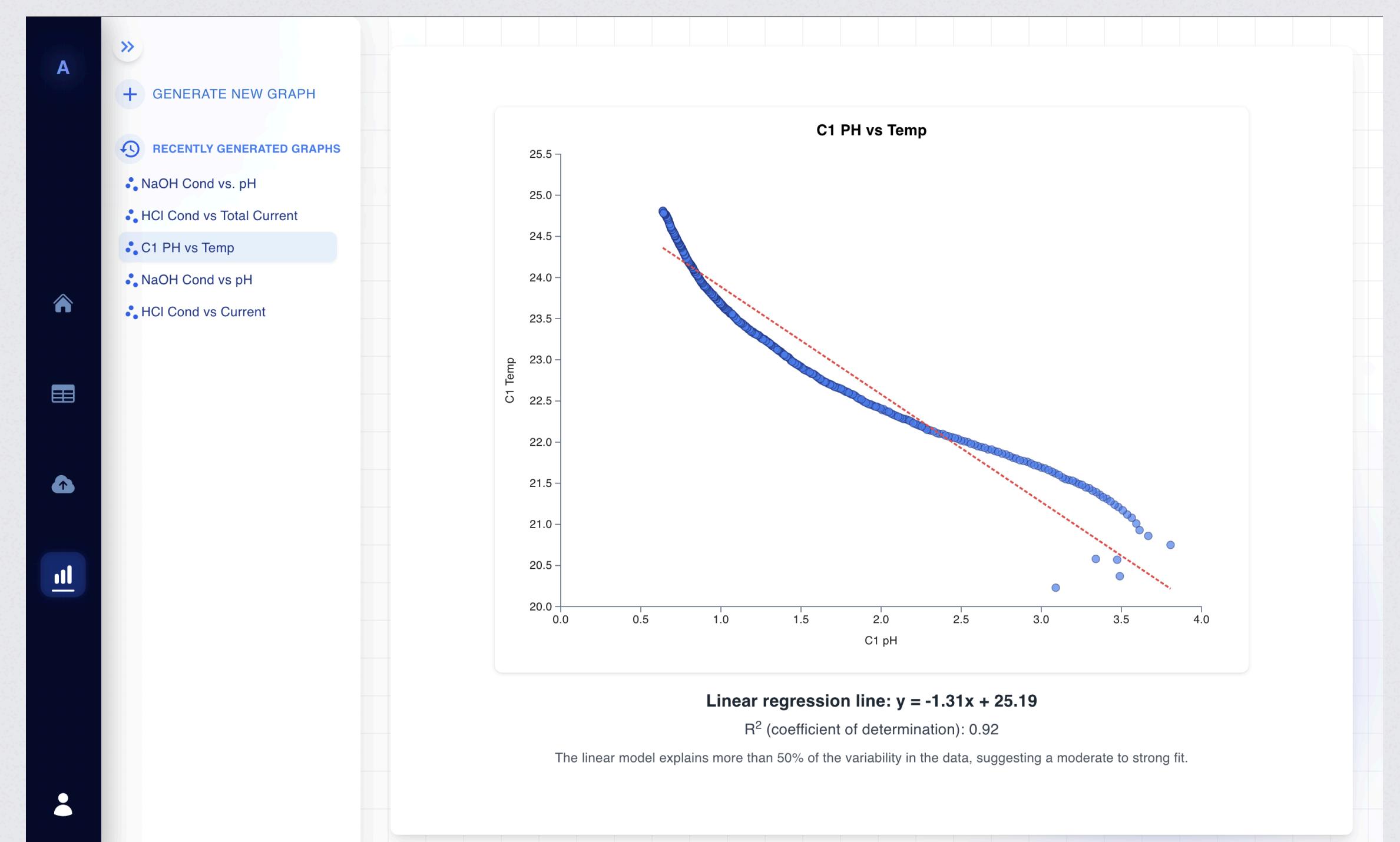
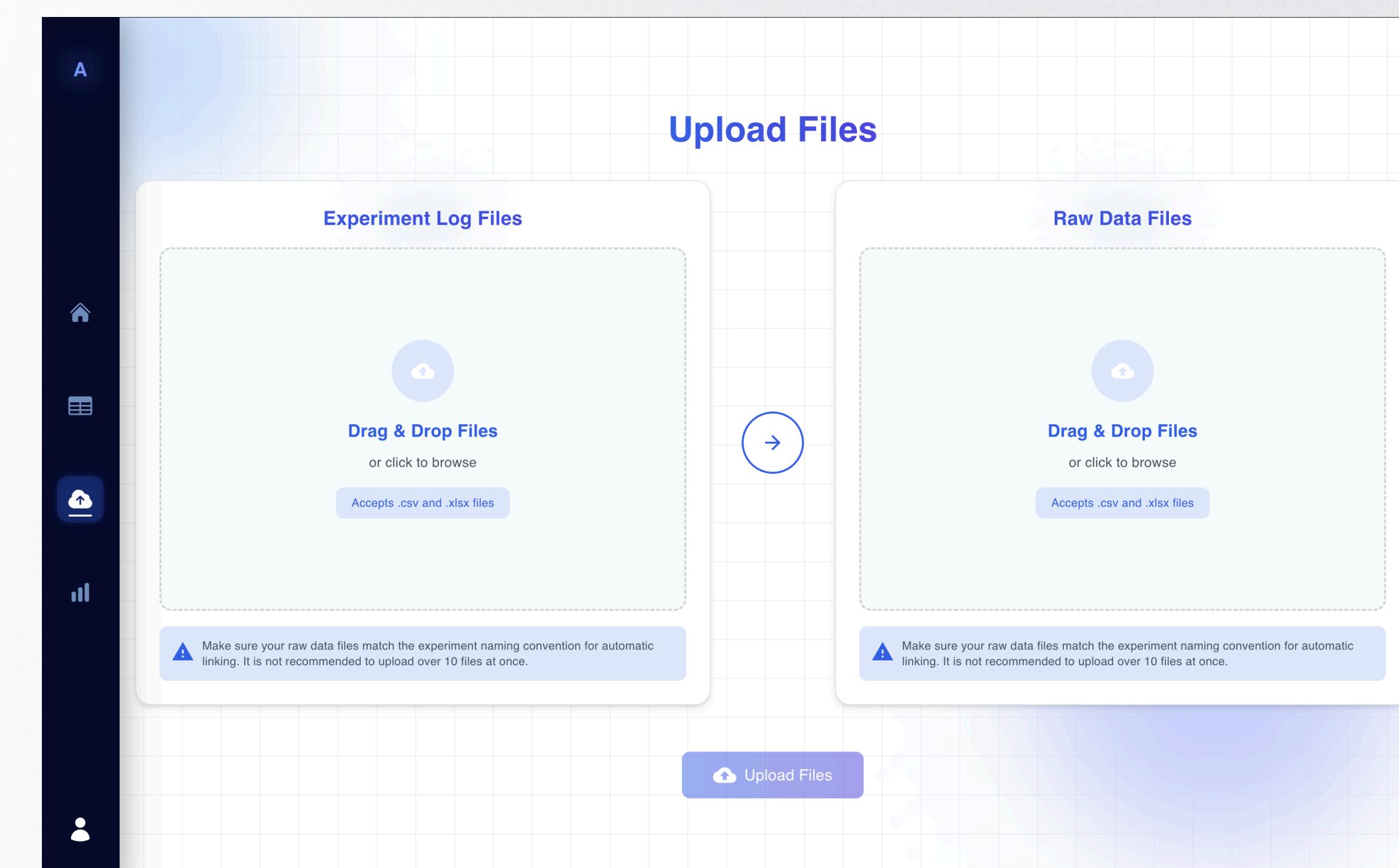


All Experiments

| ID  | EXPERIMENTID | TIME INTERVAL | CURRENT EFFICIENCY | CURRENT VOLTAGE | VOLTAGE DROP | REACTION EFFICIENCY |
|-----|--------------|---------------|--------------------|-----------------|--------------|---------------------|
| #1  | 2023-11-20   |               |                    |                 |              |                     |
| #2  | 2023-11-21   |               |                    |                 |              |                     |
| #3  | 2023-11-22   |               |                    |                 |              |                     |
| #4  | 2023-11-23   |               |                    |                 |              |                     |
| #5  | 2023-11-24   |               |                    |                 |              |                     |
| #6  | 2023-11-24   |               |                    |                 |              |                     |
| #7  | 2023-11-25   |               |                    |                 |              |                     |
| #8  | 2023-11-27   |               |                    |                 |              |                     |
| #9  | 2023-11-28   |               |                    |                 |              |                     |
| #10 | 2023-11-29   |               |                    |                 |              |                     |
| #11 | 2023-11-30   |               |                    |                 |              |                     |
| #12 | 2023-12-01   |               |                    |                 |              |                     |
| #13 | 2023-12-01   |               |                    |                 |              |                     |
| #14 | 2024-02-04   |               |                    |                 |              |                     |

### Table View

Numerical analysis with streamlined computations



### Upload Files

Automatic raw data processing with validation checks

### Graph Generation

Graphical data visualization with linear regression analysis