



INTEGRATION OF A WATER FEATURE FOR THE GRADY ERWIN NATURE RESERVE

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Abstract

In this capstone design project our team discusses the process in developing a system that enhances a natural spring located in the Grady Erwin Nature Area of Natchitoches, Louisiana. The purpose of this project is to provide a resting area, a drinking fountain, and a water feature (fountain, rock garden, etc.), powered by solar energy, for visitors to enjoy. This project explores areas such as power transmission and storage from solar panels to solar batteries as well as detailed calculations to determine how the system will function relative to overall head loss due to friction. These appropriate components and devices for fluid transmission (pump/motor types and their power requirement) can be determined. Conceptual design layouts of the entire system including tanks, piping, control systems, etc. are included. The team members found this experiential learning during the capstone project very rewarding in terms of the ability to utilize learned concepts in real-life projects as well as building professional confidence in members that are ready to join the workforce.

Background

Formerly known as the Normal Wells the Grady Erwin Nature Reserve was named in memory of Dr. Grady Erwin. Dr. Erwin was first employed at NSU in 1945 as an associate professor. Seven years later he was promoted to Head of the Biology Department at NSU. Dr. Erwin served as department head for 21 years until he eventually retired in 1973. For many years, the area was known as the Normal Wells after Northwestern State University's former name, Louisiana Normal College. It was home to six different wells scattered throughout the 84 acres of land. These wells at one point were the source of water throughout the entire college campus and west Natchitoches.

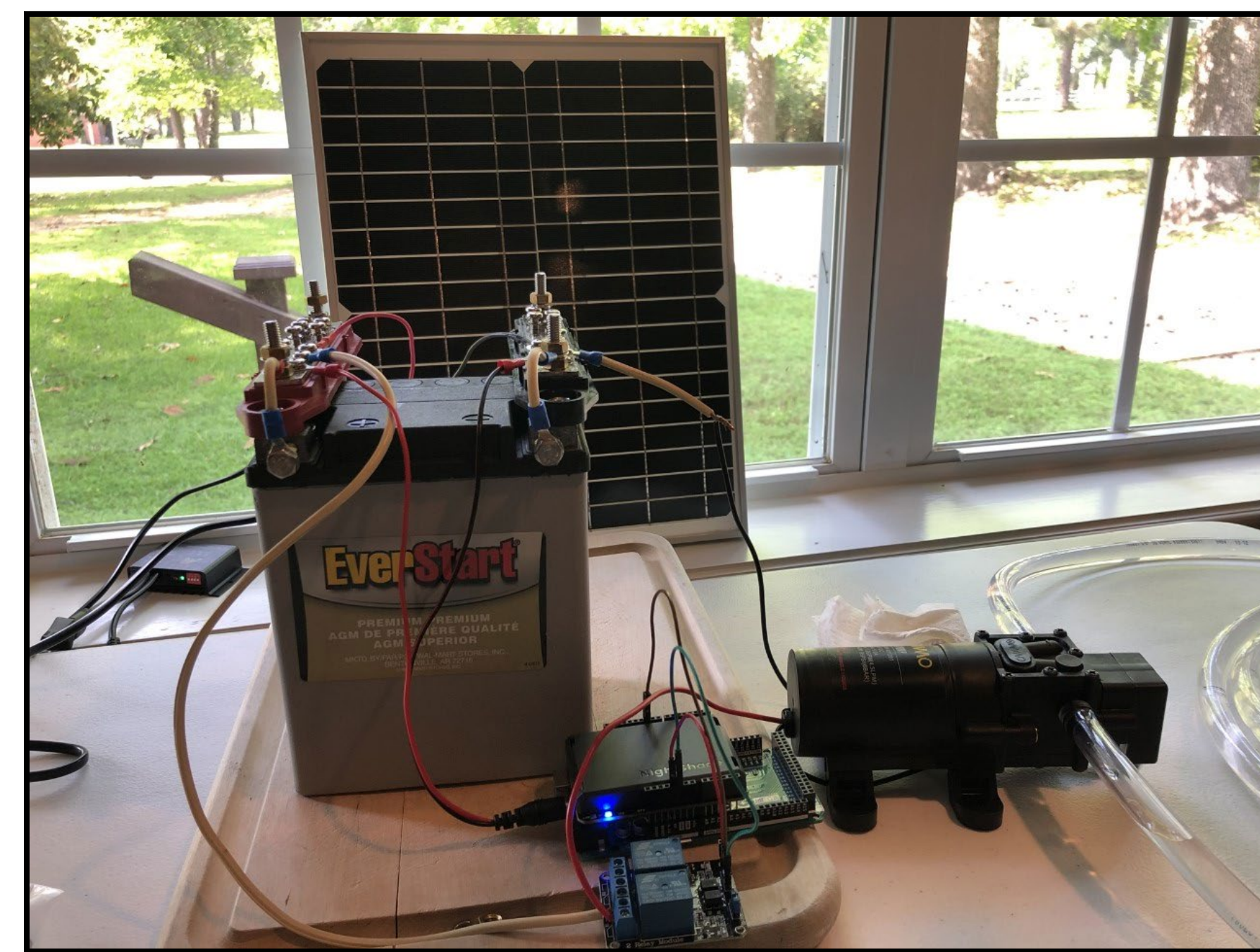
Problem Statement

The water from the spring is not easily accessible for people to drink or fill their container for the rest of their visit. Also, the trails lack an area to rest while hiking.

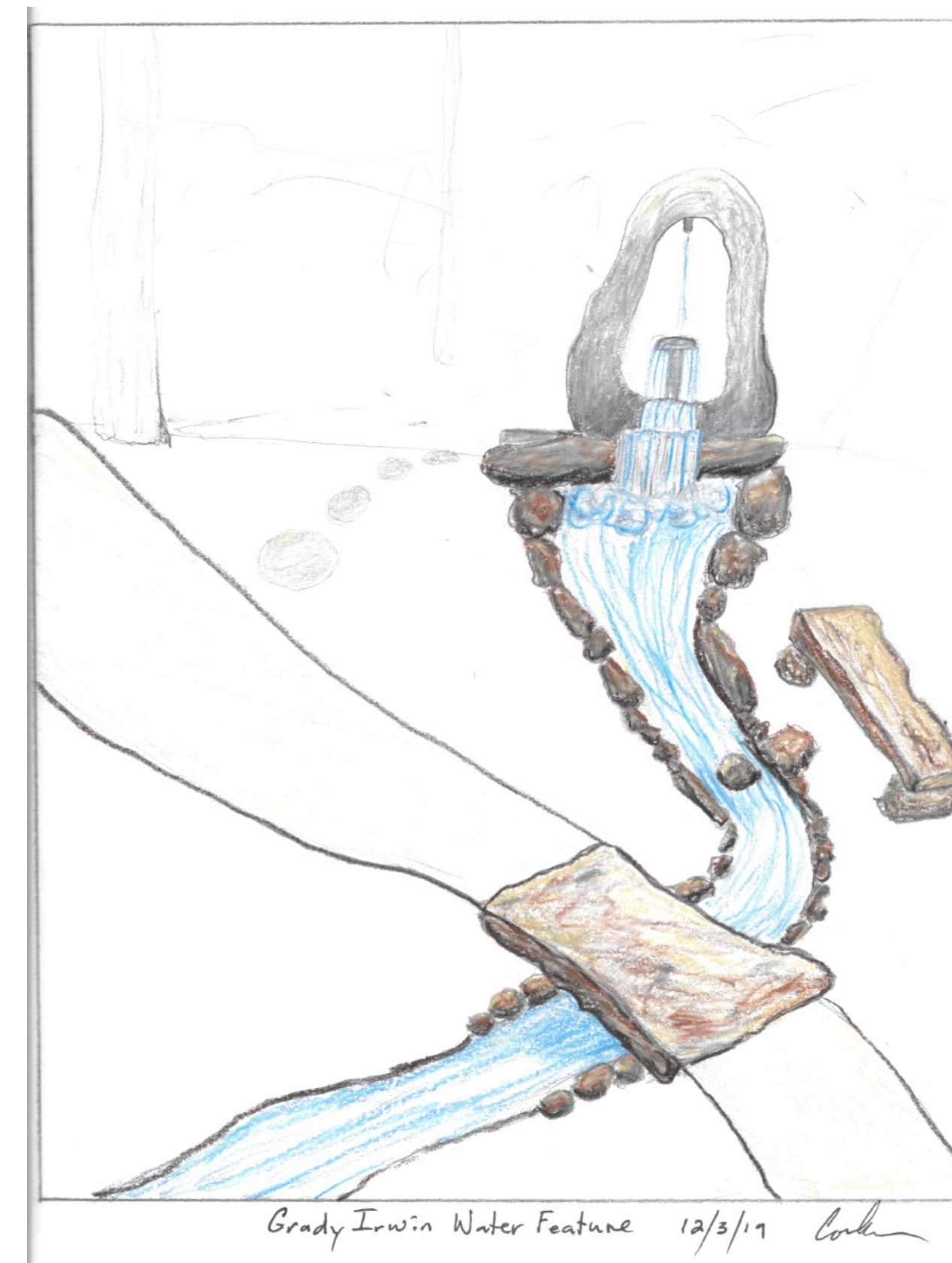
Prototype

Prototype Control System

- Arduino Mega 2560 Rev 3
- EnergyShield 2 Pro RTC
- 20w monocrystalline solar panel kit
- 12v DC diaphragm pump
- EverStart 12v 14Ah battery



Final Design



- 300-Watt monocrystalline solar panel
- 12-Volt dc 110ah battery
- 12-Volt dc diaphragm pump, 2.9 gpm, 50 psi



Rationale

This project gives a new purpose to the Grady Erwin Nature Reserve. Visiting the resting area to have a drink of freshwater and enjoying the water feature could be implemented into the daily routine of avid trail visitors. This will also be a reason for new people to visit the trails. Seeing a well-maintained area along with a beautiful water feature could spark a new interest for them to begin living a healthier lifestyle by walking or biking the trail frequently. Also visiting the trail in the summertime can be difficult because of the hot climate. However, knowing there is an area to rest and refill their water containers will provide a reason to continue exercising during the summertime months and make for a safer experience.

Conclusions

This project will provide a new attraction to the Grady Erwin Nature Area. Our team believes that the prototype demonstrates a proof of concept for the full-scale project. Through the theoretical study of fluid power applications, battery charging and discharging rates, microcontroller programming, and solar energy we were able to design a self-sustaining system. Providing attention to details like these with mathematical calculations has allowed our team to design an optimal system that can achieve the objectives of the project and please the visitors of trail C in the Grady Erwin Nature Area.



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