Automated Plant Watering

Embedded Systems Development – Capstone 2018

The Team

JTA Embedded Solutions

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Project Manager

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Software Developer

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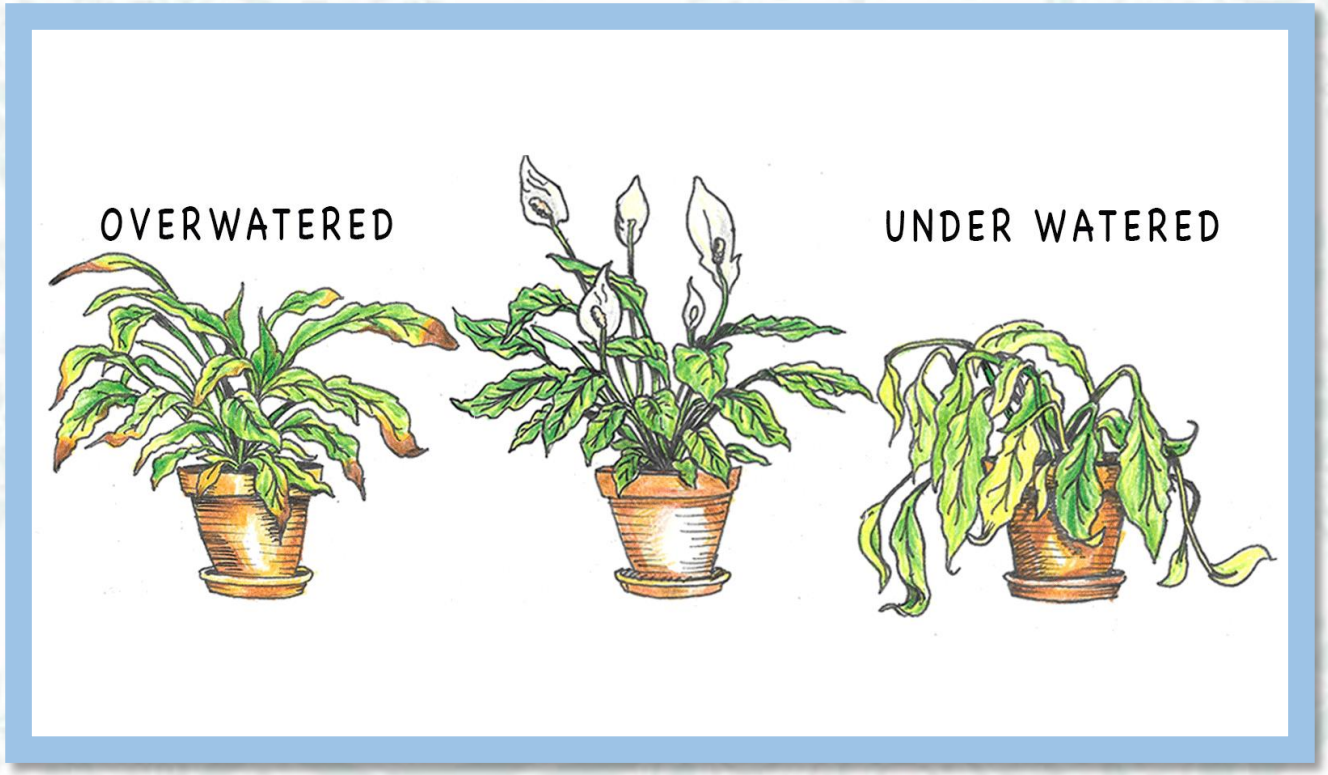
Hardware Integration

The Project

- Explore the feasibility of using low priced, off the shelf sensors and an MCU to automatically detect when a plant needs water and provide it to the plant using a small water pump.

The Problem

Has this ever happened to you?



The Problem

Orchids

- Need ample water
- But soil needs to dry out before next watering
- Hgh Humidity required

The Problem

African Violets

- Picky about water
- Can't let stand in water or completely dry
- Medium intensity light required

The Problem

Succulents

- Doesn't like "wet feet"
- Can be left dry for few days
- ½ to full day of light required

The Problem

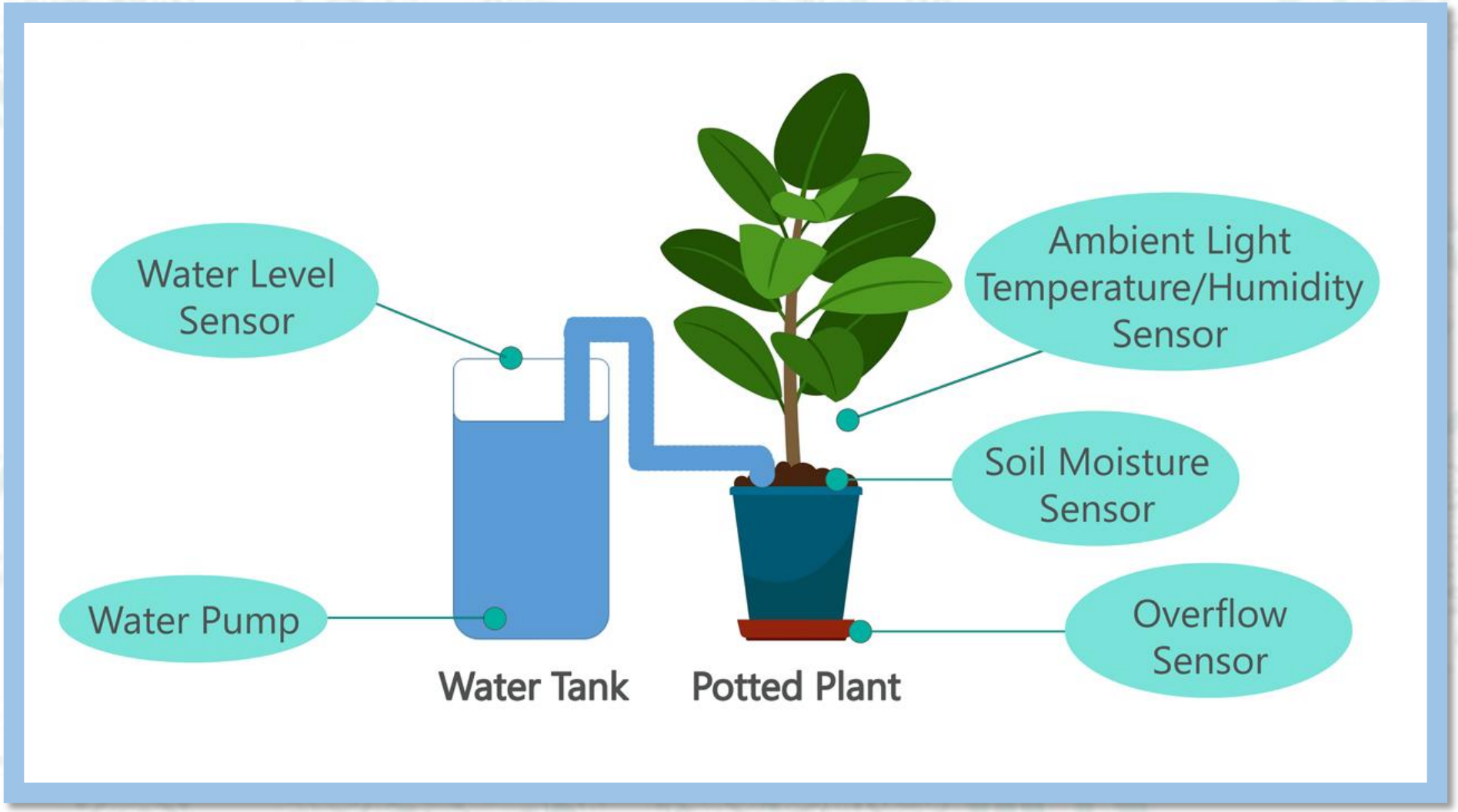
Existing Solutions – Aero Garden

- Hydroponics Method
- Automatically provides light and nutrients to plant
- No feed back data to user
- Can't be used for all plants

The Requirements

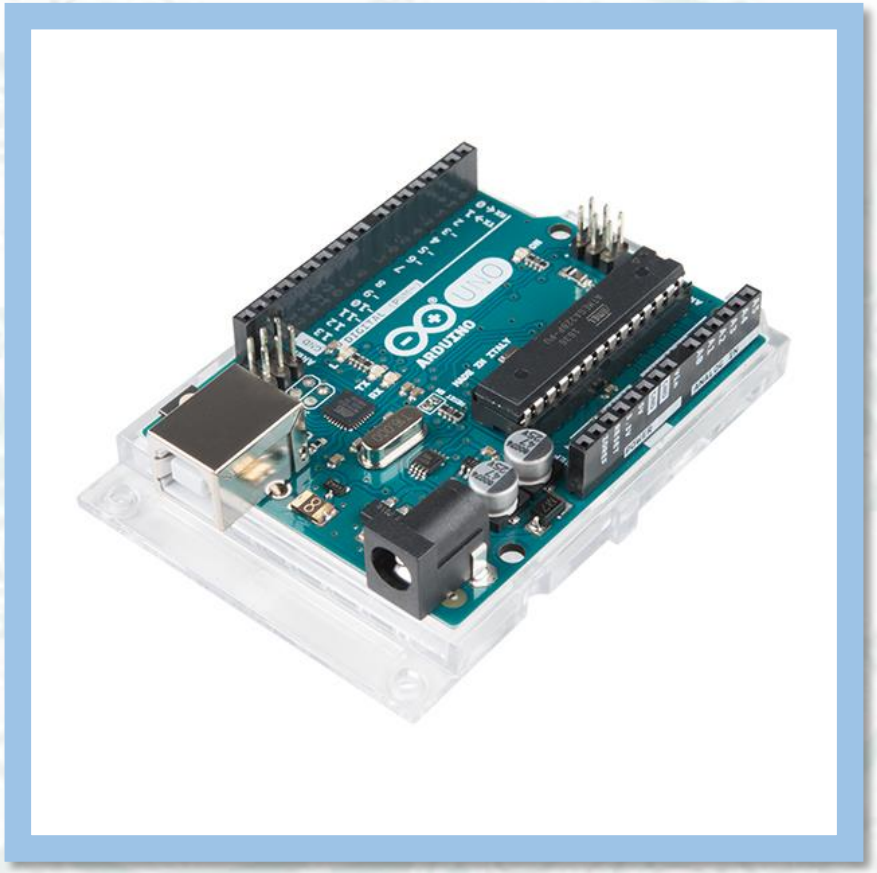
- Detect Soil Moisture of Plant
- Provide water to the plant based on soil moisture requirements
- Allow user to set moisture requirements
- Monitor Ambient Light, Temperature, Humidity
- Monitor water level in water tank
- Monitor overflow of water from pot
- Feed back data to user
- Use low price / off the shelf parts

The Design


Water Level Sensor
Ambient Light Temperature/Humidity Sensor
Soil Moisture Sensor
Water Pump
Overflow Sensor
Water Tank
Potted Plant

The Components – MCU

- Arduino UNO

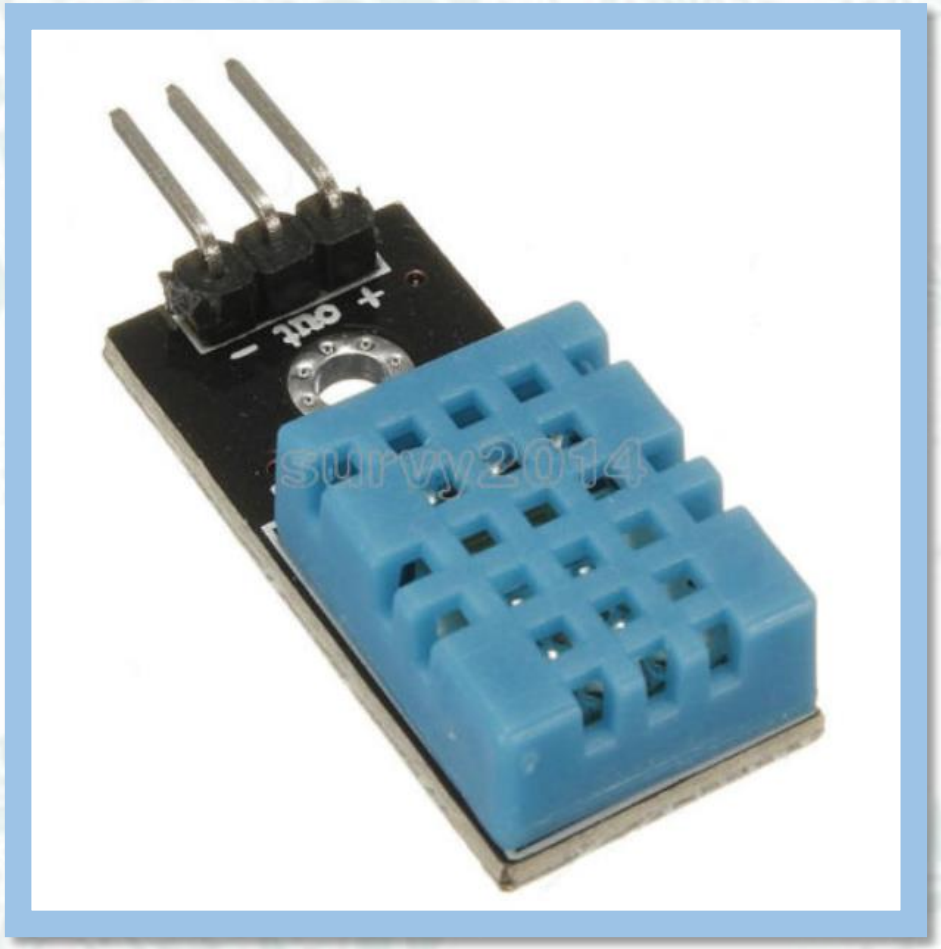


The Components – Soil Moisture Sensor

- Capacitive Soil Moisture Sensor

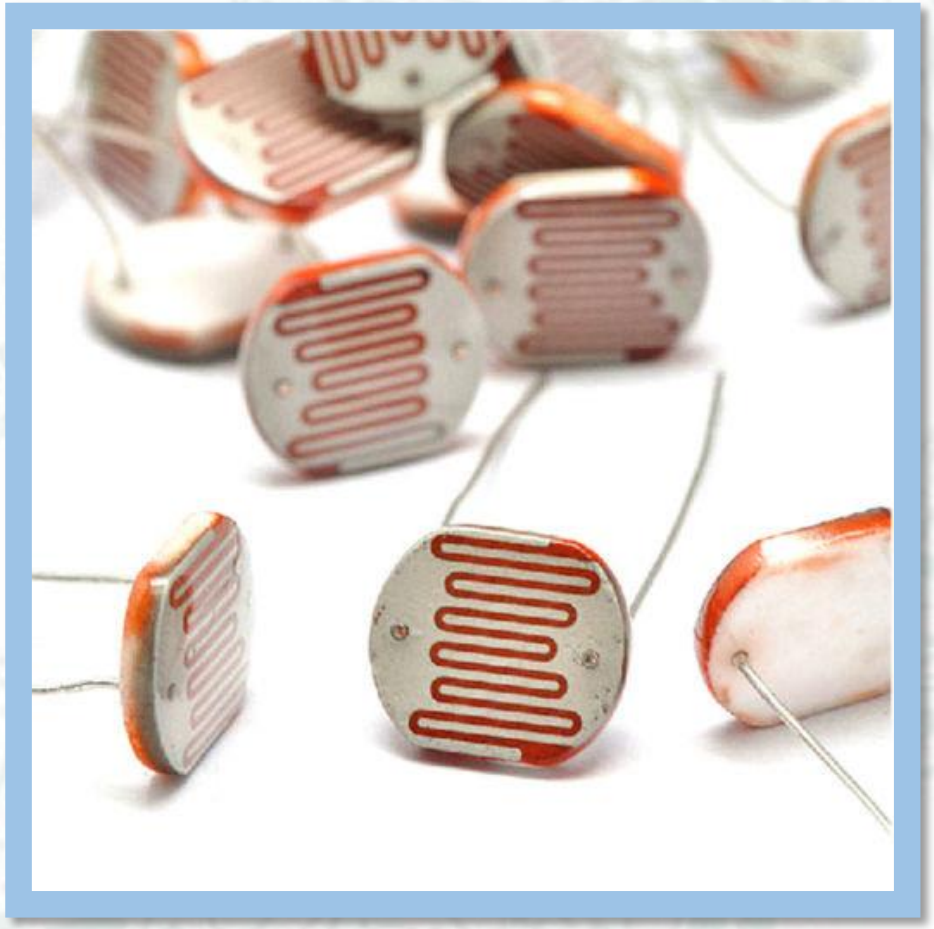
The Components – Temperature/Humidity Sensor

- DHT11 Temperature and Relative Humidity Sensor



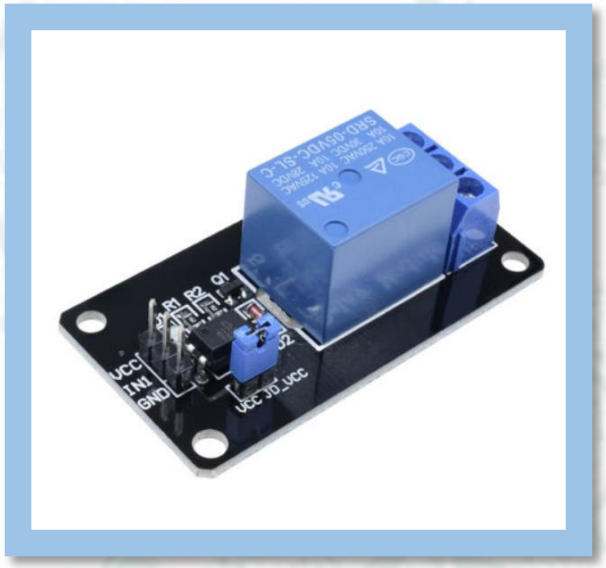
The Components – Light Sensor

- 12mm Photoresistor



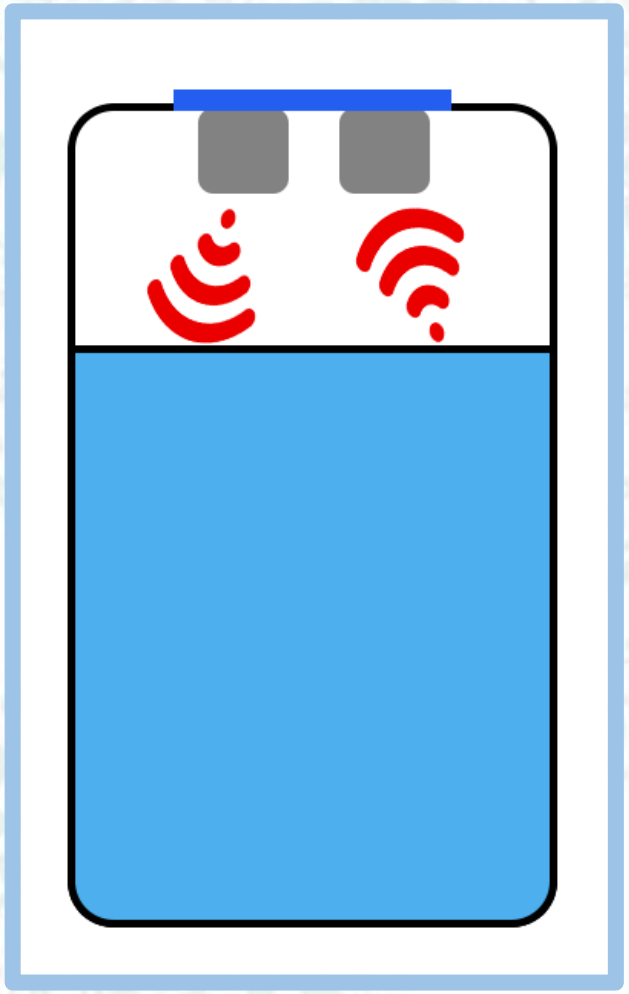
The Components – Water Pump

- DC Motor Water Pump
- 5V Relay



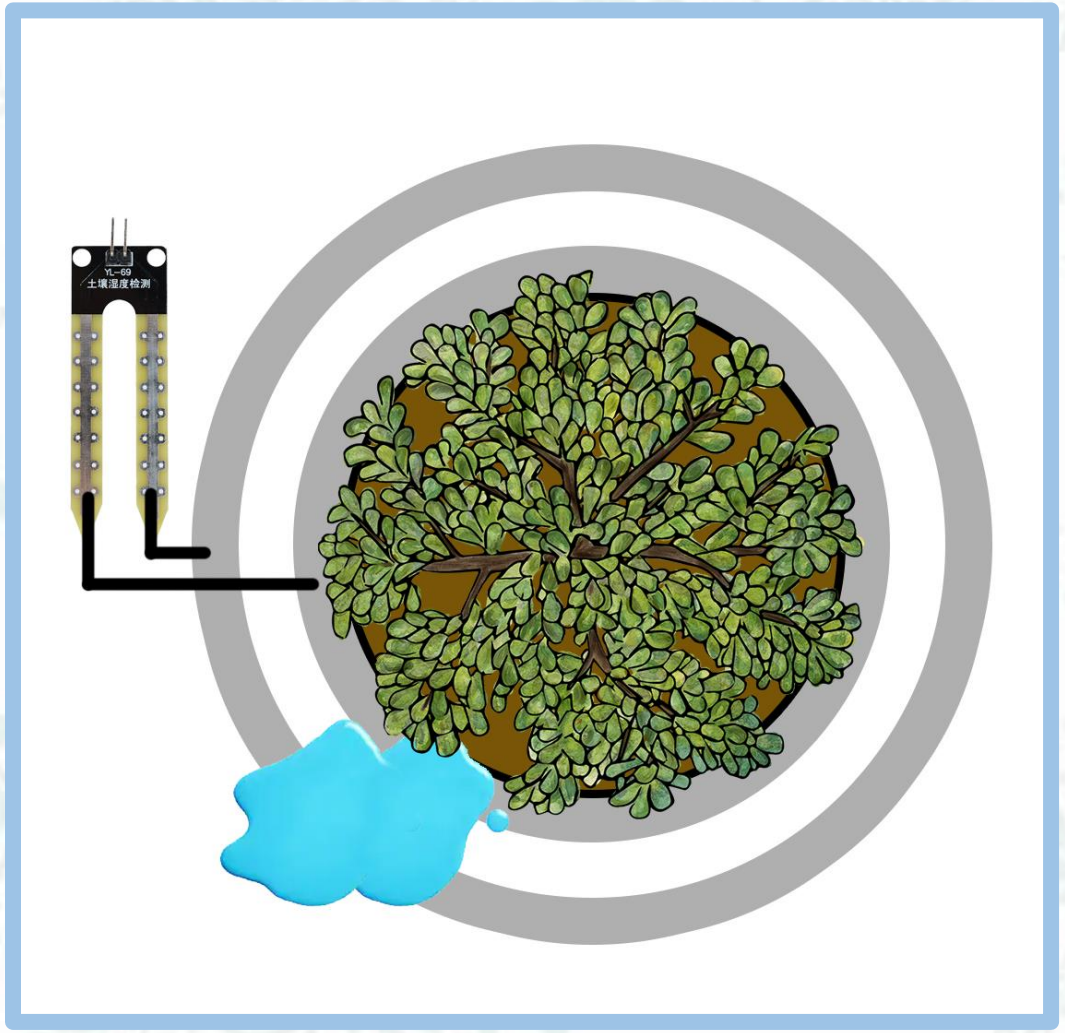
The Components – Water Level Sensor

- HCSR04 – Ultrasonic Sensor



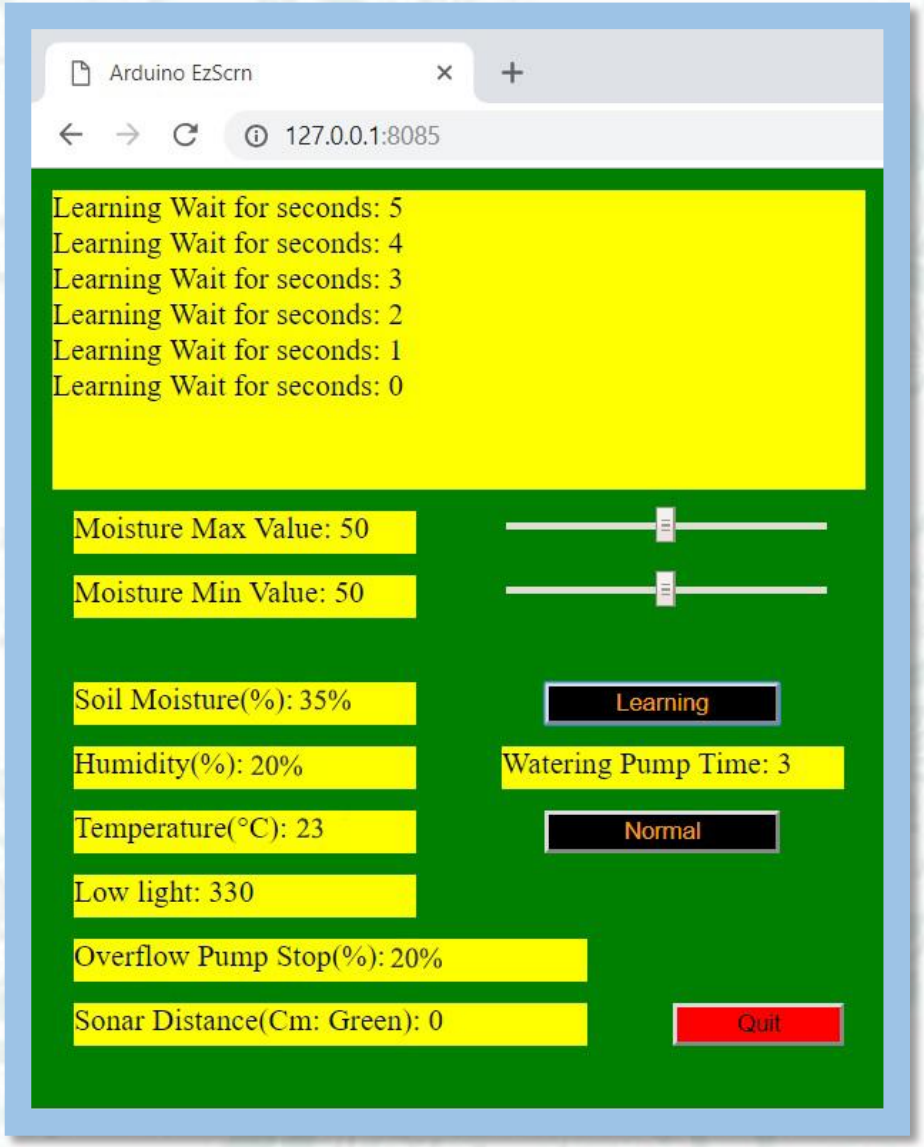
The Components – Over flow Sensor

- Resistive Soil Moisture Sensor



The Components – GUI

- Python Script-Based GUI
- EzScrn



The Results

- Intelligent Pot Size Learning

The Results

- Soil Moisture Level Input

Maintain Soil Moisture

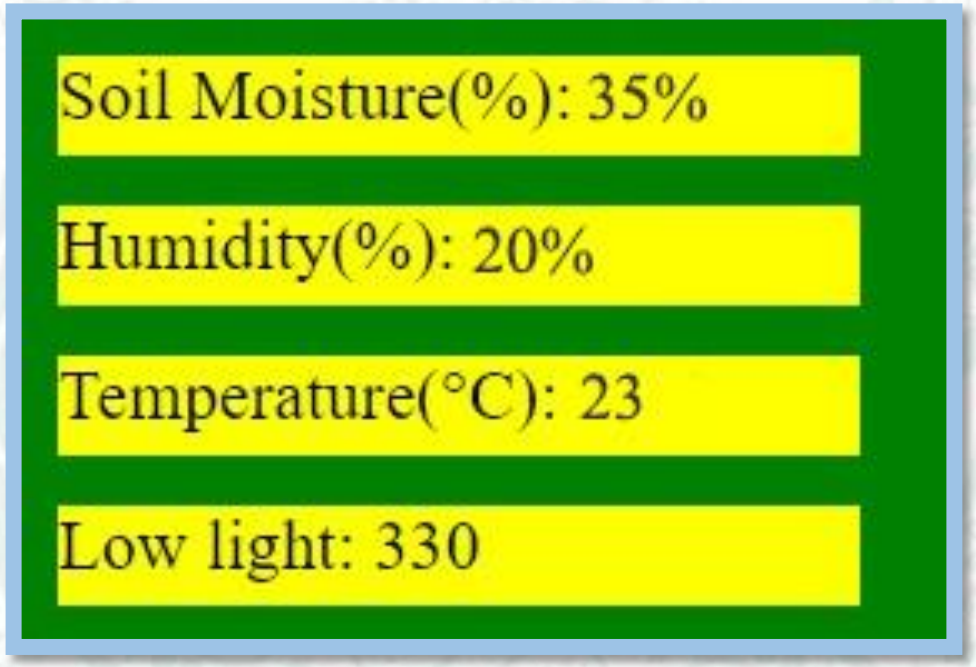
Specify Moisture Range

The Results

- Supply Water Level Monitoring
- Water Overflow Detection

The Results

- Ambient Light / Temperature / Humidity Monitoring

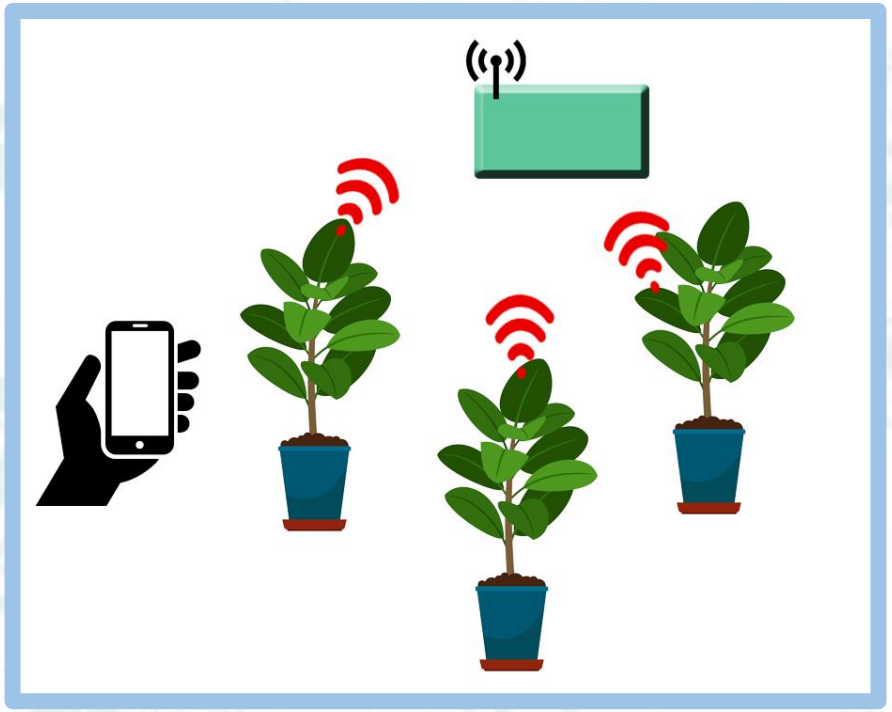


The Conclusion

- Successfully Monitored Soil Moisture & Supply Water to Plant as needed

Future Developments

- Plant Database – Eliminate need for the user to setup soil moisture levels
- Provide Recommendation feedback based on Ambient Readings
- Automate Light Exposure based on plant requirements
- IoT for multiple plants setup



Acknowledgements

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[Soil Moisture Monitoring Project (August 2018)]

The Embedded Wizard

Professor Jaraplexer
[Mike Jarabek]

THANKYOU

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