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# CurrentSee Design Specification
# Version 1.0

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# 1. Introduction

## 1.1. Product Overview

CurrentSee is a senior project being developed by a team of five students at the University of California, Santa Barbara. CurrentSee is designed to collect consumer power consumption data, store the data, and provide analytical tools the consumer can use on the data. The set of analytical tools includes a graphical interface that displays charts and diagrams, software logic that pinpoints important data points, and software that suggests where a consumer can modify their power consumption strategy and save on the electricity bill.

## 1.2. Definitions, Acronyms, Abbreviations

Please Refer to the Glossary at the end of this document

## 1.3. Document Overview

This document will begin with a brief overview of the components involved. Following this will be documentation about the different events that may occur in the system including registration, account creation, user interaction with the graphs, etc. Thirdly, the class diagram will be presented. Finally, there will be the user interface mockups which depict what the user may expect to see navigating through the website.

# 2. Components

CurrentSee can be understood to be two major components, the frontend and the backend. The frontend and backend can be further described by the different technologies involved. The front end consists of the Python-Django code and modules that display our website or the mobile platform (Android or IOS) that the user interacts with. The backend consists of the Amazon Web Service that is hosting our servers, the green button API that allows us to query electric companies for information, and the MYSQL database that maintains all of the data.

## 2.1 Green Button Data

Green Button data is electricity consumption information which can be downloaded from the electricity companies in an extensive markup language (XML) or comma separated value (CSV) format. Since the energy consumption information is available to us in hourly increments, we are able to precisely analyze the data.

## 2.2 Green Button API

Green Button API is an application programmer interface that our program interacts with to pull relevant electricity consumption information from the electric companies without requiring additional user interaction. By having this service available to us, the user can retrieve all of his information by pressing one button which allows our system to query and present this information back in a visual fashion. Otherwise, the user would first have to visit the electric company's website and download his/her green button data before he reuploads into our system.

## 2.3 MySQL Database

MySQL database is a data repository that will be used to store and serve electricity consumption data. After CurrentSee receives Green Button Data, the data will be parsed and only energy consumption information will be stored in our database. Additionally, when CurrentSee needs to produce a visual representation, CurrentSee's engine will send a request to the MySQL server for the user's consumption information and then use this information to produce the visuals.

## 2.4 Python-Django

Python-Django is a collaboration between the programming language, Python, and the web framework Django that is built on top of Python. Django-Python is designed to facilitate web development.

Python is analogous to glue in that it serves to merge our functionalities with Django's web framework so that they may work together. Additionally, the functional logic of the software and connection between technologies will be programmed in Python.

Django is a web framework that is structured to facilitate the development of web services. Django has its own directory structure and functions that our group will work with in order to get CurrentSee into service.

### 2.5 Amazon Web Services

"Amazon Web Services offers a complete set of infrastructure and application services that enable you to run virtually everything in the cloud: from enterprise applications and big data projects to social games and mobile apps.[Amazon]" Included in this set of tools is web server hosting. Web server hosting allows us to incorporate a third party to maintain the physical servers. However, our group still has the ability to remotely access and configure the web server to our needs.

CurrentSee's web service will be hosted by Amazon's Web Services. On top of AWS, our server will be a Linux instance with the Python-Django web service running on top. The MySQL server will also run on that server.

# 3. Design Specifications

## 3.1. High Level Overview

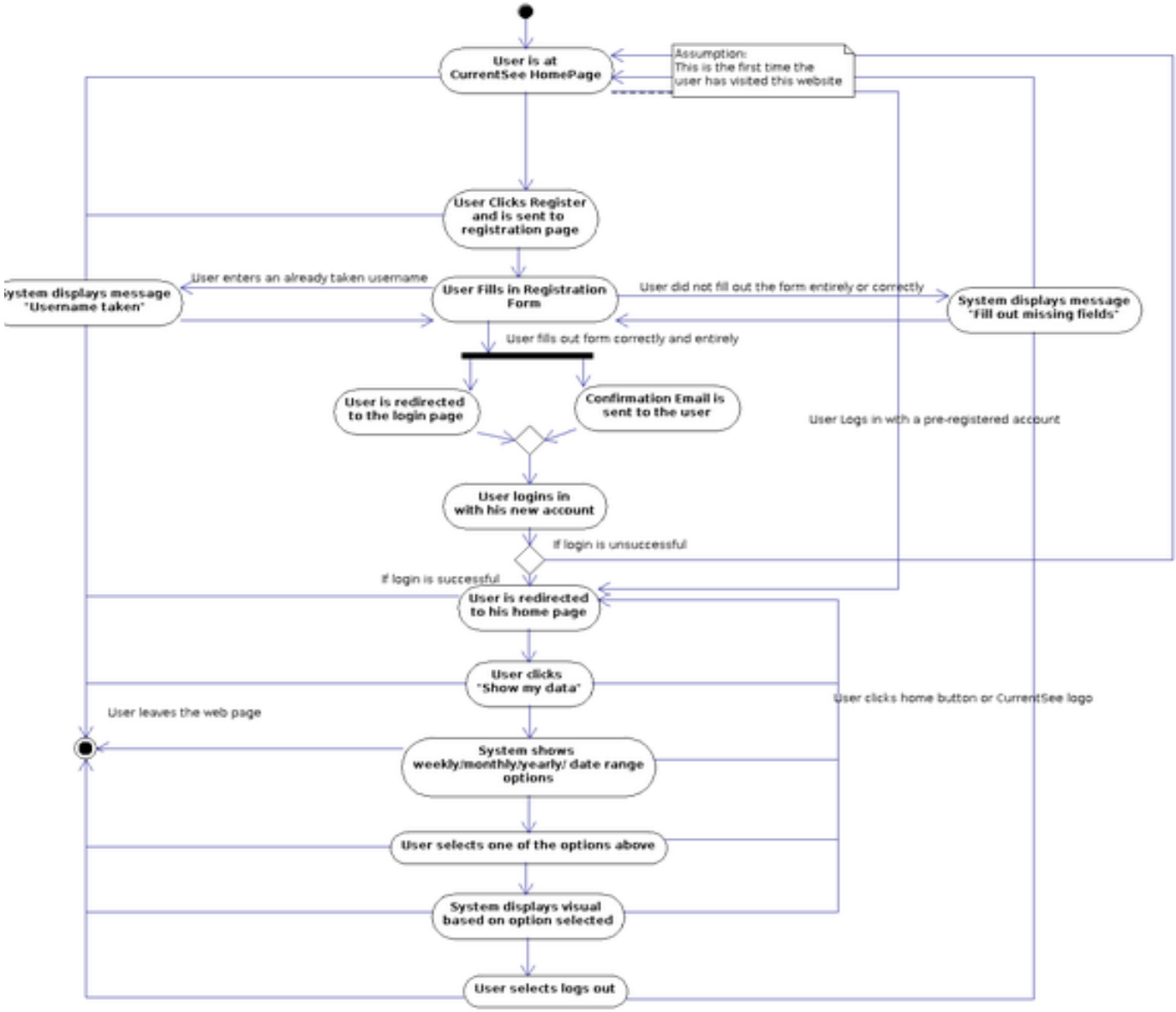



***Figure 1.*** *The figure above shows a high level expected interaction between the user and CurrentSee web service. The user is expected to visit our website and interact with his data which may in be presented in different graphical formats. If the user does not already have a CurrentSee account, they may register one upon visit. At any point in the users visit, the user may exit the service by leaving the web page. Additionally, the user may be redirected to the home page by pressing home, the CurrentSee logo, or logging out.*

### 3.2. Account Creation and Log in

First time users must begin by:

- Registering with our website
- Acknowledge registration confirmation via email

After registration completion the user must be able to access their account by logging in with their username, or email, and password.

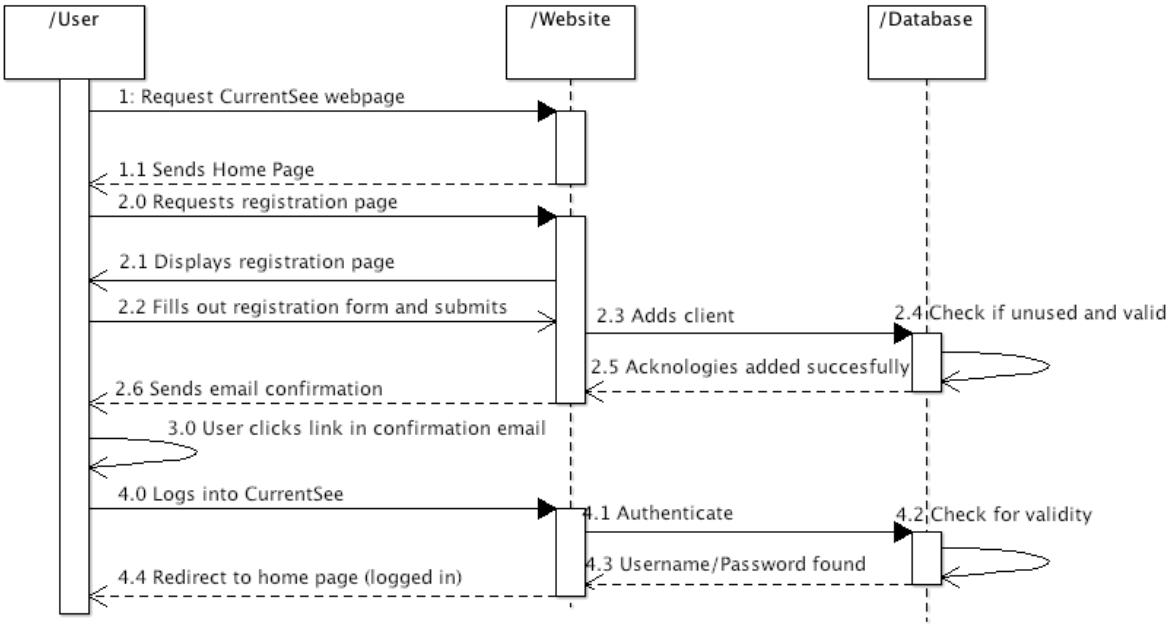



***Figure 2.*** *The figure above is the sequence diagram for a successful user account creation. The summary of the diagram is that the user will first fill out the registration form. Then, the user will confirm the email that CurrentSee has sent to him. Finally, the user will have access to CurrentSee's web service.*

#### 3.2.1 Successful Account Creation

Account creation is successful if the user completes all form fields and satisfies the following requirements: username and password meets minimum length, the username and email entered is valid and unique, and the power company is defined; then upon clicking submit, CurrentSee will then send a confirmation email to the user's specified email address. Once the user

validates his email by visiting the link provided in the email, the account will be created.

### 3.2.2 Failed Account Creation

Account Creations fails if the form is not completely filled out, the username or password does not meet the minimum length requirements, the email is incorrectly formatted, the username or email is not unique, the power company field is not valid, or the user leaves the page. At this point, CurrentSee will display a message requesting that the user correct the errors and resend his application.

### 3.2.3 Successful Log in

Login is successful if the user inputs a correct username-password or email-password combination that has been pre-registered and exists in the database. CurrentSee will then redirect the user to his energy profile.

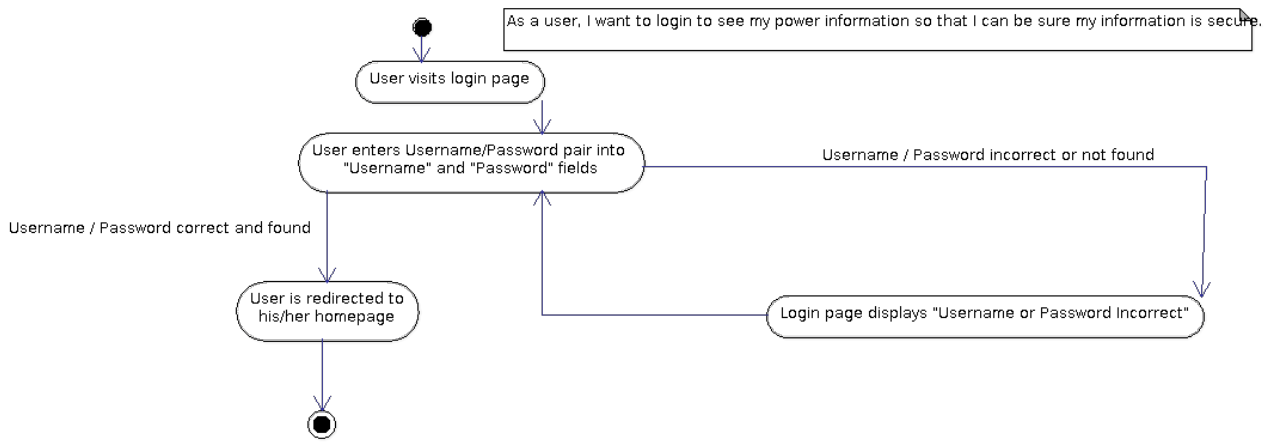



***Figure 3.*** *The figure above shows the activity diagram for login.*

### 3.2.4 Unsuccessful Log in

If the user enters an incorrect username-password pair, then the system will display the "Username or Password Incorrect" error message. Otherwise, the user will be redirected to his home page.

## 3.3 Client-Power Company Registration

In order for any data retrieval regarding the client's power-consumption, the client must allow access to their power profile through CurrentSee.

Issue: Security issues regarding one's power information.Solution: Only grant access to database for super users and admins. Prevent XSS or SQL injections through sanitization fields.

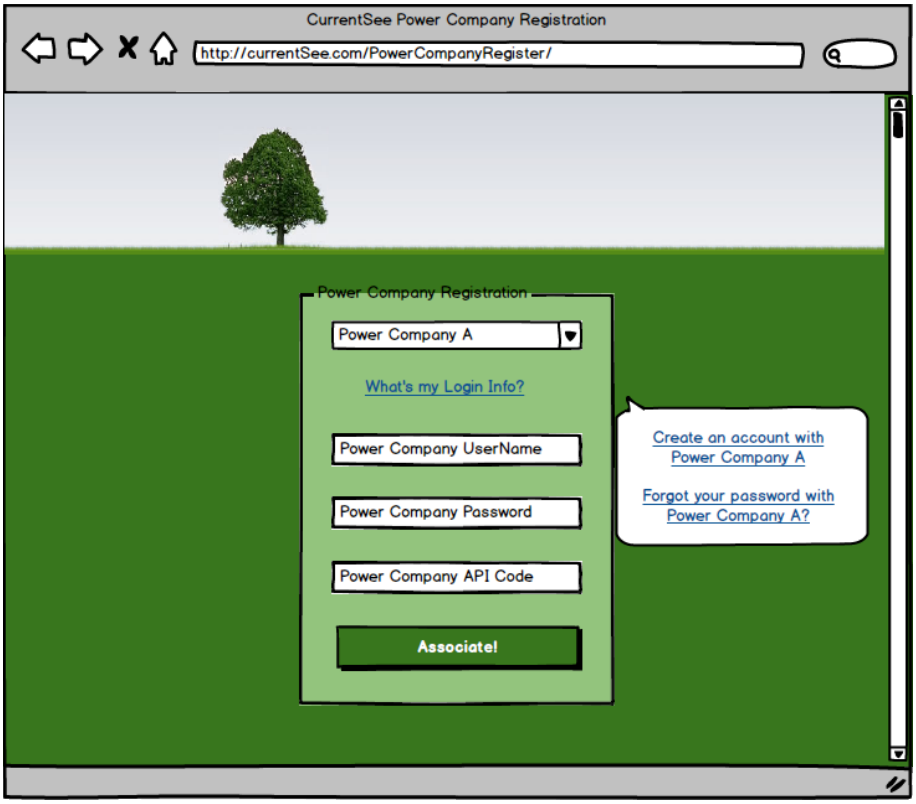



***Figure 4.*** *The figure above is the UI Mockup for the power company registration page.*

### 3.3.1 Successful Client-Power Company Registration

Client-Power Company Registration will successfully complete if all the following requirements are met:

- Filled in all corresponding fields
- Registered a secondary account with the power company directly
- Input Client-power company account information correctly
- Input corresponding API code

Once all requirements are fulfilled the client will be redirected to his home profile page.

### 3.3.2 Unsuccessful Client-Power Company Registration

Client-Power Company Registration will be unsuccessful if:

- All form Fields are not filled out
- All or one of the form fields are filled out incorrectly

If the client doesn't fill out the form correctly then he will be prompted "Field information does not match" for cases of incorrectness, and prompted "Fill out missing field" for cases of empty fields.

### 3.4 User wants to view his Electricity Consumption Graphs

Given:

- The user has successfully logged in
- The user is allowed to use our web service

#### 3.4.1. User Navigating Different Graphical Representations

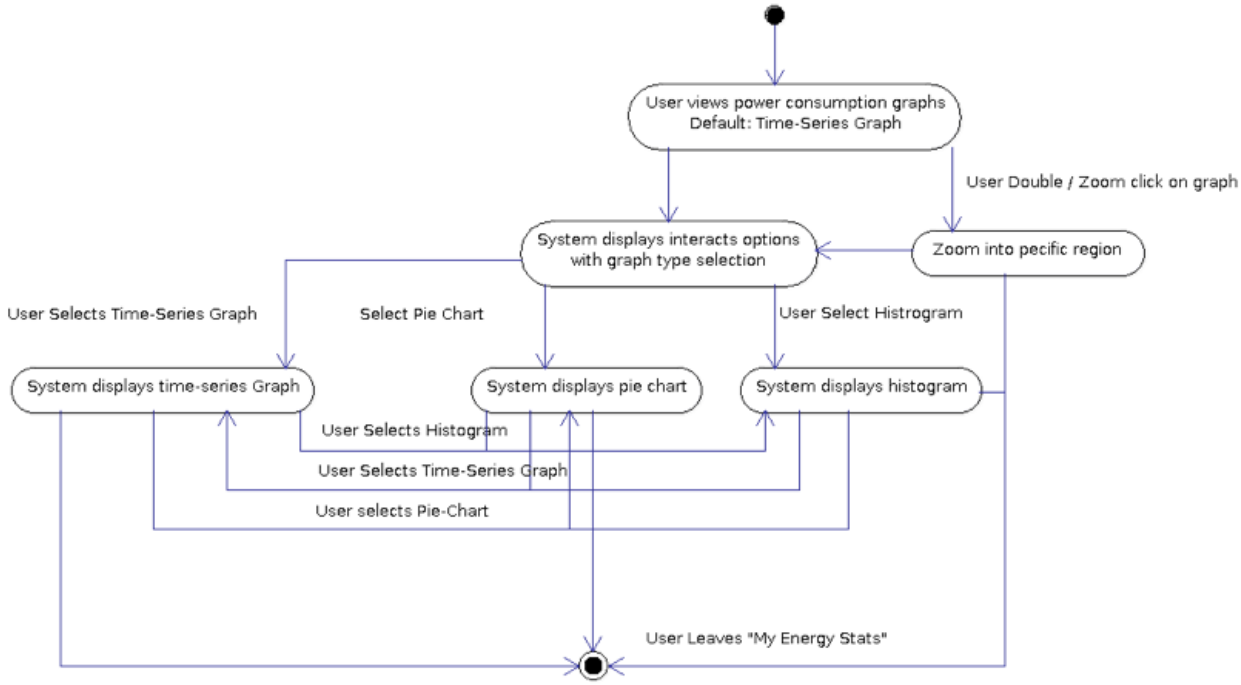



***Figure 5.*** *This is the activity diagram for a user interaction with the graphs that are seen in the "My Energy Stats" page. The user can see his electricity consumption in three formats: time-series graph, pie chart, and histogram.*

There are three graphical representations available. They are time-series, pie chart, and histogram. The user can navigate through these options by selecting the appropriate options. The user can also zoom in by double clicking a region.

### 3.4.2 User wants to view his Peak Information

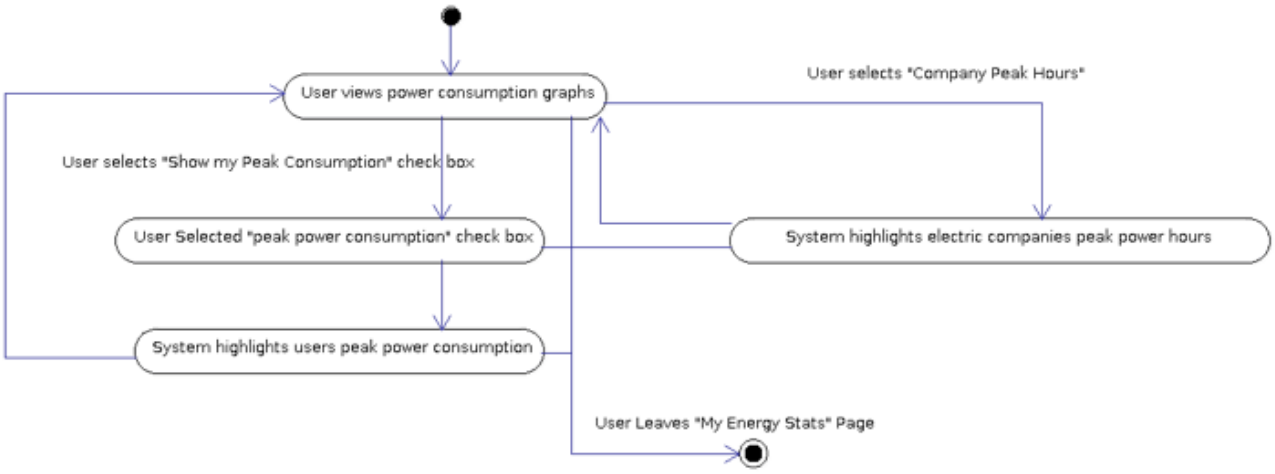



***Figure 6.*** *This is the activity diagram for a user's interaction with the "My Energy Stats" view regarding highlighting peak consumptions and company peak hours.*

CurrentSee may highlight two important aspects for the user. These aspects are the company's peak hour ranges and the user's peak consumption hours. The graphical interface will have check boxes which will allow the user to activate and deactivate these options on demand.

### 3.4.3 User navigates between Daily, Weekly, Monthly, Yearly, and custom view

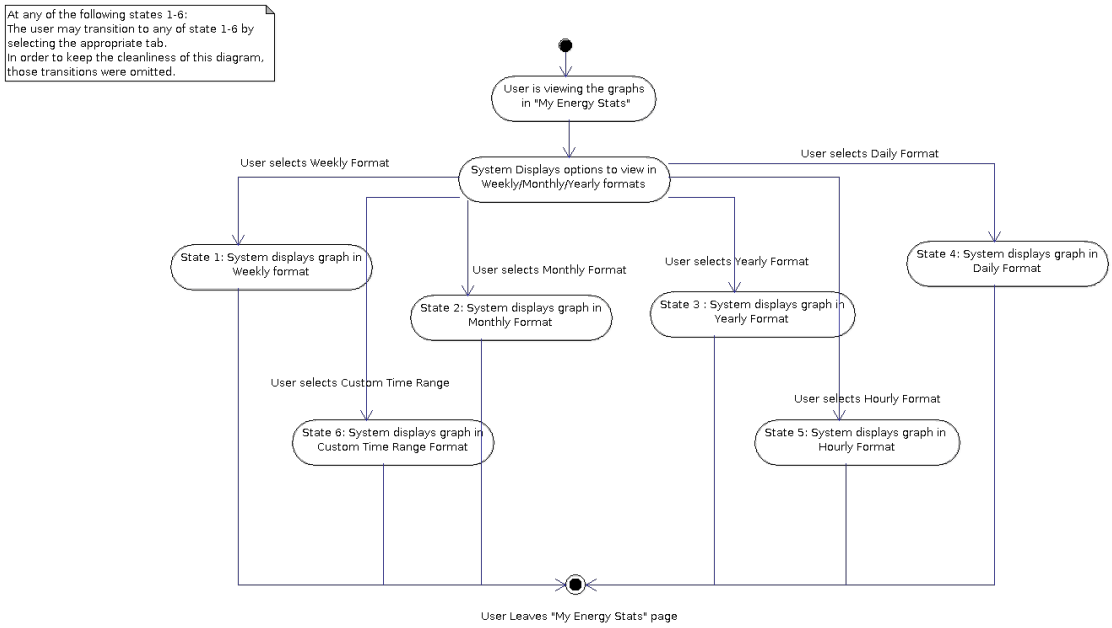



***Figure 7.*** *This is the activity diagram for a user's interaction with "My Energy Stats" view regarding weekly, monthly, and yearly format of the energy data.*

The user has the choice of daily, weekly, monthly, yearly, and custom views. The user may easily navigate between these representations by selecting the appropriate tabs on top of the graph.

## 3.5 Data Retrieval

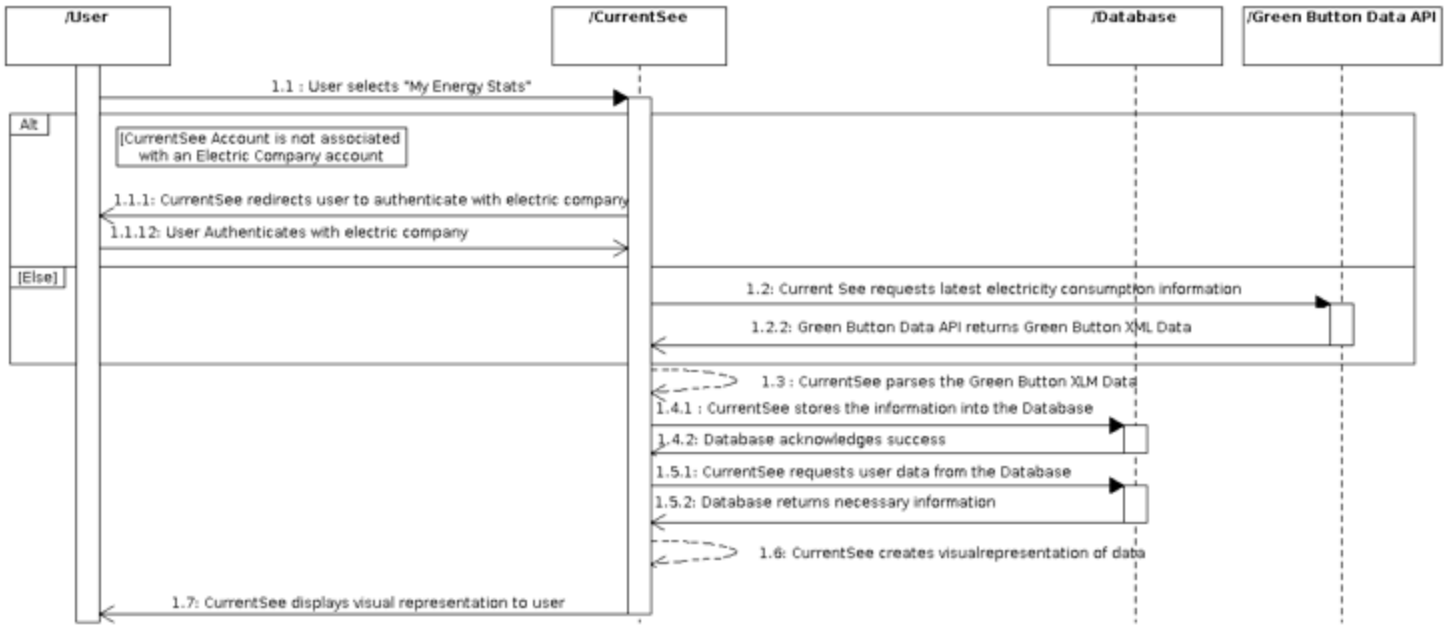



***Figure 8.*** *The figure above shows is Data retrieval sequence diagram. This series of event will occur whenever the user wants to see his latest data. There are two contingencies in this sequence of events. The first being that the user does not have an electric company account associated with CurrentSee and the second being that the user does have an electric company account. If there is no account associated, then the system will redirect the user to a webpage where he may authenticate with his electric company. Otherwise, the system will make an API call to Green Button API and store the data into the database after parsing.*

### 3.5.1 User has an Electric Company Account Associated with CurrentSee

If there is an electric company account associated with the users CurrentSee account, then the rest of the sequence will occur as normal.

### 3.5.2 User does not have an Electric Company Account Associated with CurrentSee

If there is no electric company account associated with the users CurrentSee account, the user will be redirected to a webpage where they may authenticate with their electric company before the rest of the sequences may continue.

### 3.5.3 Error occurs during Parsing, Storing, or Retrieval

If an error occurs when the system is parsing the Green Button XML Data, storing relevant data into the MySQL database, or retrieval electricity consumption information from the Green Button API, then the system will log the appropriate error message. Additionally, the user will be kindly notified and redirected to his home page.

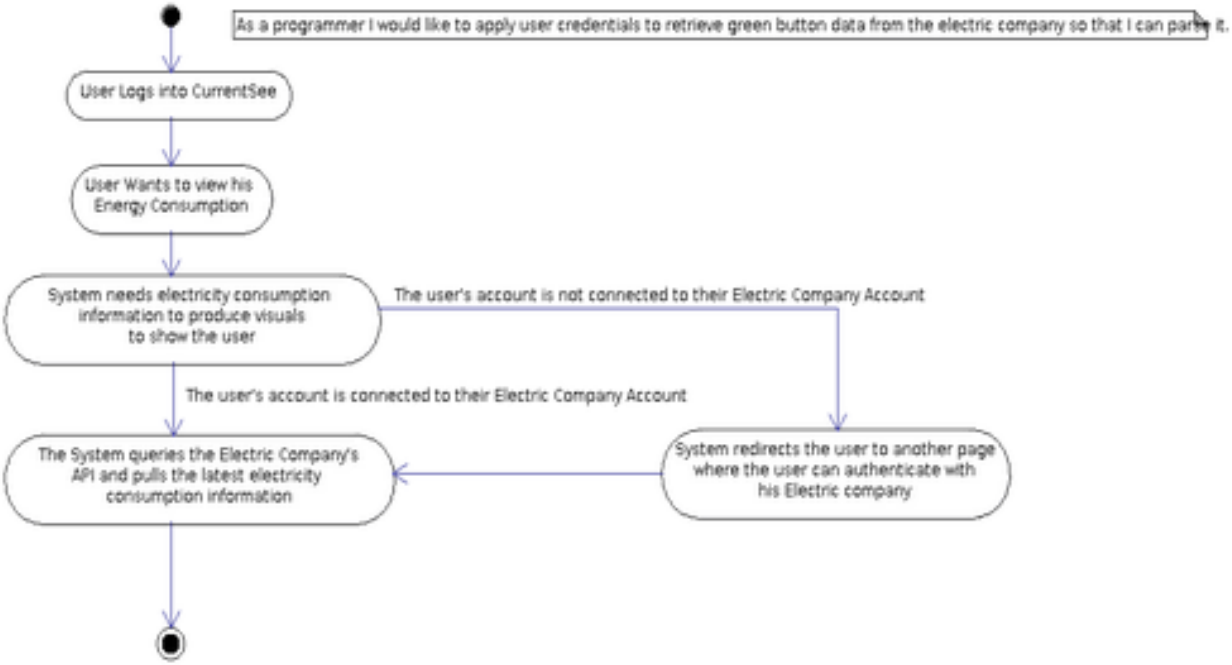
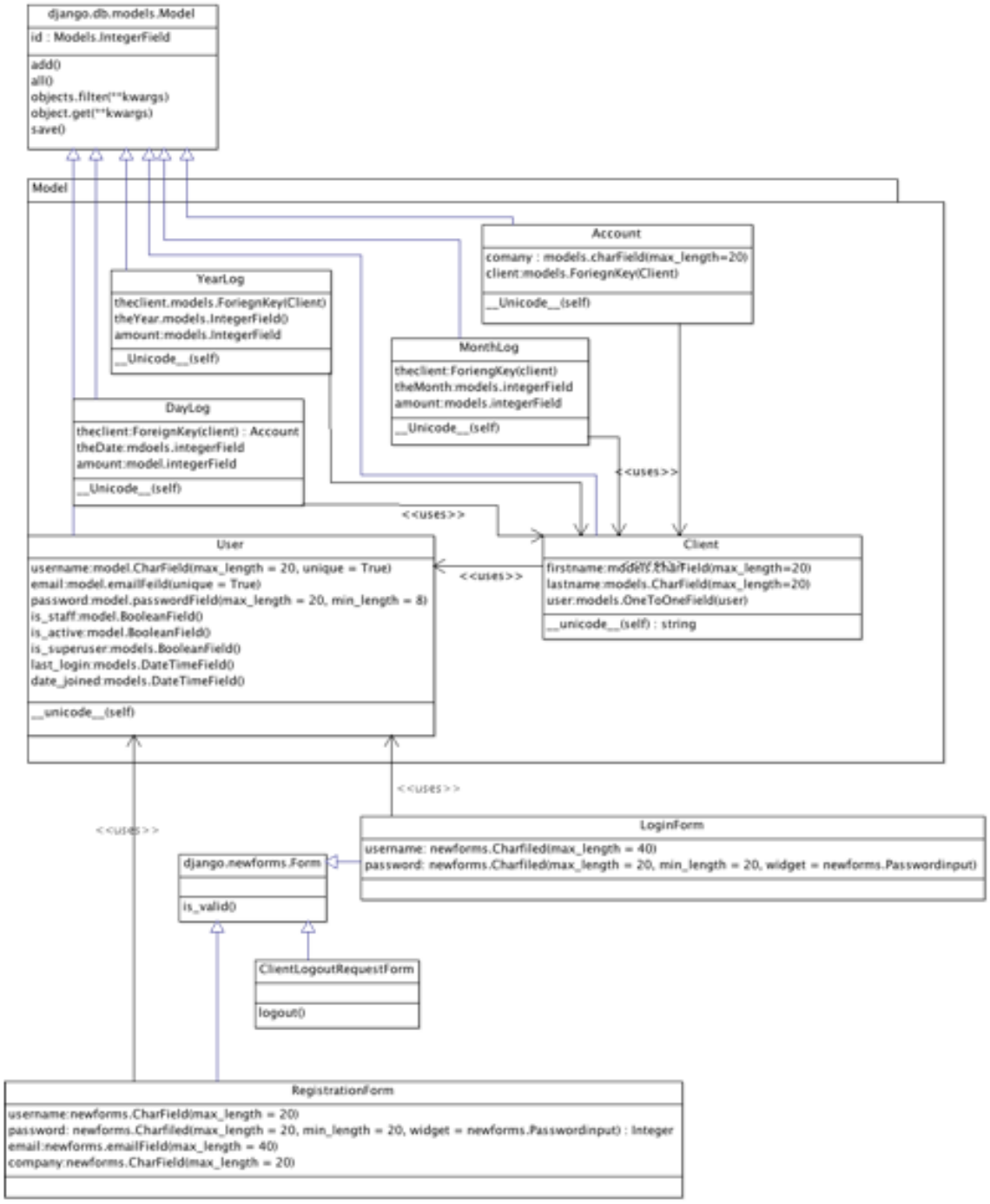



***Figure 9.*** *The figure above shows the background activity diagram for a user who wishes to view his electric consumption visual representation. The system will do an API call to the electric company for the latest data. If no electric company account is associated, the user will be redirected to another web page where he/she may authenticate with the electric company.*

# 4. Class Diagram




*The figure above is the class diagram. The class diagram depicts the classes that structure our system.*

# 5. UI Mockups

This section will provide the various user interfaces that a typical user will expect to encounter on our web page. Included in this section is the login screen, registration screen, client-power company registration screen, home page, energy stats page, my alerts page, and about us page.

### MU.1 Login Page

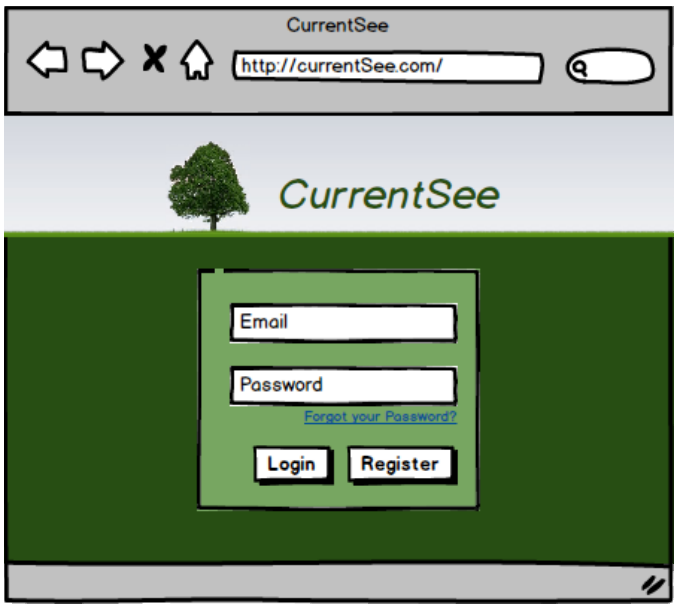



***Figure MU.1*** *The figure above shows CurrentSee's homepage. Users will be directed here upon visiting this website, logging out, or pressing the home or CurrentSee logo. The "Forgot your password?" link can be used in conjunction with the email field to send a password reset email to the associated account. The "Register" button sends the user to the MU.2 Registration Page.*

## MU.2 Registration Page

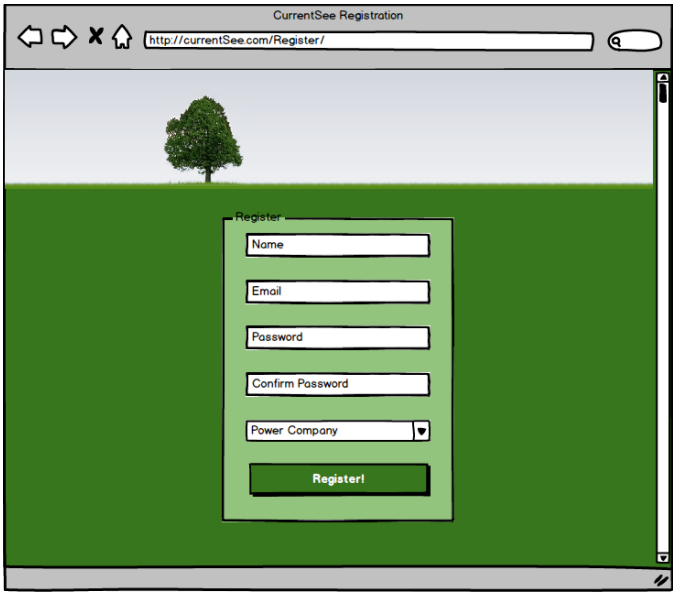



***Figure MU.2*** *The figure above shows the registration screen where users can register for new CurrentSee accounts. This is the account with which users will log in to the CurrentSee website.*

## MU.3 Client-Power Company Registration Page

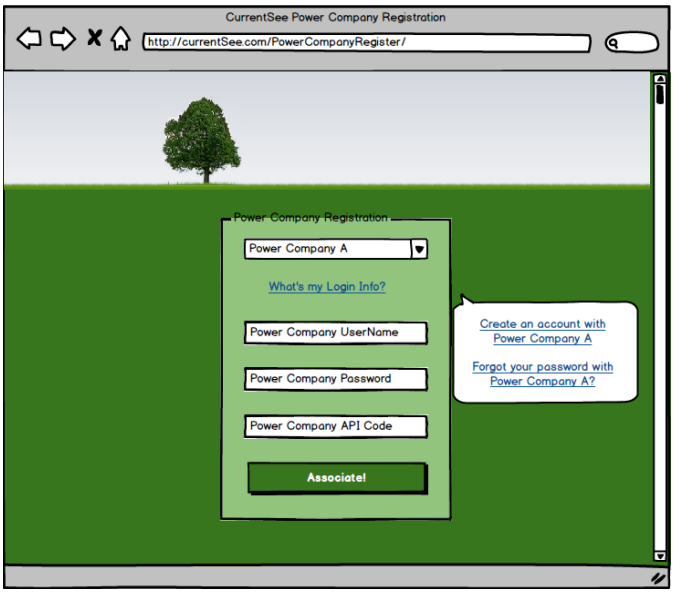



***Figure MU.3*** *The figure above shows the page where users will specify their electric company and link their CurrentSee and Electric Company Accounts together.*

Specific power companies require an account through them directly in order for data to be sent to us

through Green button. After the client registers through their respective power company, they can gain access to their energy profile through us.

Fields that must be filled in are as follows

- Power Company Username - Username of the account you set up with the power company
- Power Company Password - A corresponding password to the Username
- API Code - This code allows access to CurrentSee to receive users data

### MU.4 CurrentSee Client Profile Homepage

Once the client is:

1. Registered with CurrentSee
2. Logged in
3. Registered their client-power company profile with CurrentSee

Then he/she will be directed to a default Weekly Usage page.

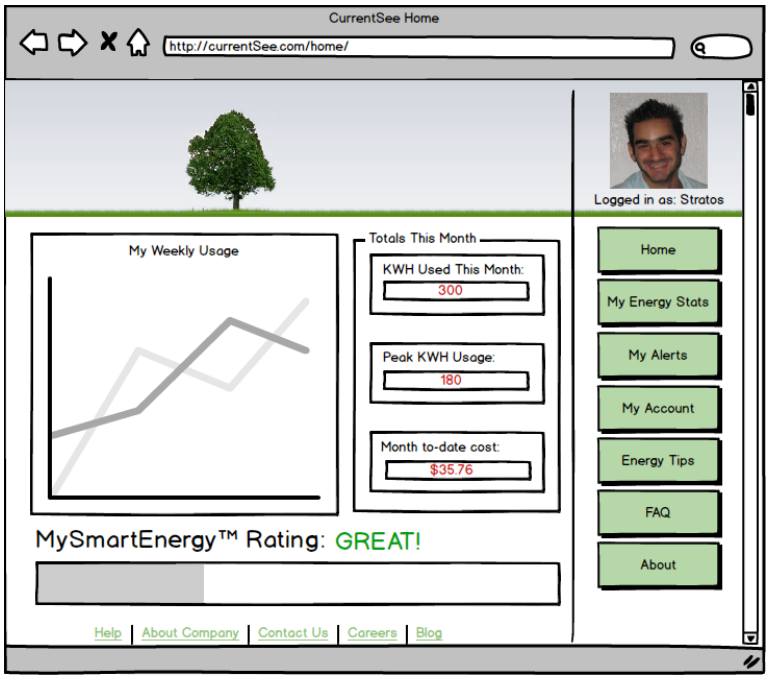



***Figure MU.4*** *The figure above is the user's homepage that he is redirected to when he successfully logs in. A high level overview of the user's power usage is presented.*

### MU.5 Navigation Bar

The navigation bar consists of seven different tabs:

1. Home
2. My Energy Stats
3. My Alerts
4. My Account
5. Energy Tips
6. FAQ
7. About

All of which take the user to the corresponding page. As shown above, Home tab redirects to Home profile page, see Figure MU.4.

**Note:** If at any point during navigation the page does not show up or have issues loading the user will be taken to a contact us page about the problem.

### MU.6 My Energy Stats Page

Through this tab the client may view his energy consumption through different means:

1. View clients energy consumption for the last 15 days in an hourly graph
2. View clients energy consumption for the past year in a daily graph
3. View clients energy consumption for past years in a yearly graph
4. View clients energy consumption in comparison to his/her neighborhood
5. View clients energy consumption and peak hours during that time interval
6. View clients energy consumption for the last pay period

All of which refer to the tabs/checkboxes within the body of the page, refer to figure MU.5.

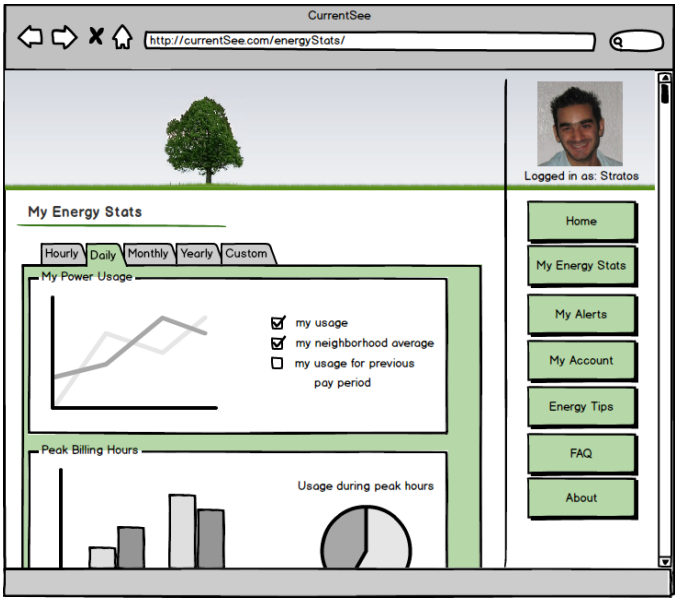



***Figure MU.6*** *The figure above is the "My Energy Stats" page. This page displays the user's electrical data in various graphical formats.*

## MU.7 My Alerts Page

Through this tab the user will be able to set power alerts via choice of mail i.e. text message or email. These Alerts may consist of custom settings that the client specifies. Notes and tips are displayed when the client visits the page for easy understanding and setup.

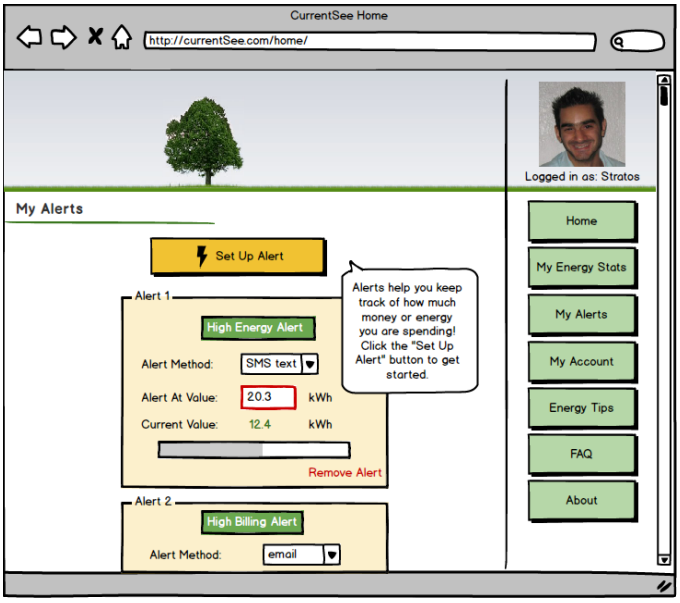


***Figure MU.7*** *The figure above is the "My Alerts" page which allows the user to view already set up alerts.*

## MU.8 My Alerts Page (new alert)

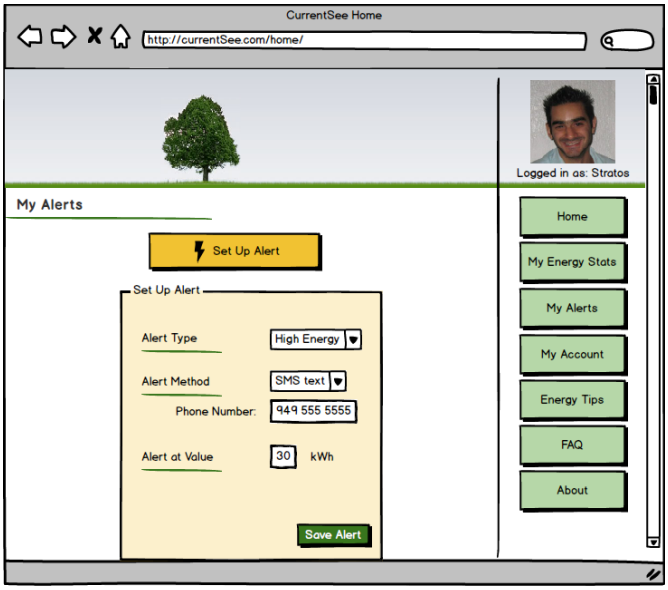



***Figure MU.8*** *The figure above is a variant of the "My Alerts" page seen after clicking the "Set Up Alert" button. Upon scrolling down, the normally-visible previously set up alerts can be seen below the new "Set Up Alert" dialog. Upon clicking "Save Alert," the "Set Up Alert" dialog is closed and a new corresponding alert is added to the list of alerts shown on the "My Alerts" page.*

## MU.9 Energy Tips Page

Through this tab the user will have the option to view some tips and tricks in order to reduce the amount of power they are using to reduce their electric bill.

***Figure MU.9*** *The figure above is the "Energy Tip Page." This page presents useful advice for users to be more efficient with their energy consumption.*

## MU.10 About Page

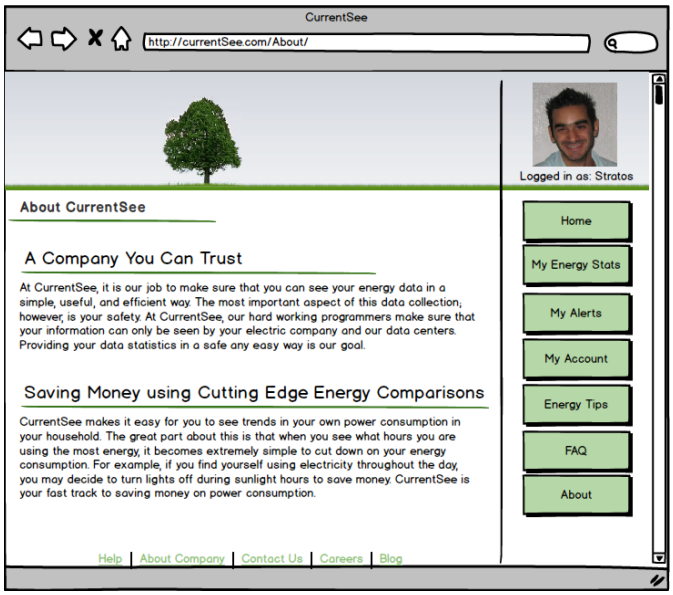



***Figure MU.10*** *The figure above is the "About Us" page. This page gives a brief overview of*

*the CurrentSee software and our goals.*

## MU.11 My Account Page

***Figure MU.11*** *The figure above is the "My Account" page. This page allows you to edit details about your account, providing a means for you to upload a user photo and associate with a power company (via the "register with another company" button)*

## MU.12 Frequently Asked Question Page

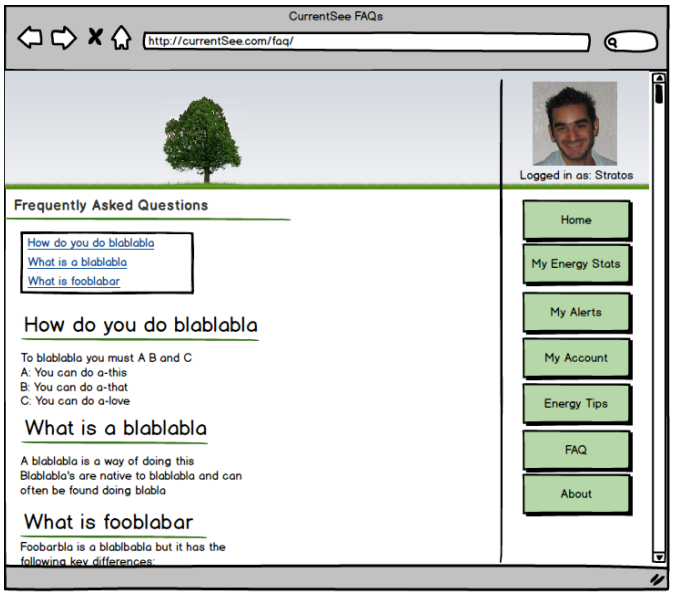



***Figure MU.12*** *The figure above is the "Frequently Asked Question" page. This page contains*

*a series of hypothetical questions a user of our application might have along with answers to said questions.*

# Glossary

| | |
|---|---|
| API | Application Programming Interface |
| Django | Web application framework which follows model-view-controller architecture |
| MySQL | My Structured Query Language |
| Python | General-purpose high-level programming language |