# Smart Planter


CSE Senior Design

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## Executive Summary


We are going to build a self-watering plant pot, removing the consistent maintenance required in watering a house plant on your own. This pot is called the Smart Planter. The Smart Planter will measure humidity, temperature, and light exposure. We will also build an application to interface with the planter, to monitor the state for the individual plant(s). The hardware will consist of a printed circuit board and ESP32 microcontroller to minimize the size and cost of the pot.


## Background

The smart planter will solve many of the problems when it comes to doing maintenance on plants. People who have plants sitting in their house tend to forget or have a busy work schedule to take care of the plant. Therefore, the plant ends up dying, so the smart planter could be used by people who like having plants around them but do not like to take care of the plant often. The smart planter application can also be used as a learning tool for people who do not know anything about taking care of plants and want to learn how to take care of their plant by utilizing a cloud database which obtains information about the plant. For instance, some might not know how often to water a plant, so they sometimes over-water or under-water a plant, causing harmful deficiencies, which can lead to the death of the plant. Additionally, new plant caretakers could unknowingly keep their plant in an environment that's too warm or cold for that specific species, or too dark/bright for the plant, which can also be harmful. The smart planter's automation would remove these issues and ensure the longevity of the user's plant. The smart planter cloud database will have information about different plants, the user can pick the type of plant they are planting in the smart planter. The smart planter is designed to be used in a regular household but can also be retooled to use in a small commercial setting to grow plants on a small scale in a green house. The purpose of the smart planter is to be affordable and decorative to the public. There are some IoT planters out there, but they are expensive or have a self-watering system outside of the pot. The smart planter is supposed to combine the self-watering and IoT pot in one for ease of use.

## Key Requirements

**User Interface:** The Smart Planter will include a phone application that the user can use to monitor their plant. The phone application must include a user account creation section before the user is allowed to connect to their device(s).

**Wi-Fi/Bluetooth:** The Smart Planter app must allow the users to pair to their Smart Planter device and link the device to their local network by providing their Wi-Fi name and password. Once the device is paired and set up, all the paired devices will be displayed on the home screen.

**Plant Pot:** The plant pot will be a 3D print design incorporating all the circuitry inside and include a refillable water tank. The design must include designated section to install the plant sensors, power cable and a reset button.

**Auto Watering:** The Smart Planter must be self-watering. The water pump must activate when the soil moisture indicates the plant needs water and will stop once the sensor indicates the ideal soil moisture is met.

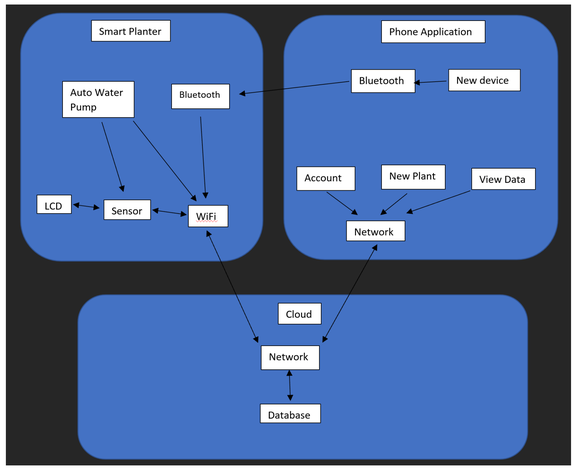
**LCD screen:** The design of the plant pot will have an LCD screen in the front that must include the local time, low water tank notification, and a slideshow of sensor data.

**Sensors:**

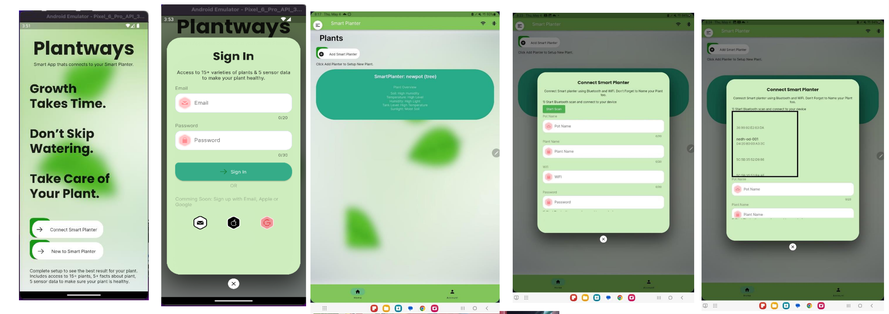
- Light sensor
- Temperature sensor
- Humidity sensor
- Water level sensor

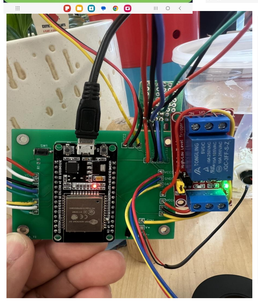
## Architectural Design Specifications

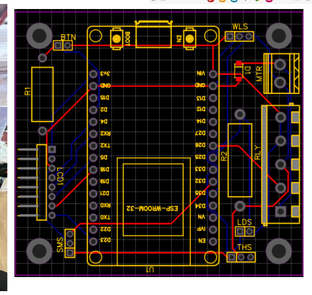
In the phone application subsystem, the user would be able to connect to the smart planter subsystem via Bluetooth whenever they press the new device button in their application. Once connected, they can set up their planter with their home Wi-Fi. Once their account and planter are set up both devices are connected to the network where they can send and receive data from the database. The Smart Planter sends sensor data to the LCD screen to display and to the database via Wi-Fi. The Water Pump component detects water level in the tank and sends it to sensor data. In the phone application subsystem users can view plant data, account information and plant list.




## Experimental Results





## Conclusions

**Current state of project:** We currently have completed three 3D design prototypes, the initial design, the redesign, and the second larger version of the redesign. We also are done with the circuitry, and are missing some UI components, like the plant list and notification page. Currently the home page shows static values of a user's plants.

**Future implementation:** The finalization of the rest of the UI, like improving the user experience and stylization of the app. Completing all the database components and making sure the correct data is sent to and from the database. Finally, completing the 3D pot most recent prototype, with complete app connectivity. We also plan on adding a list page of all the available plants to use on the pot, and a notification page which lets the user know when the water tank is low or if any of the sensor data doesn't meet the recommended conditions for that specific plant.

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