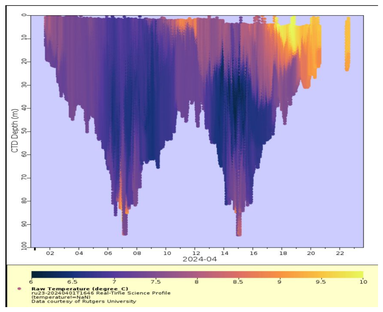
RUTGERS
WINLAB | Wireless Information Network Laboratory

Virtual Reality Visualization for Underwater AUVs

Amanda Lau, Catzby Paul, David Zhao
Advisors: Ivan Seskar, Jennifer Shane, Wade Trappe

Objective

To develop an innovative and user-friendly VR visualization tool for 3D glider data from the Rutgers Center for Ocean Observing Leadership (RU-COOL).



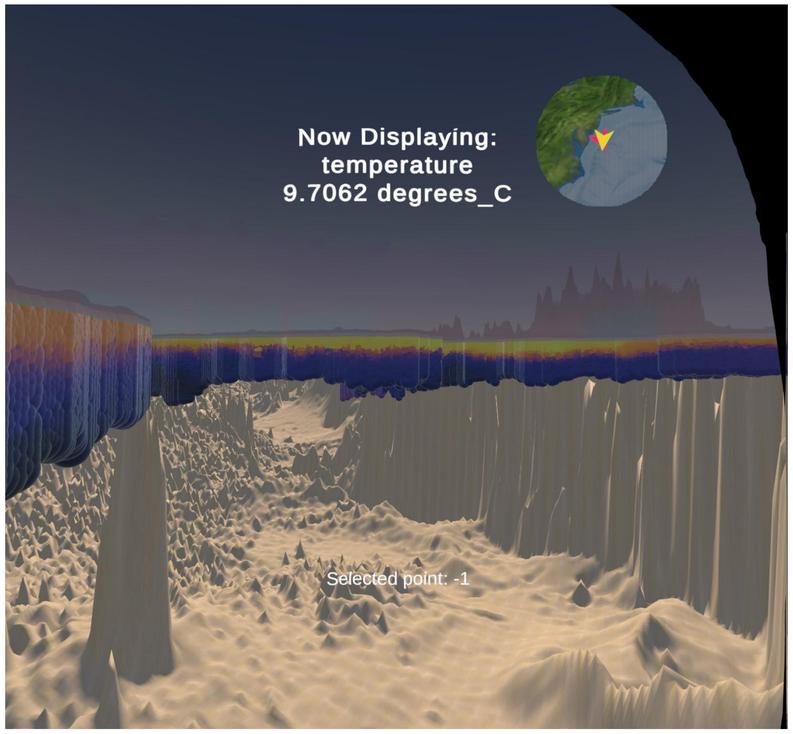
Visualization Overview

This project was built using the Unity Engine, and implemented with the Meta Quest 3.

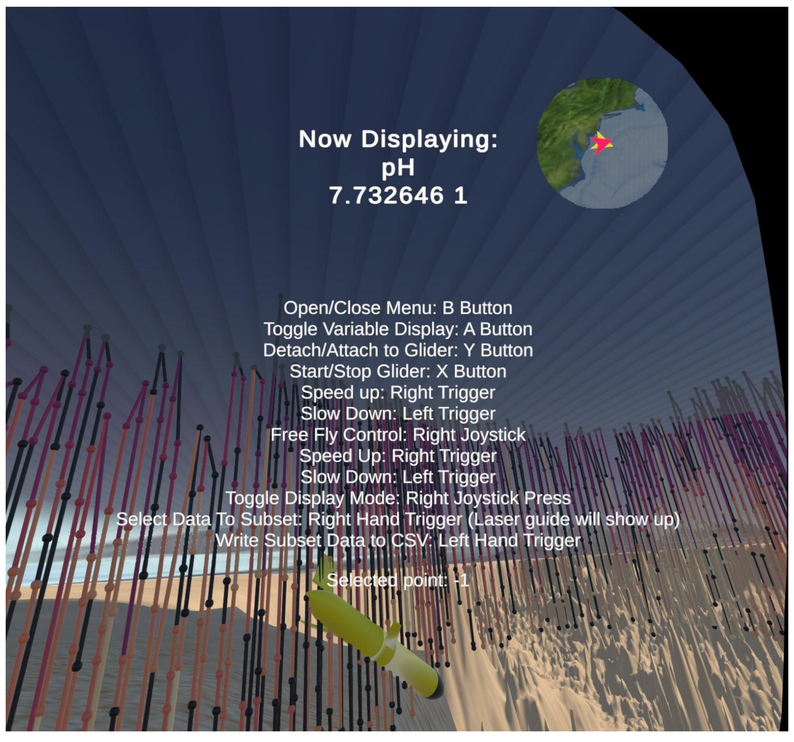
To aid in our goal of visualizing the glider data in 3D, we implemented the following features:

- Automatic downloading and processing of user-specified datasets and variables of interest from ERDDAP
- Detailed 3D worldmap with bathymetry and topography
- Toggle for switching between gradient colormaps to discern large-scale patterns
- Variable readout for reading precise values
- Toggle for switching between "riding" the glider and freely exploring the data
- Minimap with position markers to show glider and user location on the worldmap
- Selecting a subset of data and saving it to a new file for further examination/visualization

Visualization Images



Temperature data overlaid on ocean bathymetry



Glider and additional UI

Challenges

- Latency in downloading data
- Lag and screen clipping in rendering large amounts of data
- Implementing 2-dimensional UI overlay in a 3D environment
  - Added a separate UI renderer

Application and Future Work

The project generates paths in real-time based on the datasets and variables in the ERDDAP database. The user can interact with and manipulate the data in real-time, making this a useful visualization tool for the RU-COOL team and the students.

Further development would include:

- ❑ Optimization of data extraction and drawing the path
- ❑ Gauges to display current data
- ❑ Implementing ocean current patterns
- ❑ Visualization of marine organisms
- ❑ Adding a time scrubber for more flexible time forwarding and rewinding

Acknowledgement

We would like to thank Ivan Seskar, Jennifer Shane, and Dr. Wade Trappe for guidance, and the researchers at RU-COOL for their data expertise. This work was supported by RU-NB CSI Scarlet Vision.

WINLAB