Smart Gardening System

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Summary

We chose to do this project because Kuwait has harsh weather for plants. This system is going to grow or take care of a plant with minimum human interaction. The design is programmed to cool the chamber whenever the temperature is higher than wanted. It can also make The chamber drier by a suction fan whenever it is too humid. It can also water the plant whenever it needs watering. The chamber has two security measures, one is to alarm the user whenever the motion sensor is activated. The second measure is that the door cannot be opened unless the RFID scanner grants a success code by a card. The plants that are going to be placed within the chambers are a Rhubarb and a Zenia. We chose these plants because they need extra care that this system can provide. Moreover, those plants need different environments so they can live in a more nurtured environment that suits the plant's needs.

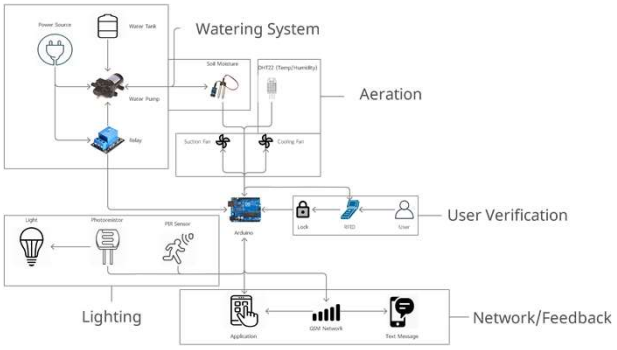

Figure 1: System Architecture for the Smart Gardening System

Design Process

It is a chamber that was built with a see-through acrylic and has a separator in the middle so two plants can be placed on each side. At the bottom where the soil and the plants can be placed, is a pot that has been divided, so two plants can be in. The sensors in the project are: DHT22 temperature and humidity sensor, soil moisture sensor, photoresistor, and motion sensor.

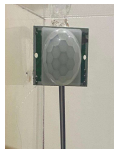

Figure 2: PIR Sensor to check the motion within the premises of the chamber

Figure 3: Temp/Humidity Sensor

Figure 4: RFID Scanner to scan ID cards

Figure 5: Photoresistor to read the lighting conditions

Figure 6: Water Pump to pump necessary water into the tray

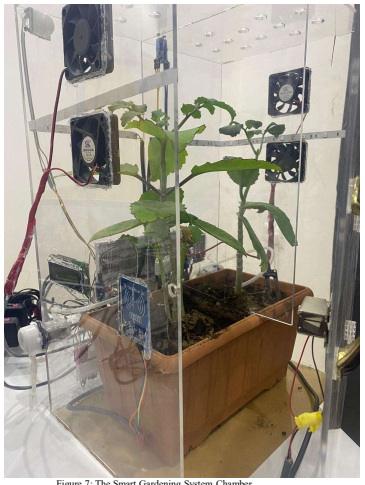

Figure 7: The Smart Gardening System Chamber

Figure 8: Soil Moisture Sensor

Figure 9: Suction Fan On top, Cooling Fan on the bottom

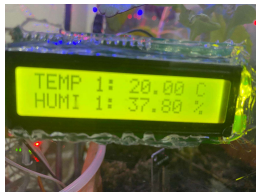

Figure 10: LCD display to give readings from the chamber

Results

The chambers are fully automated once the necessary data regarding the plants are listed in the system. Such as how much water the plant should have, what is the optimal temperature/humidity is for the plant. As a result, the chamber will run cooling fans when the temperature is high. A suction fan will be turned on to aerate the chamber for better air quality for the plant. A water pump would turn on, once the system detects that the moisture level for the soil has decreased. During daylight, the plants can enjoy the sunlight coming from the sun. Once the chambers get darker, our system will detect a lack of light and will turn on the lights to keep giving the plants the necessary light to keep on growing.

Before accessing the system, the user will need to pass their verified ID card into the scanner, to gain access to the chamber and the entire system. After any operation occurs the user will receive a message regarding the specific operation that had happened and get the results through an app and a text message for some functions.

```
AT
AT+CMGF=1
AT+CMGS="97547312"
DOOR OPEN!
```

Figure 11: A serial monitor output that shows that the door is open, the message will be sent to the user as a text as well.

```
AT+CMGF=1
AT+CMGS="97547312"
PUMP 2 ON
```

Figure 12: A serial monitor output that shows that the water Pump is On.

```
AT+CMGF=1
AT+CMGS="97547312"
COOLING FAN 1 ON
Humidity: 28.90%
AT
AT+CMGF=1
AT+CMGS="97547312"
COOLING FAN 2 ON
```

Figure 13: A serial monitor output that shows that the temperature is high. Therefore, the cooling fan will turn On

Conclusion

Our design can be used by anyone and can be placed anywhere. It is easy to carry and can be moved easily. Our design is a design that can take care of any plant that can fit in it, all the user has to do is to input the wanted room temperature and the humidity of the chamber. The user also needs to input the percentage of water wanted for the soil. After inputting these values the system is ready for their plants. Overall, the user can have any setting needed for the plant.

In the process of making this project, we have learned that we can achieve a lot if we plan exactly what we wanted to do. We also learned that no matter how hard it might be, it can be easier if you started to work through the design process. It is no shame to seek help from your peers, your client, or academic resources to understand and achieve success.

References

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