

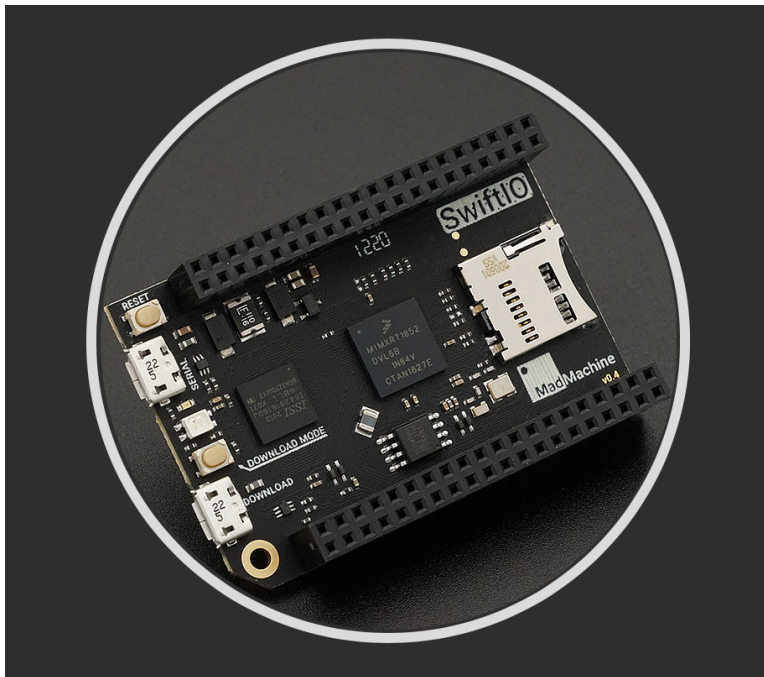
# SwiftIO VISA Driver

## 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

My group develops a lot of custom software to control our instruments, often with the help of CSM computer science students. One of our larger projects has been to rewrite the VISA communication protocol in Swift (Apple's default language for macOS and iOS). This SwiftVISA project (<https://github.com/SwiftVISA>) has been a great success in our group and we would like to be able to use this package to control some of the microcontrollers we use to control some of our smaller instruments. Specifically, we recently started testing out some new SwiftIO microcontrollers (<https://www.madmachine.io>) and we would like to make a VISA-compliant driver to run on the SwiftIO microcontroller. This would allow us to use our existing SwiftVISA APIs to dynamically interface with this boards and the instruments they control. For example, we could use them to monitor and control the mass flow controllers for our furnaces or create a better interface between our dispensing printer and syringe pump.



The objective of this project is to develop a VISA-compliant driver/server running on the SwiftIO board so that we could send VISA read/write commands to the boards to control their inputs and outputs.

Required features:

- Develop a VISA-compliant driver running on a SwiftIO board that will read in string commands, parse the string to VISA commands, convert these VISA commands to the native SwiftIO board commands, and then execute the SwiftIO commands.
- Take a VISA read string command, collect the requested data from the SwiftIO board, and return a VISA-compliant string.
- Write a SwiftIO driver for UART-to-USB communication (read/write)

- Write a SwiftIO driver for a UART-to-Bluetooth communication (read/write)
- Write a small application demonstrating the capability to read a digital in, analog in, and write a digital out.

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 drivers 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**

Develop a VISA-compliant driver for SwiftIO microcontrollers.

## **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.