

Analysis Paralysis

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

The graduate students in my research group collect a lot of data. A lot. We've written programs to organize that data, so that is cool. However, organizing the data is only half the battle. The other half is analyzing the data – and it seems like that is the hard part. Students collect data but don't analyze it unless they must. The objective of this project is to make data analysis easier by integrating analysis seamlessly into the organization step.

For this project, the team will build a proof-of-concept app-to-app communication protocol that will allow our Data Organization application (Fluffy) to call a separate, external program to run an analysis script (Matlab for example), and then read the results back into the Data Organization application. This will allow engineers and scientists to have a simple UI for organizing and reporting their data while providing access to today's power analysis programs.

The applications will be written for macOS using Swift 5.6 and leveraging the latest SwiftUI API's. Students will learn Swift 5.6, desktop-level API's, Apple-oriented App-Architecture design, and inter-app communication strategies.

Required features:

- Develop a json-based grammar for inter-app communication
- Develop a proof-of-principle application that:
 - takes in a file to be analyze
 - reads a json processing file
 - calls the appropriate application to run the designed analysis script
 - reads and displays the analysis results in the application
- Must use Swift's async-await capabilities for structured concurrency
- Must handle errors and failures gracefully

This project is an excellent opportunity for students to get experience with Swift, driver design, microcontrollers, and application design.

2.1 Deliverables

1. Final design report (mandatory for all teams)
2. Working proof-of-concept application
3. Clearly defined grammar for inter-application communication through json files
4. Clearly documented and marked up code that also leverages jazzy to create the API documentation

2.2 Summary

Fix analysis paralysis

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. Internship opportunities at National Labs

6. Location for Work

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