

EE CprE SE 491 Weekly Report 2

September 8th – September 22nd

Group number: sddec26-06

Project title: VIS-NIR Spectrometer

Client and Advisor: Dr. Avishek Das & Dr. Manojit Pramanik

Team Members and Roles:

Samar Gill – Optics & Documentation

Ryan Majstorovic – Embedded Systems & Hardware

Dawson Posekany – Embedded Systems & Optics

Evan Tamer – Optics & Hardware

○ **Weekly Summary**

Over the last two weeks our team has completed the 3D print of our calibration device. This device will house our 4 laser diodes that we will use to calibrate our CCD device. Currently there are a few issue with the axis alignment for the calibration device (see pending issues regarding this).

○ **Past Week Accomplishments**

As part of the Week 1 review, the team documented the technical baseline established last semester. The TCD1304DG CCD, STM32 microcontroller, and supporting driver electronics have been integrated, providing stable detector readout and data transfer at 125 Hz. The GUI can receive, display, and save spectral data at the same acquisition rate, and the software includes dark and bias subtraction and pixel-to-wavelength calibration. The team also confirmed the preferred optical architecture, purchased the laser diodes needed for the calibration device, and began assembling that system. Based on this baseline, the team identified the remaining work required to combine the optical, embedded, and mechanical elements into one calibrated and testable spectrometer.

○ **Pending Issues**

The main pending issues are the design of the calibration module, the effect of harmonics in the incident light, and the repeatable placement of lenses inside the device housing. The team must also confirm whether any additional components need to be ordered before integration begins. These items affect measurement consistency and must be resolved before the system can collect reliable reflectivity data. The schedule is also a concern because assembly, calibration, and experimental work need to be completed by the end of October to keep November available for analysis and presentation preparation.

○ **Individual Contributions**

<u>Name</u>	<u>Individual Contributions</u> <i>Quick list of contributions</i>	<u>Hours this week</u>	<u>Hours cumulative</u>
Samar Gill			6

Ryan Majstorovic	Documentation writing for the low-level documenting of the GUI functionality. Attempts to extract data frames utilizing the cal device.	5	11
Dawson Posekany			5
Evan Tamer			6

○ **Comments and Extended Discussion**

The team established a recurring Monday stand-up to review progress completed since the previous Thursday, identify current blockers, and confirm planned work through the next Thursday. In-person lab sessions will be used for integration and calibration work that requires shared equipment. This meeting schedule is intended to keep experimental work moving early in the semester and reduce the amount of laboratory work required near the final presentation deadline.

○ **Plans for the Upcoming Week**

Samar will document the optics requirements, calibration approach, and lens-positioning concerns. Ryan will prepare for embedded-system and hardware integration and will work with Evan on the calibration module during the next lab session. Dawson will support the optical and embedded integration work and help identify system-level issues that could affect data acquisition. Evan will attend the in-person lab session and support calibration-module and device-housing work. As a group, the team will confirm required parts, define the integrated module's test procedure, and prepare to collect initial reflectivity data.

○ **Summary of Weekly Team Meeting**

The team agreed that the existing proof of concept is ready to move into integration, calibration, and data acquisition. The next milestone is to assemble one complete module, calibrate it, and collect data that can be included in the final presentation. A possible application was discussed with a chemistry and materials science lab that currently uses a large commercial reflectometer to measure thin-film thickness. The team will complete laboratory experiments during September and October whenever possible, then use November to consolidate results, document the system, and prepare the presentation.