UNIVERSIDAD ANA G. MÉNDEZ | UAGM

Recinto de Gurabo

SCHOOL OF ENGINEERING

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

PROJECT TITLE

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ELEN 330 Web Console

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TABLE OF CONTENTS

LIST OF FIGURES

1. INTRODUCTION

1.1 Problem Statement

A Micro-grid is a local energy grid that is an efficient alternative to being connected to the cities grid at all time therefore having the possibility to disconnect from that main grid and having control outside of the traditional grid for efficiency and manageability. The way that we can control and monitor this IoT grid can be by the use of a mobile application in this case in the Android Operating System and a web console that can be used to monitor the sources and devices and their respective generation and consumption.

This design must take the data from the Firebase Firestore Cloud Database that is sent to through the microgrid and use the android application and web console to visualize such data.

1.2 Objectives

1.21 General Objective

The general objective is to create a web console where the user can have access to their data from their specific microgrid containing their devices and sources through a web console for easy access from any device besides the android application

1.2.2 Specific Objectives

- First Objective would be to create web console with functionality to login, register, reset password and display a dashboard.

- Extract data from micro grid that is stored in the database and display to the web console for the user.

3. DESIGN DETAILS

3.1 Software Development

In the development of the web console the main programming languages that are used are HTML, CSS, and JavaScript. HTML is a Hypertext Markup Language used for designing documents that are displayed in the web browser and the way that we can give style to that HTML is by using CSS, which is a Cascading Style Sheet language used as mentioned earlier to style the corresponding HTML. The main programming language which is used to manipulate the DOM and gather data from Firebase Firestore Cloud Database using the queries is JavaScript.

3.2 User Authentication

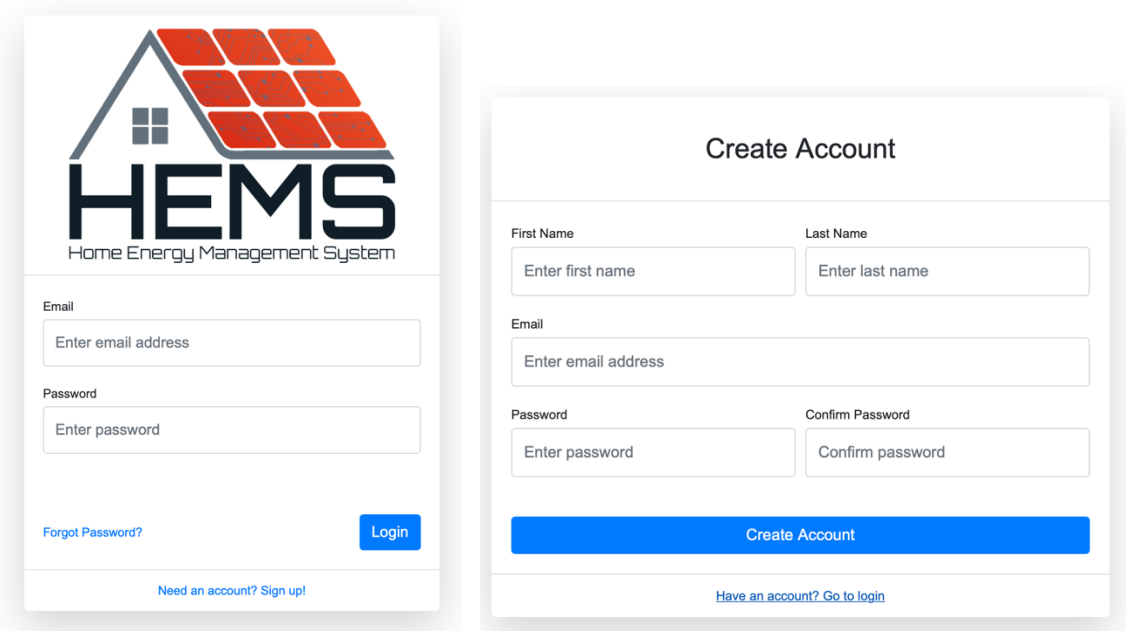

Figure 1: Login Form and Figure 2: Create Account Form

When the user first loads up the web console, they will be greeted with a login page as shown in Figure 1. Then the user has the ability to either login if they have an account by using specific algorithms to authenticate where or not the user exists or not and if the user exists they will be taken to the dashboard and if they do not have a password they have the ability to create an account, as seen in Figure 2, where they will have the

ability to create an account by entering their First Name, Last Name, Email address, and the corresponding password for which they will use to log in after they have created their account.

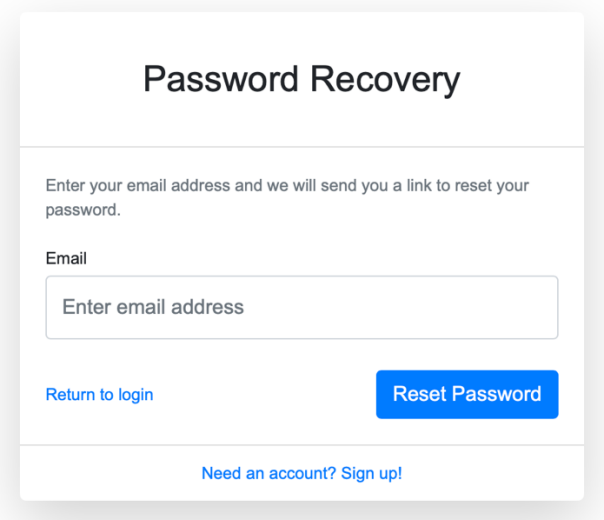

Figure 3: Reset Password Form

The user will also have the ability, as seen in Figure 3, to reset their password if they have forgotten their password, if they do decide to reset their password, they will be sent an email with a link to reset their password.

3.3 Dashboard

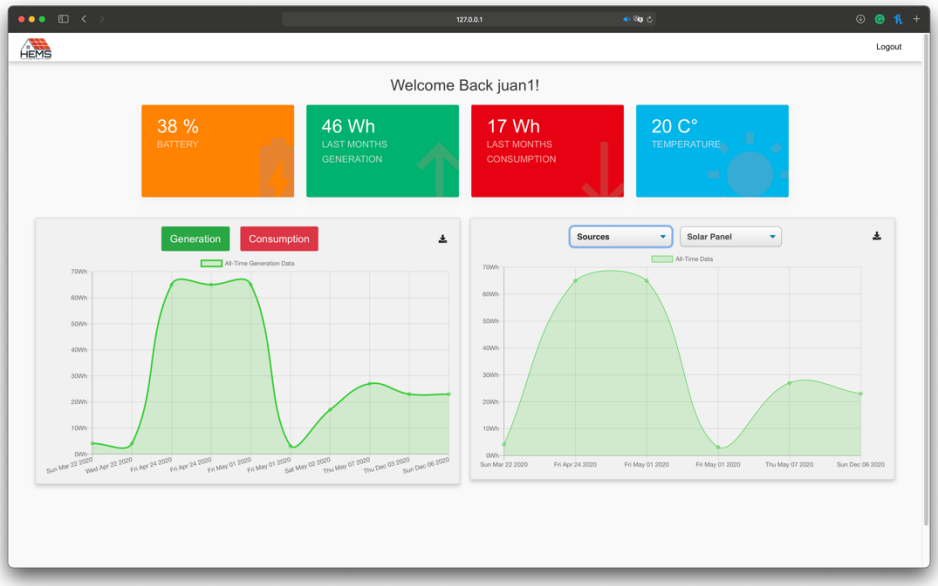

Figure 4: Dashboard

After the user's credentials have been authenticated, they will be redirected to the dashboard, as seen in Figure 4, of the web console where they will have four different cards that are used to display their current battery percentage, last month's generation, last month's consumption and the current temperature which are all queries with the algorithms using JavaScript to extract the data from Firebase Firestore Cloud Database. Directly below these cards are where the two charts are going to be placed.

3.3 Charts

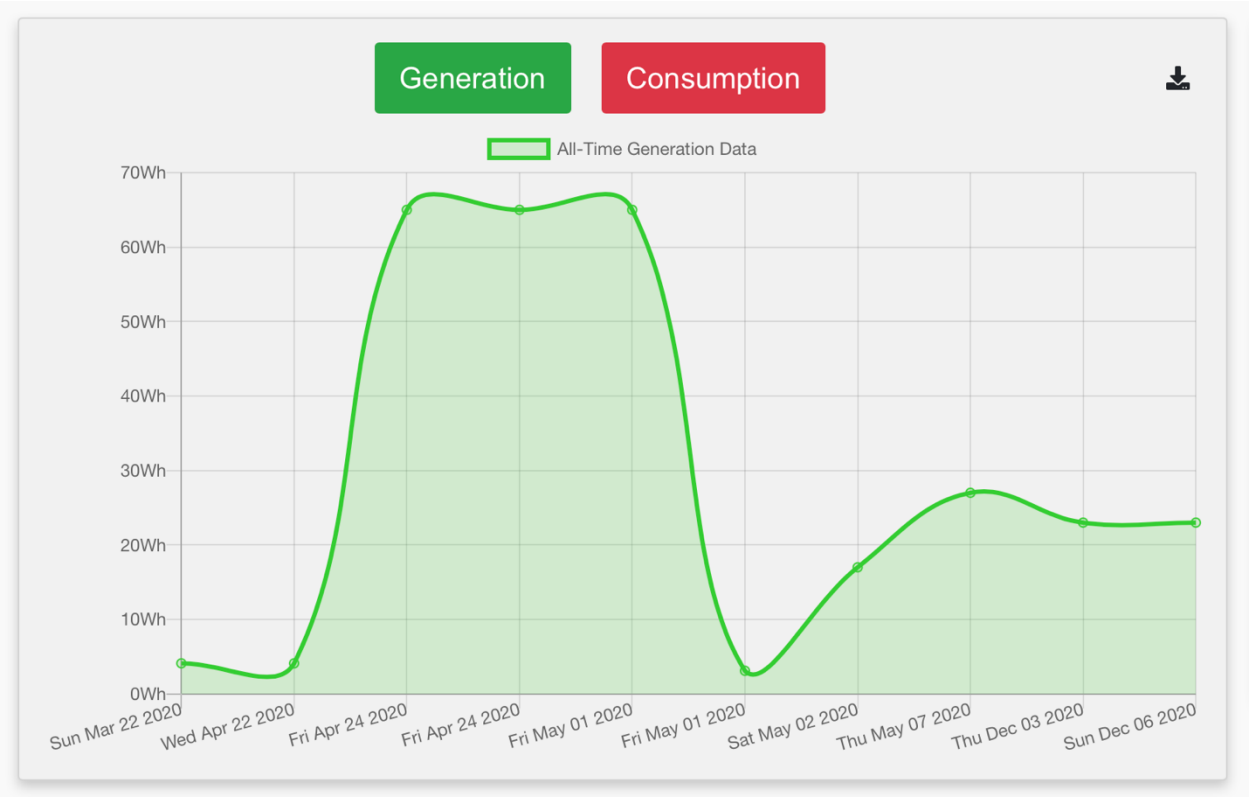

Figure 5: Generation and Consumption Chart

Below these four cards are two charts in a row where the chart to the left, as seen in Figure 5, is the main charts that will display all time data for either generation or consumption depending on what button the user clicks that is placed on top of the main chart.

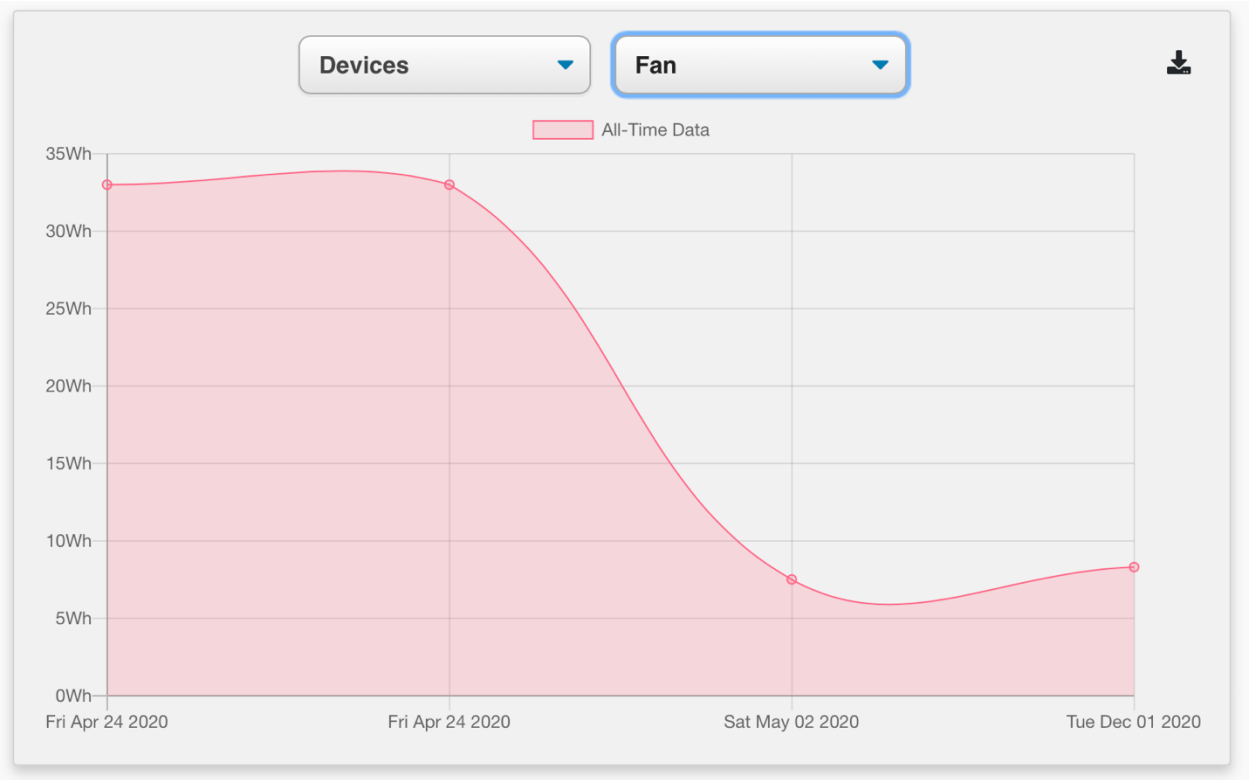

Figure 6: Secondary Chart for Sources and Devices

The secondary chart, as seen in Figure 6, to the right displays to dropdown menus where the user can either select Sources or Devices and depending on what the user selected in the first dropdown the second dropdown will be populated dynamically depending on what source or device the user selected and that is what information the chart will display. The user also has the option to click on a button to save a screenshot image of the corresponding chart that they have selected to be generated.

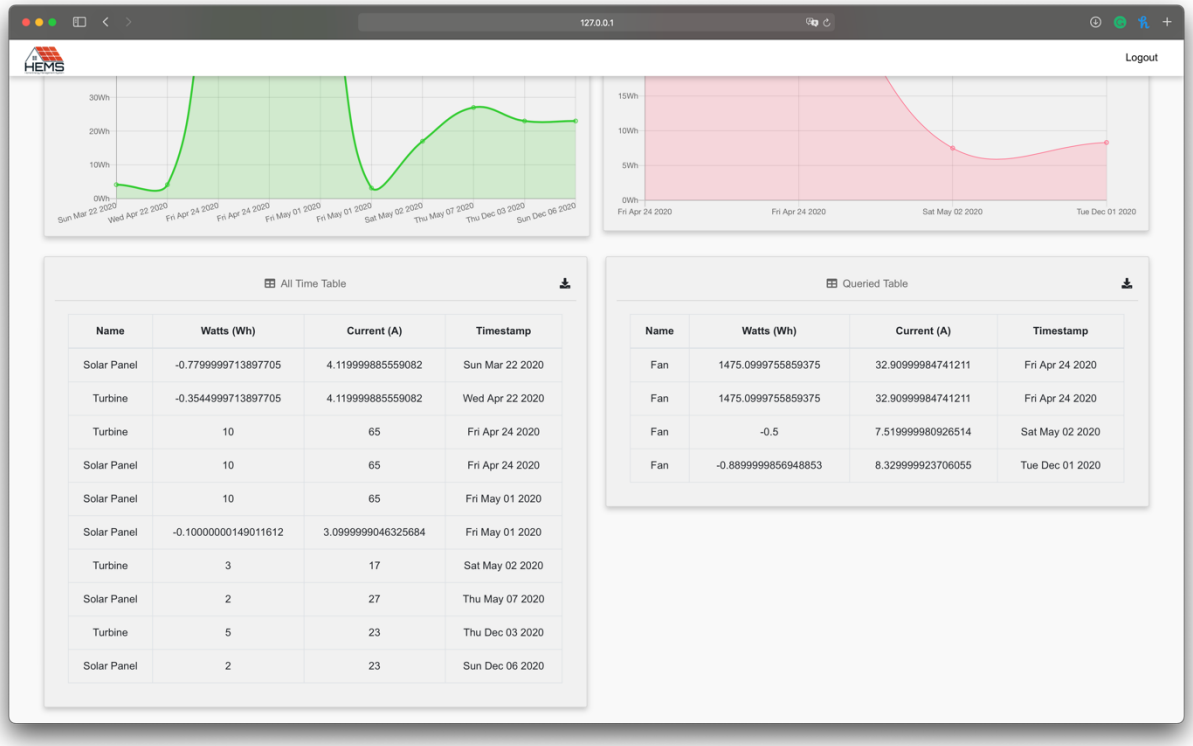

Figure 7: Both tables derived from corresponding charts

As seen above in Figure 7, there are two tables displayed. The table on the left corresponds to the generation and consumption chart that is right above it and the table on the right is queried from the chart above it where the user can see their data by their specific sources or devices. These table will allow the user to see the same values that are in their chart in a table format where they are also able to click a download button to the right of each corresponding table where a data.csv file will be download where it will contain the values of the table.

4. CONCLUSIONS AND FUTURE WORK

4.1 Conclusions

In conclusion, the web console was developed and engineered to correctly display the user data for the ability to monitor most aspects of the users data that is queried correctly from the Firestore Firebase Cloud Database where the micro grid that is stored therefore having the ability to visualize such that by using charts.

4.2 Future Work

- Minify JavaScript for security purposes.