

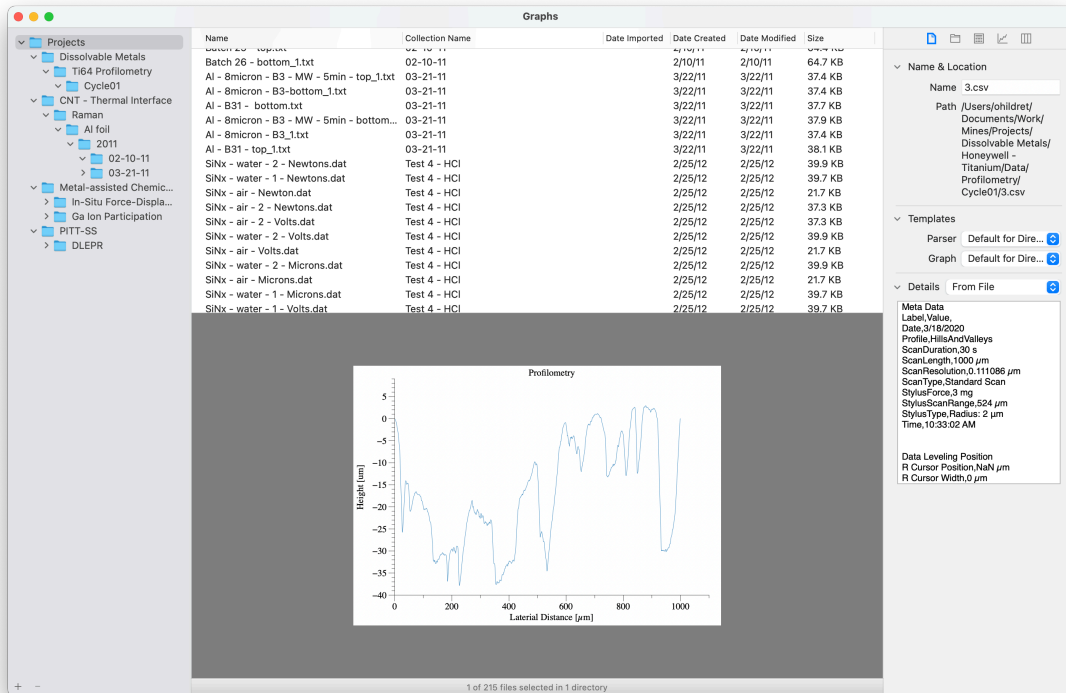
# Graphs Update

## 1. Company Background

Dr. Owen Hildreth is an Assistant Professor in the Department of Mechanical Engineering at the Colorado School of Mines. His primary research is on nanometer to centimeter-scale additive manufacturing technologies. He has written numerous MacOS applications for custom data-collection and visualization as part of his research.

## 2. Project Description

As a graduate student, I wrote a macOS program to organize, parse, and graph my data. This original version, called GraphBase, was written in Objective-C and needed to be updated to keep running. Last year, I sponsored an undergraduate C.S. student to rewrite the program, now called Graphs (<https://github.com/HildrethResearchGroup/Graphs>), in Swift using Apple's latest APIs. Graphs is working great and I would like some help adding some additional features to the application to improve performance and easy-of-use (see requirements below).



This is an opportunity for a group of 3-5 C.S. students to get experience with Swift, writing GUI-based applications using Apple's latest API's, incorporating Reactive frameworks (specifically Combine) for multithreaded applications, and working with an existing codebase.

We would like to continue this work by adding or improving the following features:

Required features:

- Add multithreading to the parser and graph controllers so that opening up large files doesn't block the UI and main thread
- Add an option to "skip data" for large files
  - e.g. only graph every  $N^{\text{th}}$  data point.
  - this will require that you come up with some scheme to determine this and a UI for the user to select or deselect this option.

- How will the user know this schematic is being applied to a particular graph/data file?
- Add an option to filter out files when dragging and dropping entire folders worth of data
  - e.g. only include the targeted .txt type of files and don't include images into the database
- Add visual feedback on parsing/loading operations
  - how much is done for loading operations that take longer than some amount of time?

This project is an excellent opportunity for students to create a graphics-based application with immediate real-world applications. Students will get experience with Swift, macOS API, GUI design, and application design.

### **2.1 Deliverables**

1. Final design report (mandatory for all teams)
2. Working application that includes the feature upgrades listed above
3. Clearly documented and marked up code that also leverages jazzy to create the API documentation

### **2.2 Summary**

Improve the Graphs program.

## **3. Desired Skill Set**

Curious, self-motivated, students interested in making useful applications. Experience writing applications for macOS, iOS, or the Swift programming language is a plus.

## **4. Preferred Team Size**

3-5 students

## **5. Internship Opportunity**

Lab research opportunities continuing application within Hildreth's lab.

## **6. Location for Work**

Off-site and on-site at Colorado School of Mines.