

Executive Summary: 4G Portable Irrigation Monitor

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The goal for this project was to create a system that could automate the process of tracking water usage from an irrigation system. The system tracks the amount of water which enters a given area and reports to a custom built website with the data wirelessly using a 4G system. The system includes a solar power system and battery which allows the device to operate 24/7. The device itself is enclosed within a 3D printed enclosure built to withstand impacts and resistant to water to prevent the internal devices from any damage. The website can be accessed from any internet connected device and includes multiple tabs each focusing on different information. The interface includes a 'Data' tab for viewing collected information, and an 'Alerts' tab where users can subscribe to email notifications should the water usage surpass the predefined limit.

The development of the system was broken up into four parts: website infrastructure/cellular communication, enclosure/pcb, velocity sensor/ microcontroller, and depth sensor/power. Each individual was responsible for designing and implementing the given systems. Early into the development, each individual began by researching implementations of their system as well as parts that could be utilized for the full device. Many portions of the project saw continuous improvement and revision as we furthered research and development. Initially, we as a team were leaning towards utilizing a raspberry pi but faced issues with power management especially for a device which was intended to be used for multiple days at a time. Another problem we encountered was our initial 4G connection system was not strong enough to reach the cell towers which required us to order an entirely new transmission device.

The process has provided each member of the team with the opportunity to develop skills like PCB design and layout, cellular communication, web design, and power management. Each member was involved in all stages of the design process, sharing knowledge from different subdisciplines of engineering. Proper documentation and project management skills were developed and improved throughout the year. The focus originally was on the technical aspects of the project, however, the importance of project management and organization was soon realized and took the forefront in the design and development phases of the project.

Senior Design Gantt Chart

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