Gray Water Controller

Riley Carlson, Deion Davis, Drew Thaxton
Advisors: Dr. McCreanor, Dr. Barnett, Dr. Mines
ECE, EVE Departments, School of Engineering,
Mercer University, Macon, GA

INTRODUCTION

The objective of this project was to design a gray water irrigation system controller that utilizes modern technology for communication and control.Due to many controllers currently on the consumer market using progressively dated technology, our client wanted to correct this gap in the market. The main driving factors included: better data-log processing, wireless communication, and compatibility for an existing irrigation system. A mobile device application will also be developed to act as an companion to the main controller.

METHODS

The design of the controller is based on an existing controller for gray-water irrigation systems by the name of A*quaworx by Infiltrator* (Fig 1). By using the *Aquaworx* as a basis, our team, and any future team(s), have a targeted form factor and functionality that needs to be improved upon. The design utilizes a microcontroller outfitted with wireless communication components, a Real-Time Clock, configurable alarms (audio and visual), system sensors, and LCD screen.

The design also allows the homeowner to monitor the irrigation system's status, become alerted to any dangerous or system critical conditions, and contact the installer all from one mobile interface. The mobile interface possesses a lockdown area where the installer can adjust system critical settings as well.

Figure 1: Aquaworx Controller by Infiltrator

RESULTS

The materials for the controller were obtained from Amazon, BeagleBoard, Omega, and Sensirion. No additional resources for the mobile device application were needed. Issues regarding compatibility between the sensors and the microcomputer and condition requirements for the sensors were met early within the project. Both sensors needed to be substituted. Afterwards, the data-logging, user alerting, and wireless communication with the companion application functions for the controller worked fantastically in our simulated environment. Due to unforeseen health concerns, the controller could not be properly tested on-site.

Looking forward, the microcomputer selection and configuration could be reassessed. Separation of the central microcomputer from the wireless modules (Wireless modules being external) could assist in diagnosis of communication issues. Development of the mobile device application on the Android Mobile Development environment should also be revisited in the future due to more mobile devices worldwide utilizing Google Android for operation than Apple iOS. Future designs could also look into integrating the inline UV Disinfection system, if the budget and irrigation tank system allows.

CONCLUSIONS

The controller was designed to include a non-wireless enabled microcomputer paired with an external bluetooth module and a mobile application built on the Android mobile development environment. The design allowed for the modular addition or removal of I2C compliant sensors, and it included two differential pressure transducers to monitor the liquid level in a tank and monitor the pressure drop across a Y-filter design. The resulting controller was able to reliably read the data from two differential pressure transducers and process said data (Fig 2).

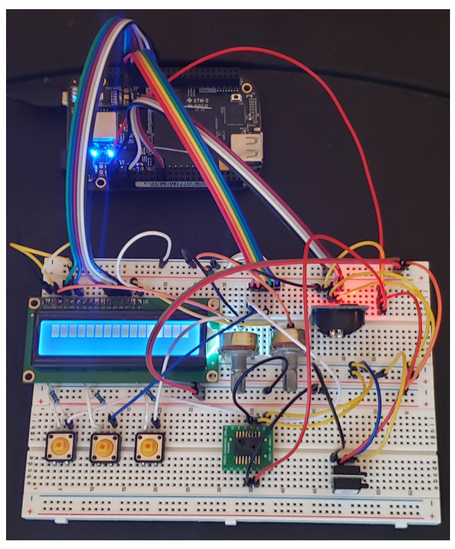

Figure 2: Final Build

Connectivity and communication between the controller and mobile device application was also consistent and stable when connected to bluetooth and when connected via the web server.

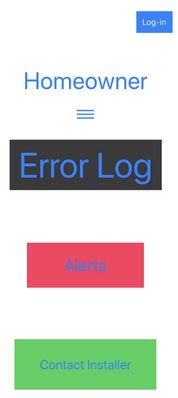

Figure 3: Homeowner Design

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