Ocean Acidification Tank Controller

Flutter App Utility Expansion

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ABSTRACT

With this project, I increased the usability of the Flutter app linked to the Tank Controller, making it more accessible without having to directly interface with the controller itself.

The main features I implemented include being able to view relevant values and switch between flat and ramp calculation modes for target pH and temperature, as well as the ability to switch between other important modes and change tank information from a computer or smartphone.

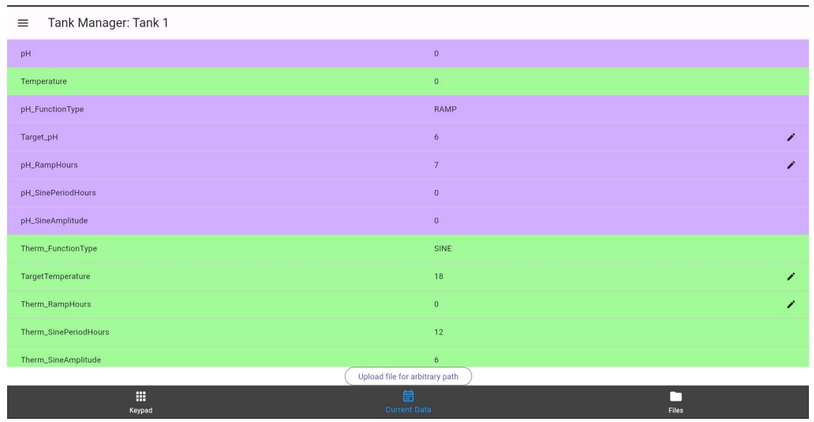
INTRODUCTION

The Ocean Acidification Tank Controller measures and controls pH and temperature within an aquarium in order to test the effect of increasing levels of carbon dioxide on marine organisms. This project is expanding the utility of the Flutter app connected to the tank controller, increasing ease of use.

The Flutter app currently has a main page displaying a keypad with information that emulates the controller box itself. This works to change values in the same way the tank controller does, but is inconvenient since you have to navigate through the menu instead of being able to just type and press enter. The Current Data page displays many different values on the device in one place, and only three values were editable from that page when I began this project. My goal was to display more values on that screen as well as increase the amount of them that are editable.

DATA AND ANALYSIS

The data that is now visible from the current data page includes temperature and pH calculation values, and some other relevant information. Variables for temperature include target temperature, time to ramp to target, and amplitude and period hours for calculating temperature in a sine wave. A function type variable displays which function is being used to determine the temperature of the tank. I also implemented equivalent values for pH.



Other assorted variables are the interval at which data is sent to the Google Sheets, the tank ID, and heat or chill and PID modes. Allowing for changes for these variables required both front and back end work through finding which function was correct, adding necessary functions, and determining what other values should change based on that edit. In addition, it required adding new variables that could be used in HTTP PUT requests to call the function on the server side. I also added tests to keep up code functionality, ensuring that new changes performed correctly, and added color coding between pH and temperature.

CONCLUSION

Overall, this project was very helpful to me because it gave me experience working on an ongoing project. In addition, this project gave me an opportunity to develop my skills in debugging. It introduced me to different programs like Postman, through which you can make different types of HTTP requests, which helped significantly in debugging and ensuring that I could deal with values displaying incorrectly on the app page. In working on the Tank Controller, I gained experience and understanding about Arduino systems, as well as HTTP requests.I also think that this project was helpful in developing an understanding of the time that goes into understanding code well enough to make worthwhile contributions to it.

SUMMARY

This project was a great experience for me to be able to work with an existing application, and have to take the time to learn how each piece of it fits together. Implementing so many different kinds of functions while avoiding errors required gaining an understanding of many different facets of the program as a whole. Overall, I believe that my contribution will be useful because it will significantly simplify the use of this tank controller through the Flutter app as it is used to learn more about Ocean Acidification.

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