Water Automation Timing and Efficiency Regulation

(W.A.T.E.R)

Francisco Becerril | Jonah Miller | Hayes Payne | Alejandro Zavala
College of Engineering & Computer Science

SACRAMENTO STATE
COLLEGE OF ENGINEERING & COMPUTER SCIENCE

PROBLEM STATEMENT

W.A.T.E.R was designed to reduce freshwater consumption in the residential sector by decreasing overwatering during unideal watering conditions using a combination of wireless technology, sensors, and local weather data.

BACKGROUND

With much of the Western United States considered to be in severe drought. Many regions are having to change the way water is distributed, by either increasing water prices or implementing water restrictions. By providing a smart irrigation system that is weather adaptive and uses the Volumetric Water Content of the soil to determine when to initiate the watering cycle, one can eliminate the water waste lost to overwatering and evaporation which experts agree account for up to 50% of watering loss.

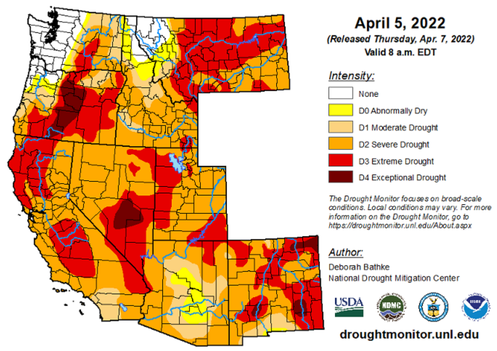

Figure 1. U.S. West Drought Monitor [1]

SUMMARY OF WORK

Our prototype uses remote sensor kits which measure soil moisture, temperature and local humidity. These kits use solar panel powered battery banks and optimized power consumption. Using supplementary local weather data gathered from an online source, the central hub determines optimal times to request a water cycle from the system. Once a watering cycle has begun, the sensor kits periodically poll the water saturation of the soil. Once the soil is determined to be sufficiently saturated, the central hub will request the system to end the water cycle.

Remote Kits:

- Programmable Microcontrollers
- Embedded Systems
- Wireless Communication Network
- Driver Programming
- Power Regulation

Central Hub:

- API Programming
- State Machine Programming
- Web Application for a User Interface

References

[1] Tinker, R. (2022, April 14). | U.S. Drought Monitor. Retrieved April 14, 2022, https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?West
[2] Payne, H. (n.d.). *Water Packages*. Retrieved April 6, 2022.
[3] Miller, J. (n.d). *Remote Control Kit.* Retrieved April 6, 2022.

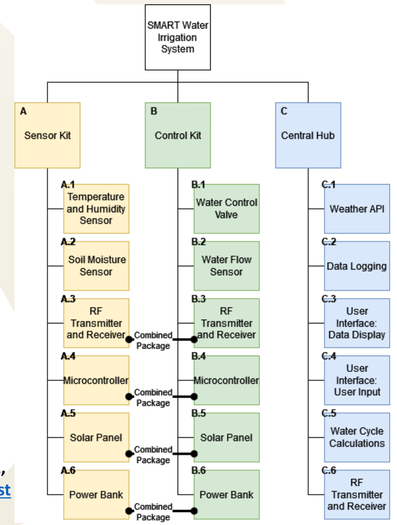

Figure 2. W.A.T.E.R Packages [2]

IMPACT ON COMMUNITY

The design of our system is to save freshwater resources. As it currently is applied, it is designed to decrease the costs associated with residential water use. We expect that this system would be applicable to larger industrial settings where freshwater consumption is much higher.

Figure 3. Remote Control Kit [3]