PLANT BUDDY

System Design

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Objective

The goal of the Plant Buddy is an Arduino-based automatic plant maintenance system.

In essence, the Plant Buddy is a device that measures the moisture levels in the soil of a small indoor potted plant and releases a valve to water it based on the observed moisture level. The device will connect to the database and compare its moisture level to the desired moisture level, and make a decision about whether to water the plant or not. If the device cannot connect to Wi-Fi, it will simply water the plant based at a certain time interval. This value will be stored locally.

On top of this, the Plant Buddy system will also measure data such as temperature, sunlight levels, and humidity over time. It will keep track of this data about the plants as well as its own data in a database. This data will be used to determine when to water the plant as well as make suggestions to the user (for example, suggest the user to move the plant to an area with more sunlight if the detected sunlight levels are lower than the ideal sunlight levels needed for this specific plant type). The system will also be able to present the data back to the User, and make graphs to help visualize the data. These graphs will be available on a website that the user can log into.

CRC Cards

PlantBuddyApplication	
• Shows the UI • When My Plants is selected, show all of the users owned plants • When Statistics is selected, show all the history of the user's plants	• User • MyPlantsView • PlantStatistics View

User	
• Has a username • Has a password • Can change username or password once logged in • Knows plants that they own	• UserDatabase

MyPlantsView	
• Aggregate all of a user's plants to show a list of the users plants	• PlantObject • User

PlantObjectView	
• Displays plant information • Displays possible plant modifications	• PlantObject

PlantObject	
• Knows the type of plant • Knows the custom name of the plant • Knows historical progress of plant • Can have information modified • Can be manually watered	• PlantModifier • PlantStatistics View • User

PlantModifier	
• Changes the name of a specific user's plant • Can delete the plant • Can toggle the manual watering of plant	• PlantDatabase

PlantDatabase	
• Knows all plants of all users • Can have modification requests • Can remove items • Can communicate that a plant needs manual watering	• User

PlantStatisticsView	
• Displays a graph of historical data for all plants: temperature, moisture and humidity	• PlantObject • PlantStatistics Fetcher • User

PlantStatisticsFetcher	
• Gets from the database the data of a plant on past days	• PlantStatistics Database • User

PlantStatisticsDatabase	
• Knows data of a plant on past days	• PlantStatistics Database • User

UserDatabase	
• Knows usernames of users • Knows passwords of users	

OptimalPlantLevelsDatabase	
• Knows best humidity level for each plant type • Knows best moisture level for each plant type	

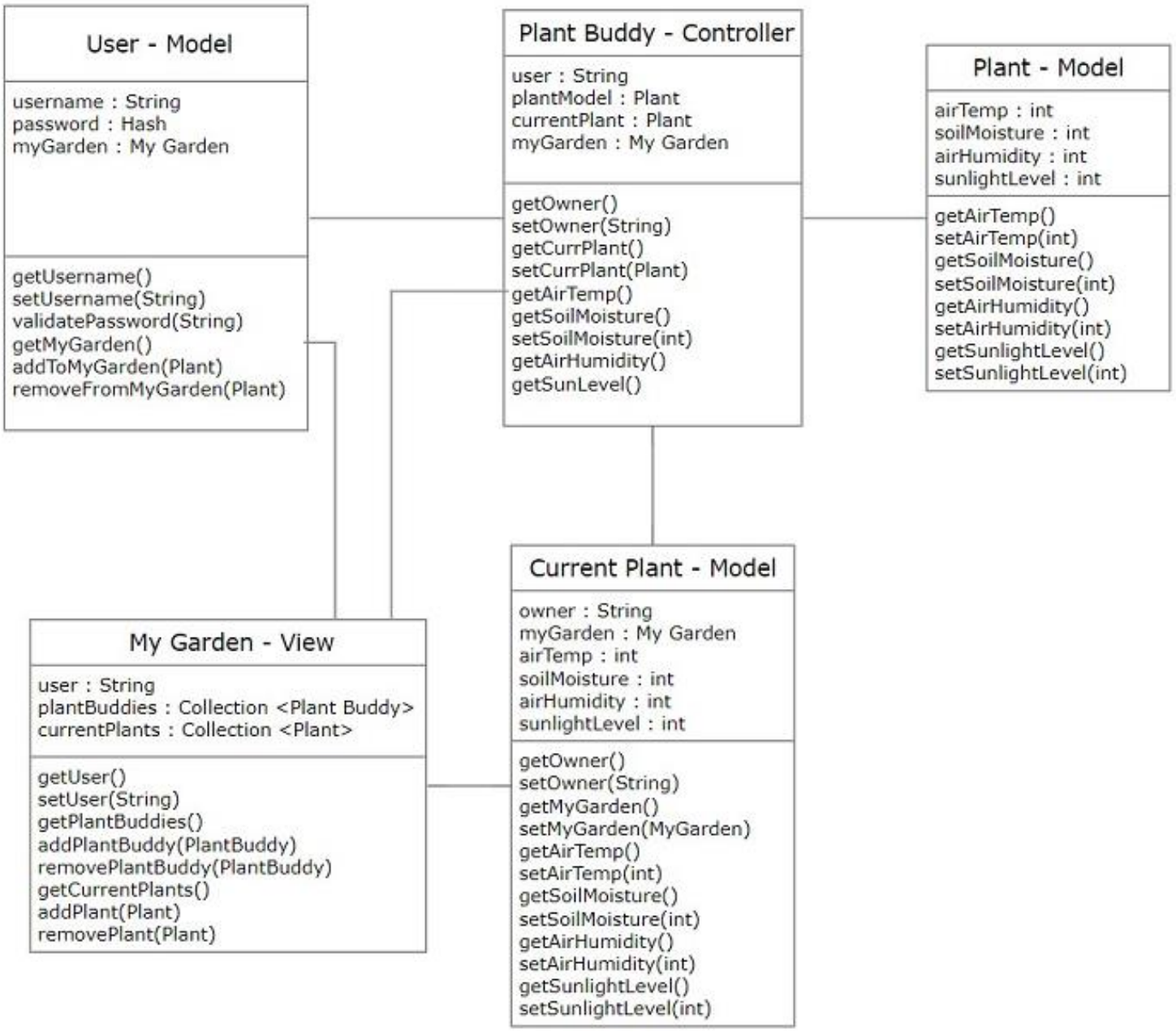
PlantBuddyRPI	
• Posts average readings to PlantStatisticsDatabase • Gets optimal levels for the plant type from OptimalPlantLevelsDatabase • Tells PlantBuddy Arduino to water plant • Gets readings from Arduino	• PlantBuddyArduino • User • PlantStatisticsDatabase • OptimalPlantLevelsDatabase • PlantDatabase

PlantBuddyArduino	
• Receives water requests from RPI • Reads data from sensors • Sends readings to RPI	• PlantBuddyRPI

System Interaction with Environment

We will have an Arduino reading in values from different sensors, turning on the valve to water the plant based on these values, and sending this data to a raspberry pi. The raspberry pi will be running a script that, every once in a while, reads these values, and gives them to a java prosgram that will connect to our database, and update it. Once these values are in the database, we can do whatever we want with the data.

Software Architecture Diagram



Exceptional Case Handling

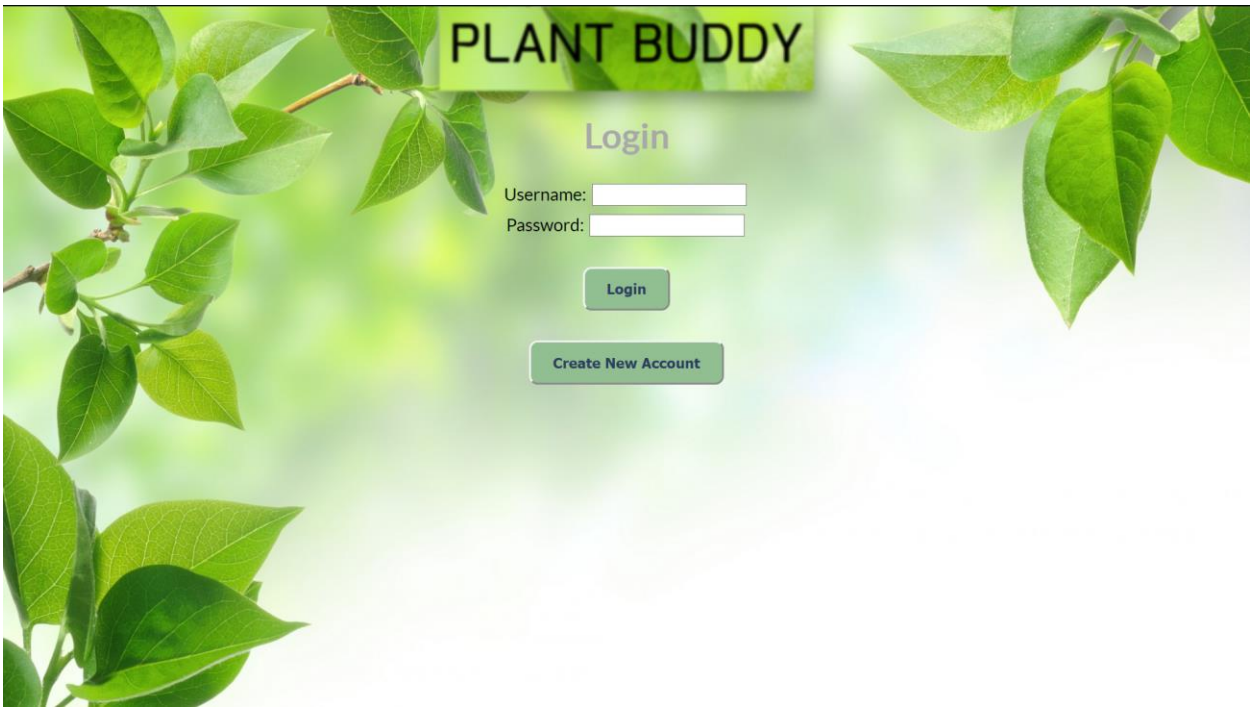
If the device cannot connect to Wi-Fi, it will simply water the plant based at a certain time interval. This value will be stored locally.

Invalid user input will not be allowed and the user will be prompted to continue providing input until input validation is passed.

Failing to refill an empty reservoir of water by the user will result in the Plant Buddy disabling automatic watering to prevent the pump from being damaged.

Login

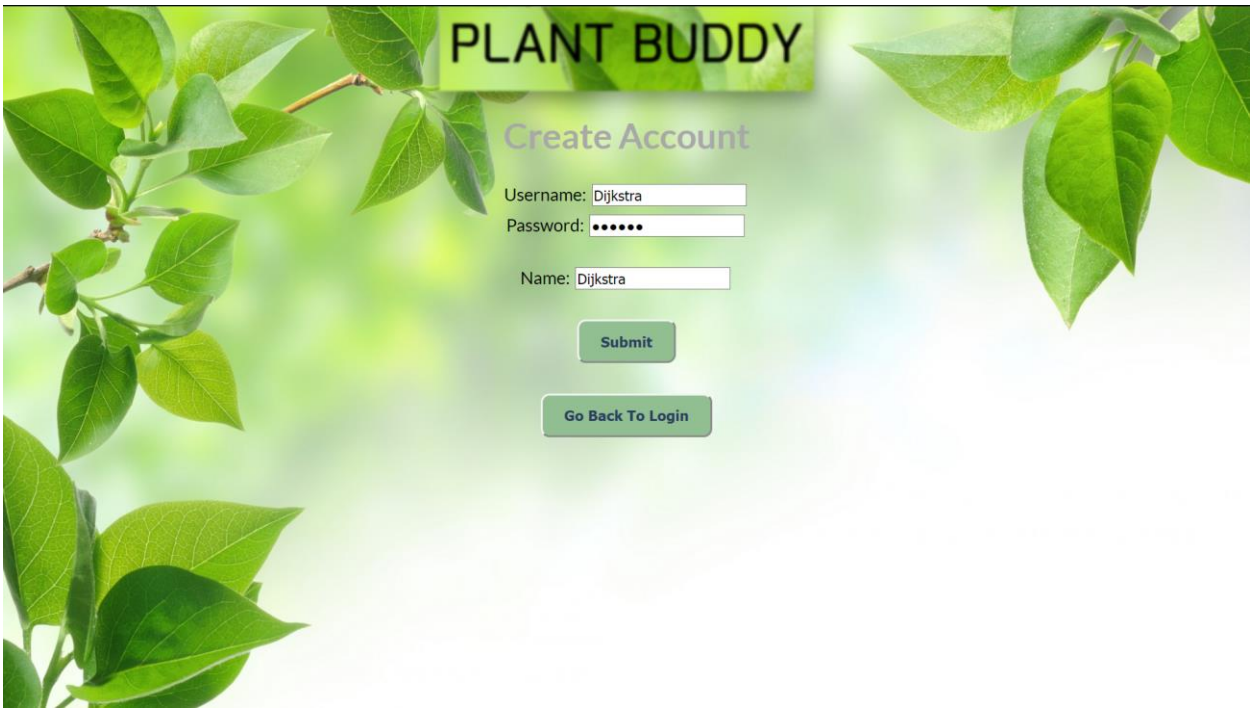
The login page includes a simple interface for users to log into their Plant Buddy account and a link to register for a new Plant Buddy account.



Registration

The registration page includes several fields for creating a new Plant Buddy account:

- Desired username
- Desired password
- Name



Menu

The menu is the heart of the navigation system for the Plant Buddy website. It includes buttons to navigate to the following sections of the Plant Buddy website:

- Viewing Your Plants
- Plant Statistics
- Account Page
- Logout

Viewing Your Plants

The plants page is accessible by the main menu. The plants page will list all of the user's plants inside a table with the following information:

- Plant Type
- Plant Name
- Manual Watering Options

The ability to manual control the flow of water to each plant is presented with buttons to switch the water on and off, for each plant.

The button to go back to the main menu is located at the bottom of this page.

Viewing Your Plant Statistics

From the Statistics page, the user may view graphs for each of their plants that show important information such as moisture/temperature/humidity over time.

Updating Your Plant Buddy Account Info

The user may update all of the information connected to their Plant Buddy account, except their username. This is done by entering the desired new information and pressing the Submit button.