Smart Garden

Design Specifications

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ABSTRACT

In this document, the design specifications for the Resilient Smart Gardens are outlined. The document explores three major design aspects of the system: behavior, architecture, and prototypes.

In the behavior aspect we examine the most critical features of the system the ability to access and view up to date information as well as change the moisture level. In the architecture aspect, a site map is used to detail the layout of the website in order to show the available features. In the prototype aspect, the vertical prototype demonstrates the process of a user adding a new account through the Android App, whereas the horizontal prototype demonstrates the user interface and layout of the website.

BEHAVIOR SPECIFICATION

The behavior of the system is shown using four swim lanes each of which represent a different component of the system.

- User: The user "lane" is all the actions the user will have to perform in order to successfully use the feature.

- Website: The website is the interface the user will be interacting with. The website will be the medium in which the user will interact with the database in order to view relevant information to the user.

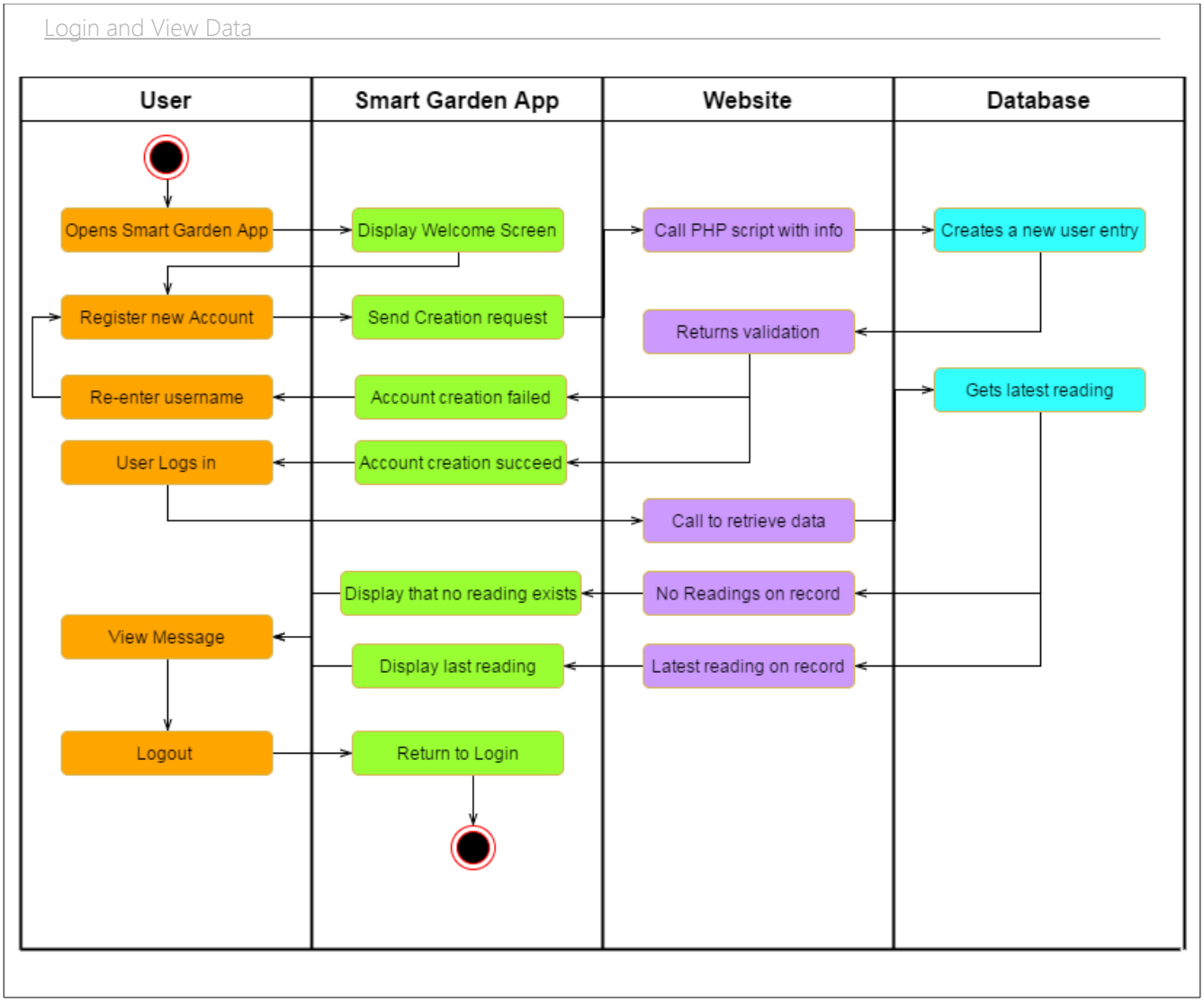
- Database: the database will be the medium used between the Raspberry Pi and the website. the database will be kept up to date with user input as well as data being sent from the Pi.

- Raspberry Pi and Sensors: the Raspberry Pi and sensors will be gathering information and data about the garden. This information includes moisture level, temperature, water usage and humidity. The information will be sent to the database twice per day at a user selected time.

- Smart Garden App: The Smart Garden Android app will be the way in which a user can create an account, find a shortcut to the user manual and login to view the gardens current environment, view a history of the garden, and change the garden's watering time,moisture level and watering amount.

The Raspberry Pi B+

BEHAVIOR SPECIFICATION (ACTIVITY DIAGRAMS)

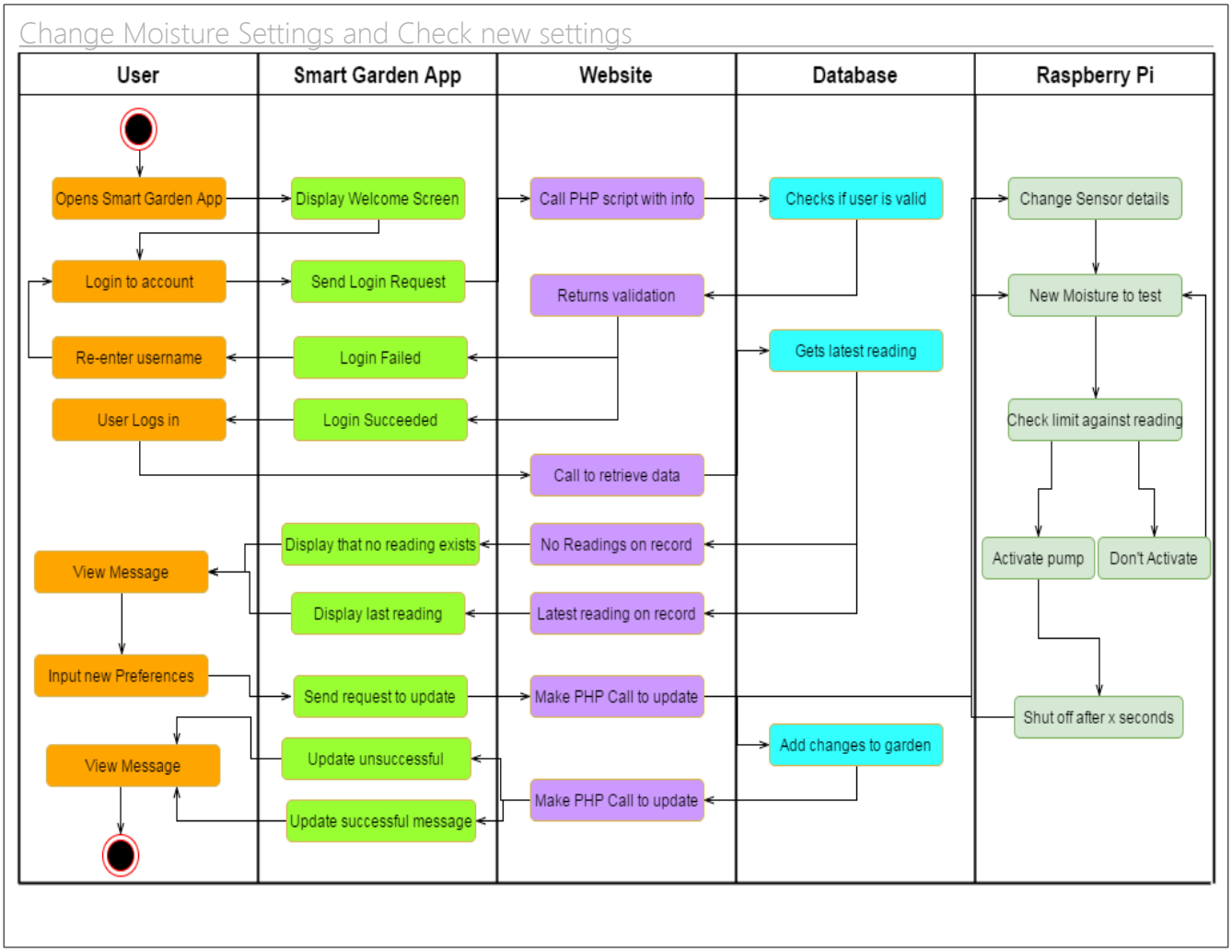


In order for the user to use the system, they will first need to download the Smart Garden app. After the user submits their login information, the website will send the credentials to the database in order to check the validity of the information. If the user exists and the information is valid, the request will either be valid or invalid.

If the request is declared invalid, the App will then reload display that there was an error with account creation, most likely a duplicate username.

If the login is declared valid, then the main page with the user information is loaded.

BEHAVIOR SPECIFICATION (ACTIVITY DIAGRAMS)



If the user chooses to change the moisture level of the current limit, the user must first successfully login to the website or Smart Garden App. The user is then sent to the welcome page upon logging in. The user will be shown current readings data corresponding to their garden and there will be an editable input field with the current soil moisture level shown. The user will then click on the input field to edit the moisture level of the soil and then click on "Update preferences". If the moisture level entered is invalid, the page will refresh with an error stating "invalid moisture level" above the input field.

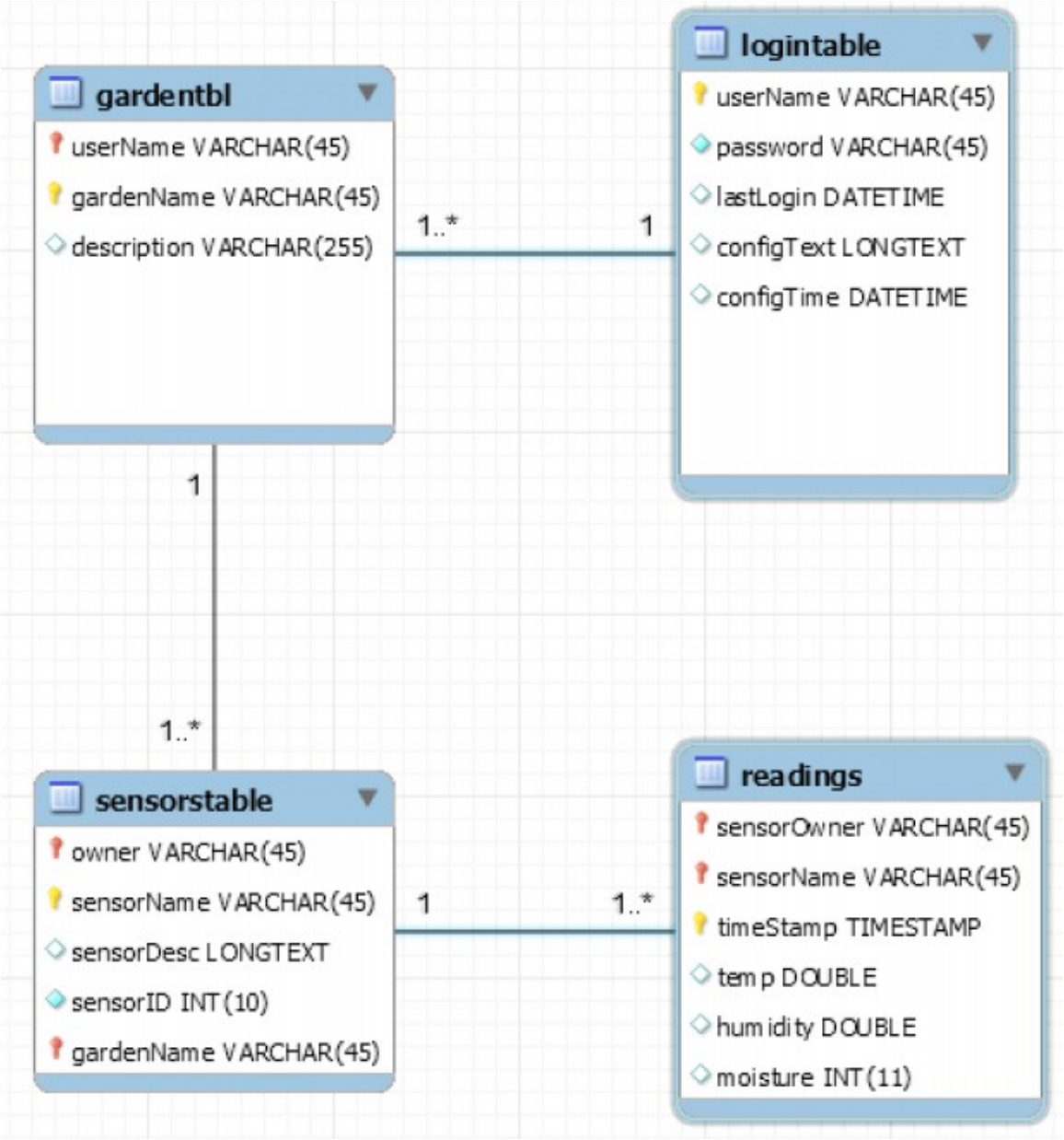
The Raspberry Pi checks the current soil moisture and if it is below the currently selected limit, then the pump will activate and water for the set amount of time.

ARCHITECTURE SPECIFICATION (CLASS DIAGRAM)

The architecture specification is used to outline the foundation of the Smart Garden system prior to actual implementation. This includes the planning of object oriented design patterns and determining interactions between server, board, and database communication.

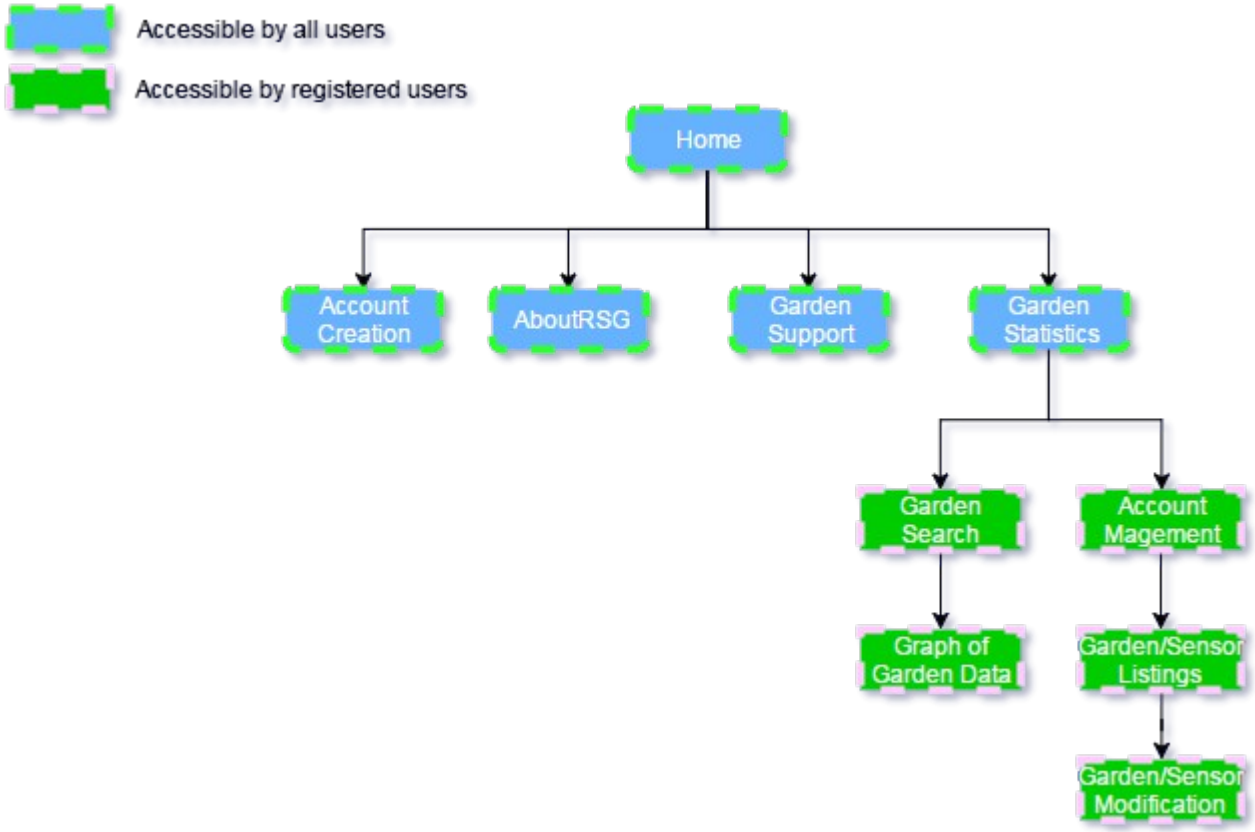
CLASS DIAGRAM

The following diagram represents the classes used to represent the Smart Garden system and the relationships between each class.



ARCHITECTURE SPECIFICATION (SITE MAP)

The layout and design of the Smart Garden website is outlined in the figure below. The pages that are highlighted in green are only accessible by registered users.



All users start from the **Home** page. From the home page, public users are able to access the following pages: **Account Creation**, **AboutRSG**, **Garden Support**, and **Garden Statistics**.

Account Creation — The user is taken to a form where they must enter their personal information. The information is then verified and stored in the database, allowing the user to continue as a registered user.

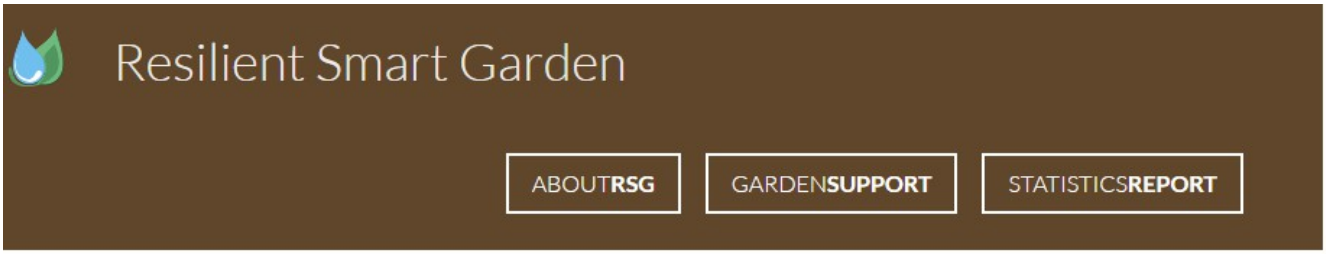
AboutRSG— A page describing the Smart Garden System, it's goals, methods of implementation, hardware summaries, and overall mission statement.

Garden Support— A page that will help new users with a complete shopping list of all hardware components and a full list of free software including the Smart Garden App. Also a step by step instructional to go from store to garden.

Garden Statistics — The section of the website that will mirror the functionality of the Smart Garden App with data visualization and account management.

PROTOTYPES (HORIZONTAL PROTOTYPE)

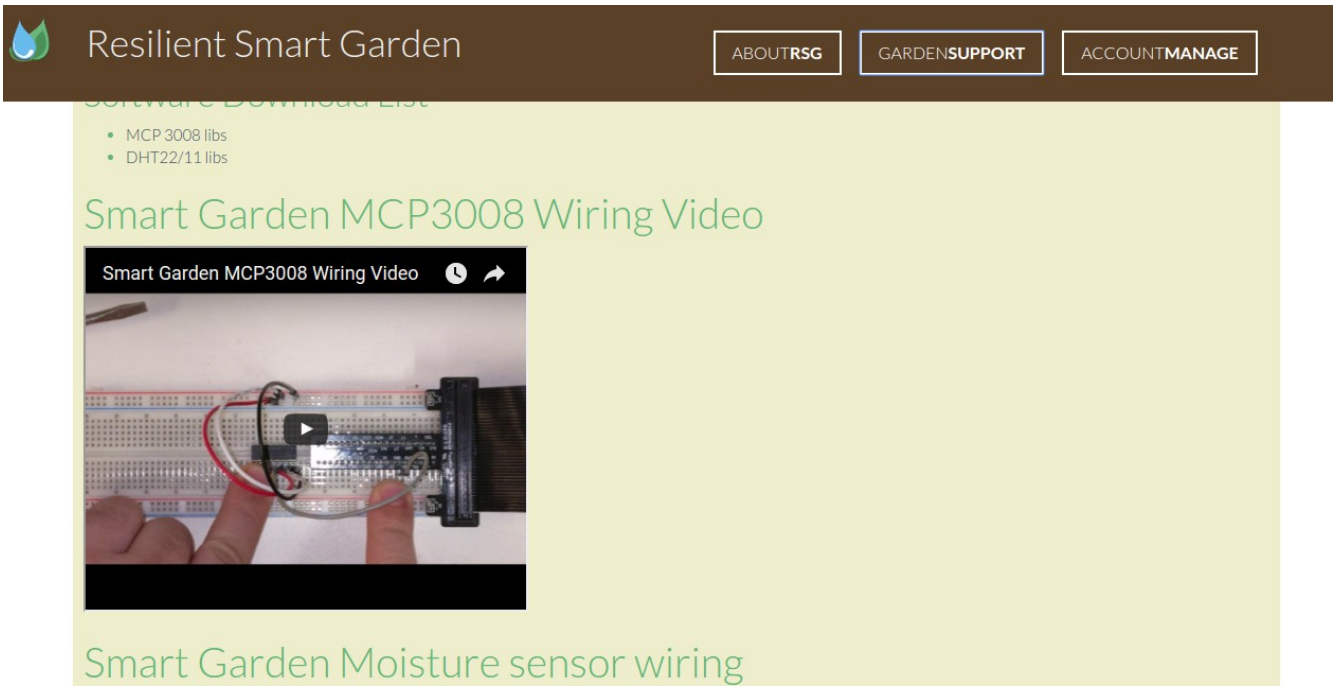
PUBLIC USER VIEW



This page shows the homepage of the Smart Garden website. The top of the page includes a navigation bar in which the user can access different sections of the website illustrated previously in the site map.

PROTOTYPES (HORIZONTAL PROTOTYPE)

View of Instructional for new users

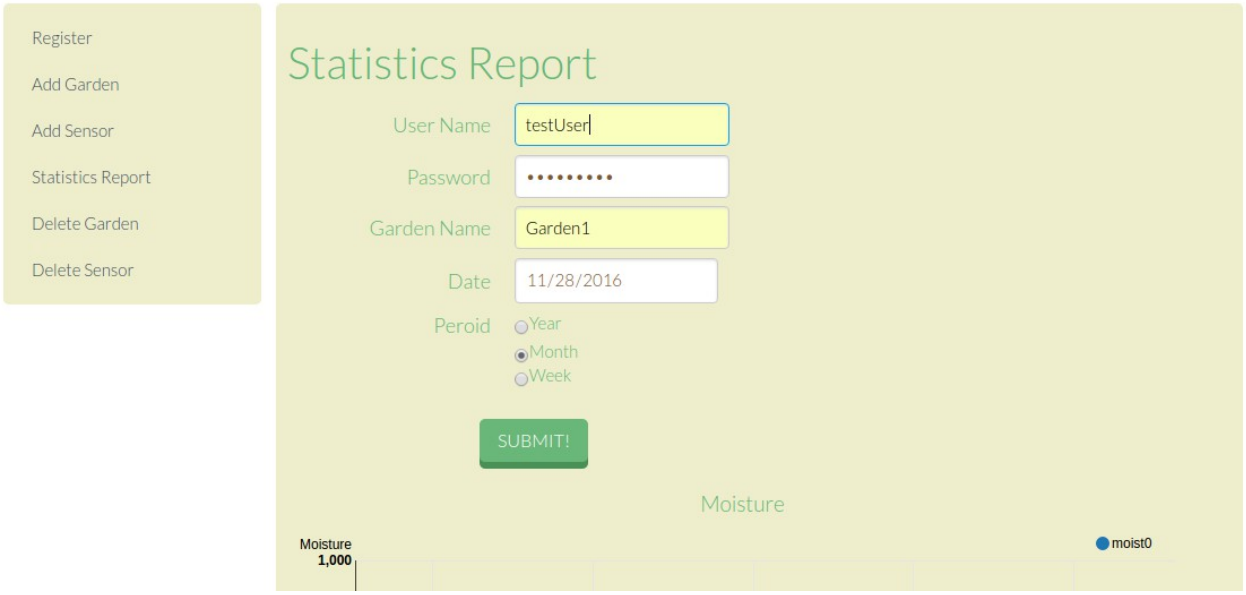


This page shows the full list of parts and where to find them, along with all the necessary software the user will need. This is also where the instructional is posted for the user to get started.

PROTOTYPES (VERTICAL PROTOTYPE)

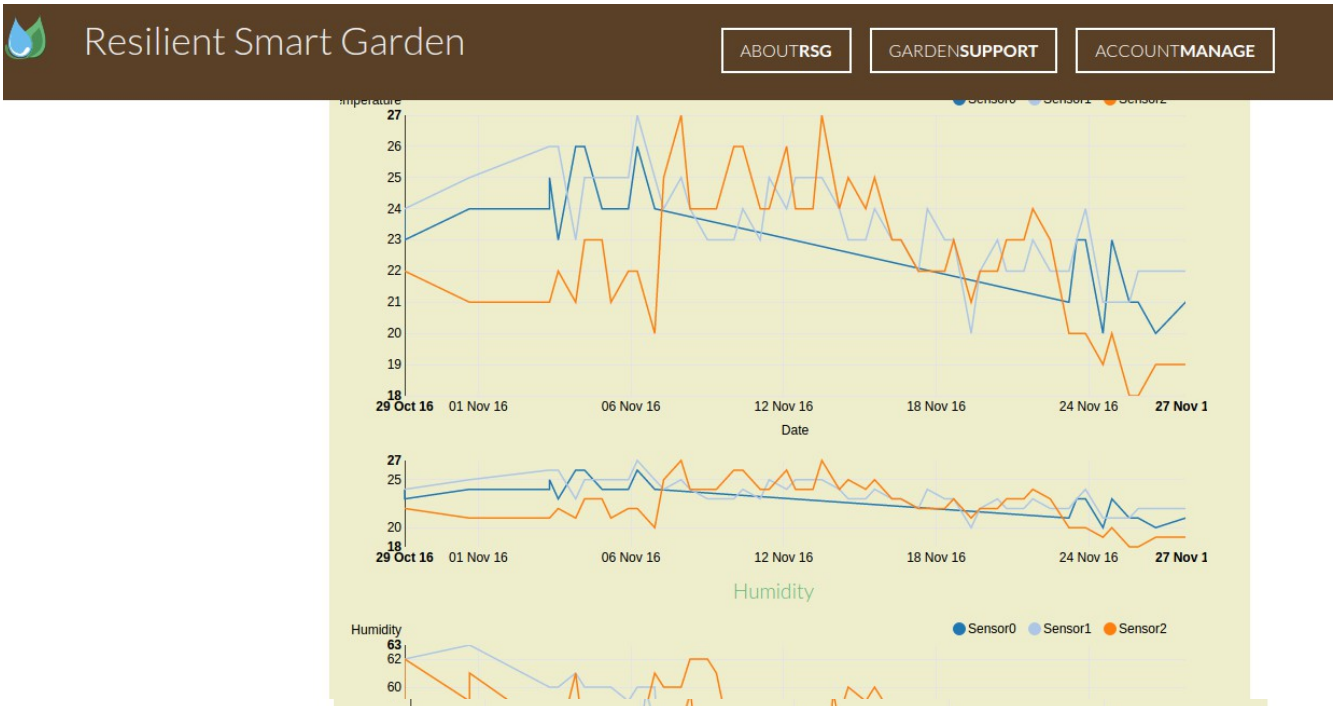
The following steps demonstrate the process behind searching and displaying Garden data.

The user must first register for the website to access their garden data.



The initial Statistics Report page prompts for a unique username and password as well as a Garden name and date to gather data from.
The credentials will then be checked against current users to see if username and password combination exists then will check if a garden entry exists for that user. An error message will be displayed depending on the error.

PROTOTYPES (VERTICAL PROTOTYPE)



Upon find the correct user and garden pair, the user will be taken to an updated Statistics report page with Garden data being displayed on a graph from the selected time in the selected interval. The graph displays Humidity, Temperature and Moisture.