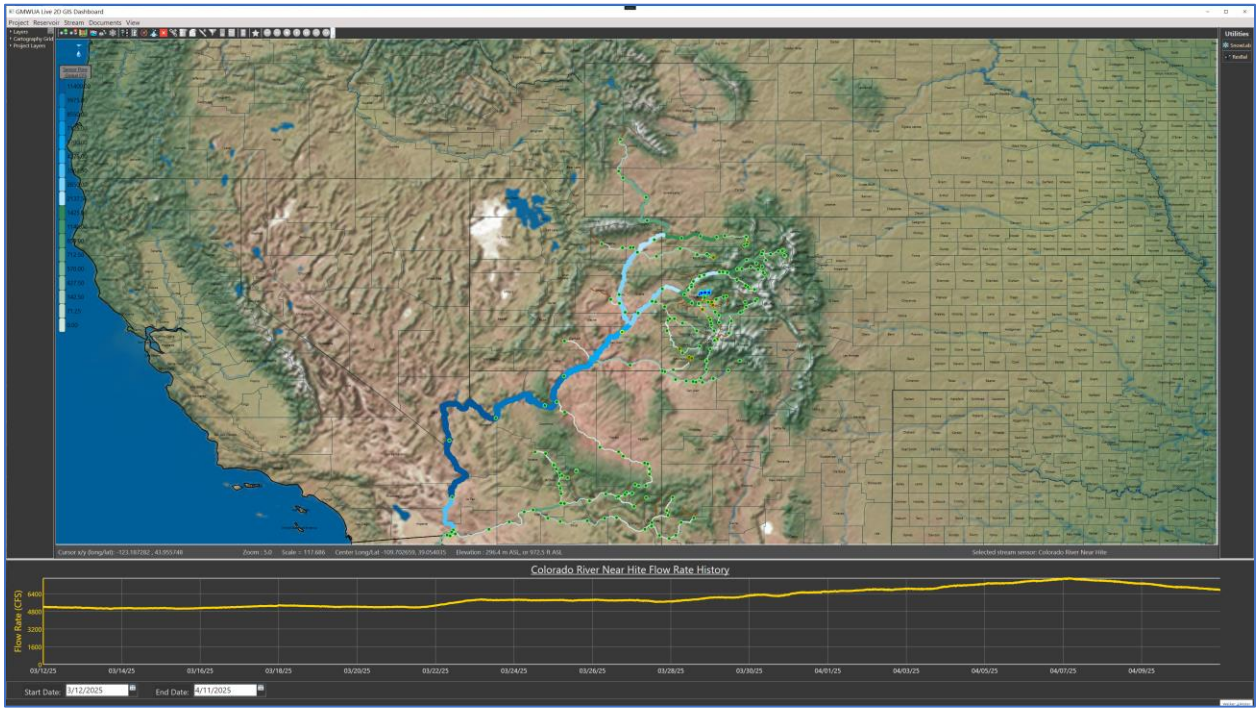
Company Background

Walker Water is a technology services company founded in 2021 by John Walker, and built upon his strong passion for conservation, and knowledge of how the complex irrigation system in the Surface Creek Valley of Western Colorado works. The development of our technologies is based upon what we learned as irrigators and water users ourselves within this valley.

We are a software development and irrigation system consultation services company whose charge is to build administrative tools that help the water administrator to ensure the accurate and timely delivery of their water to the rightful user and allow ditch companies or even individual users to know what water is flowing in their ditch.

Introduction

This project is a built upon the existing 2D GIS and 3D visualization software developed by Walker Water that shows water flows in rivers, streams and ditches throughout the globe. The illustration below shows stream flows read from sensors in the Colorado River Basin in the 2D GIS system. The map of the United States is a simple low-resolution image loaded into the canvas. However, once the user zooms further the image becomes pixilated and no longer useful, and the program removes the image and simply displays a solid background color for each state.



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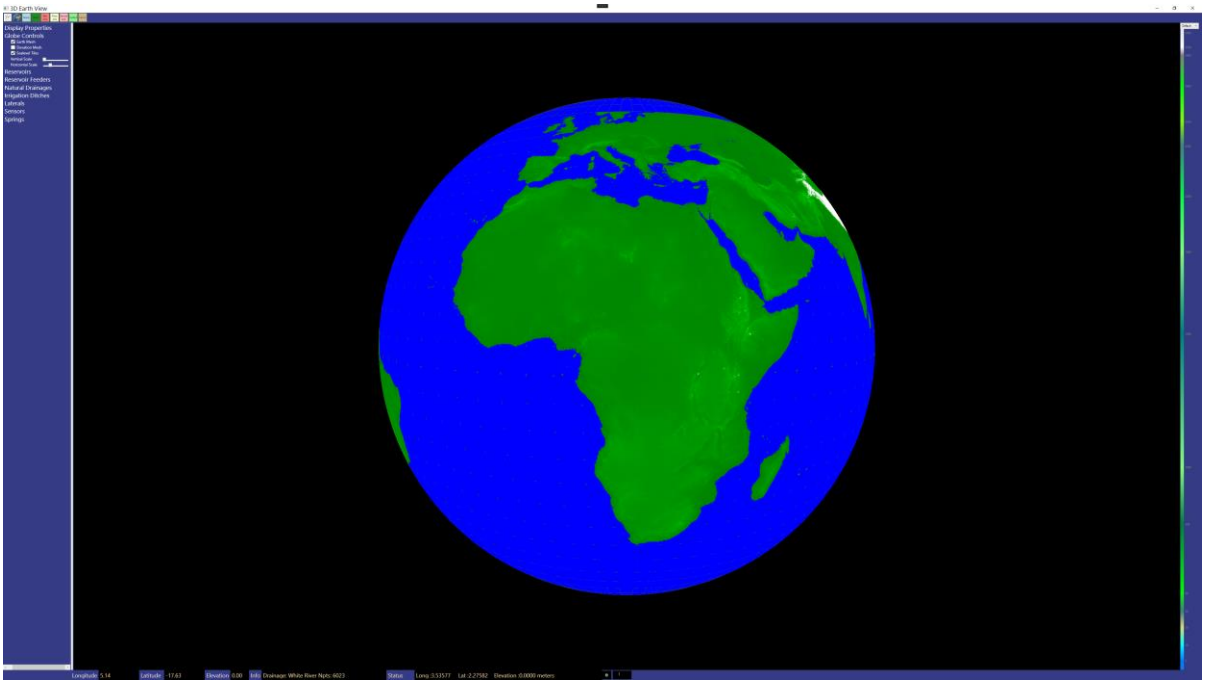
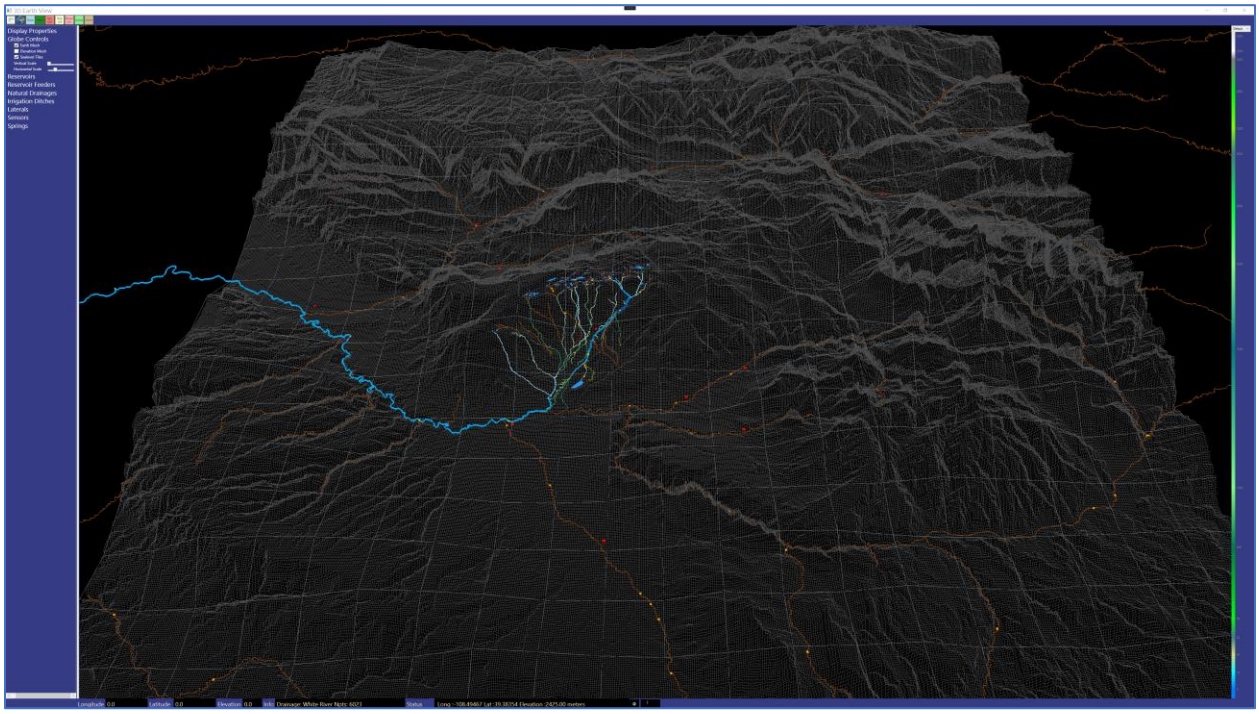
The image of the globe below shows elevation data across the globe. The elevations displayed at this scale are low resolution, a 3km grid.



As the user zooms in the display will change so that just the area of interest is displayed, and in the illustration below, in a 3D mesh. The 3D mesh uses higher and higher resolution as the zoom level increases. Current resolution ranges from 3Km, to 300M, to 30M and then ultimately to LiDAR resolution, 1M. The elevation data is stored on local disk.



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Work Description

The main challenge here is the efficient use of the elevation data (and even perhaps images). At the moment, the 3D program loads the entire globe of elevations into memory at program startup. This bogs the program down and makes it slow and practically unusable. Once the program changes from globe view to tile view, the program attempts to be more practical and load only the tiles necessary, however this is still very clunky. The 3D program does not currently read or load the LiDAR resolution data, and this will need to be implemented. The 3D viewer is written in C# and uses OpenGL graphics commands.

The 2D GIS system loads the image of the world at startup. Once the zoom level increases, the image becomes unusable as it is too low a resolution and so becomes blurry at higher zoom levels. Could we find higher resolution images that we could use as the zoom increases? Or should we use the elevation data and create a shaded contour display? In either case, there will need to be an elevation and/or image tile manager that loads only the appropriate portions of the data based upon the size of viewport.

In summary, the goal of this project is to develop an efficient way to load and page in/out the desired data, whether elevation or images, based upon the zoom and the part of the world being displayed.

The team will work closely with Walker Water developers to implement this within their system.

Student Skill Set

Our 3D software is written in C# in Windows .Net8 and WPF. The 3D environment uses OpenGL. The students will be working directly within the Walker Water system.

Team Size

The team size should be a minimum of 2 but certainly could support 5 or 6 members.

Internship Possibilities

Walker Water would be delighted to offer internships. This would be a function of our financial condition at the time, and we anticipate this may be a possibility.

Work Location

Work can be performed remotely. We deploy a git repository that supports collaboration amongst team members who can be located anywhere. Since we live in Cedaredge, we would not ask nor require anyone to visit our office.

NDA

We will require an NDA for this project. The Walker Water software is proprietary and as such we want to protect our investment.

Intellectual Property

Walker Water will retain ownership of all code developed theretofore.

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