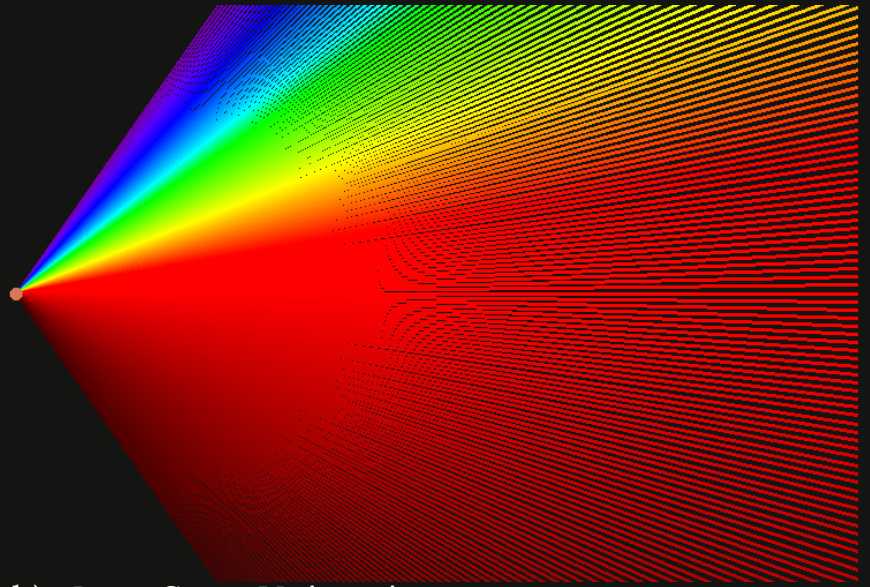
Portable VIS-NIR Spectrometer

400–1000 nm



Team: sddec26-06
Client: Dr. Avishek Das · Biomedical Imaging Lab (BILab) · Iowa State University

Ryan Majstorovic · Dawson Posekany · Samar Gill · Evan Tamer

Goal & Motivation

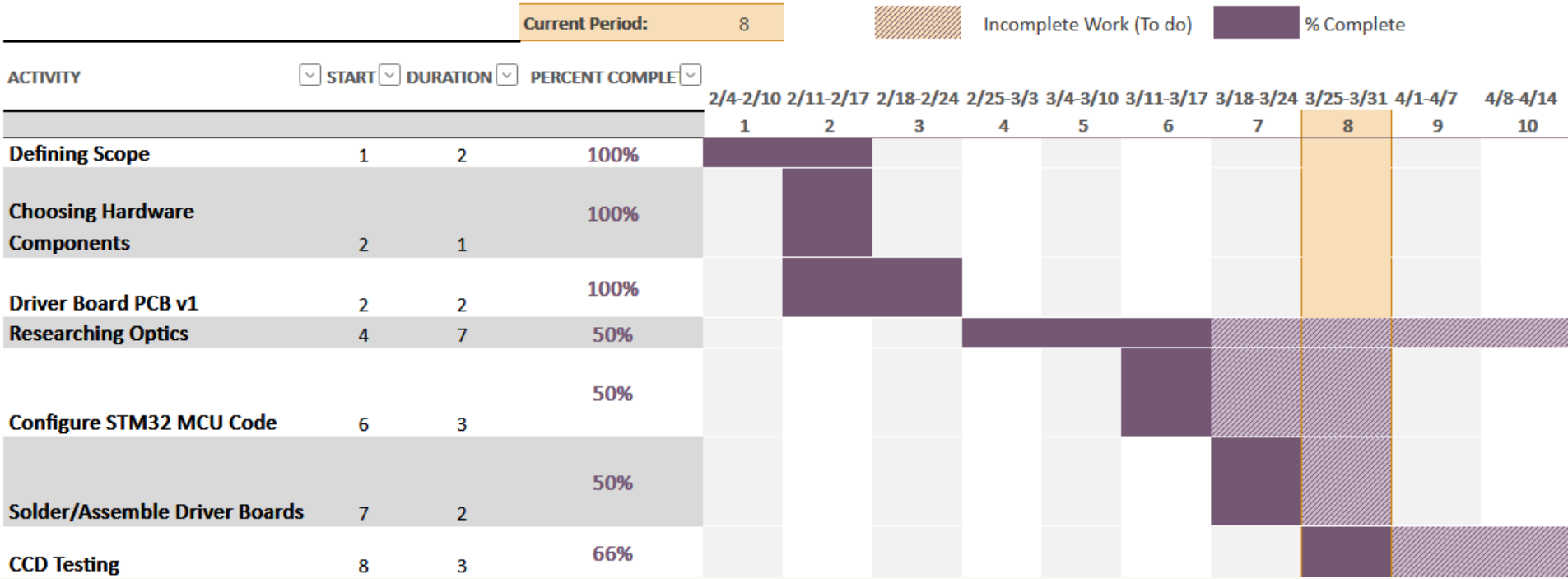
Project Goal

Our device will assist in biomedical imaging research being conducted at the BILab. The device will include the features:

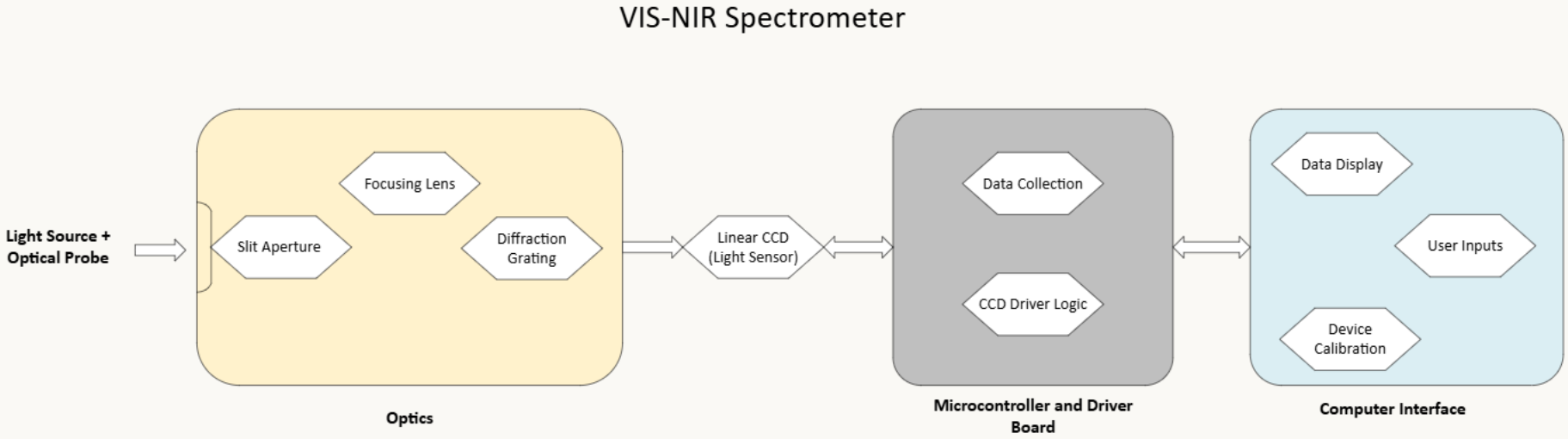
1. Measure the spectral profile of unknown, and lab made light sources
2. Log spectral data over time
3. Versatile benchtop or handheld operation

Research performed in the BILab @ ISU

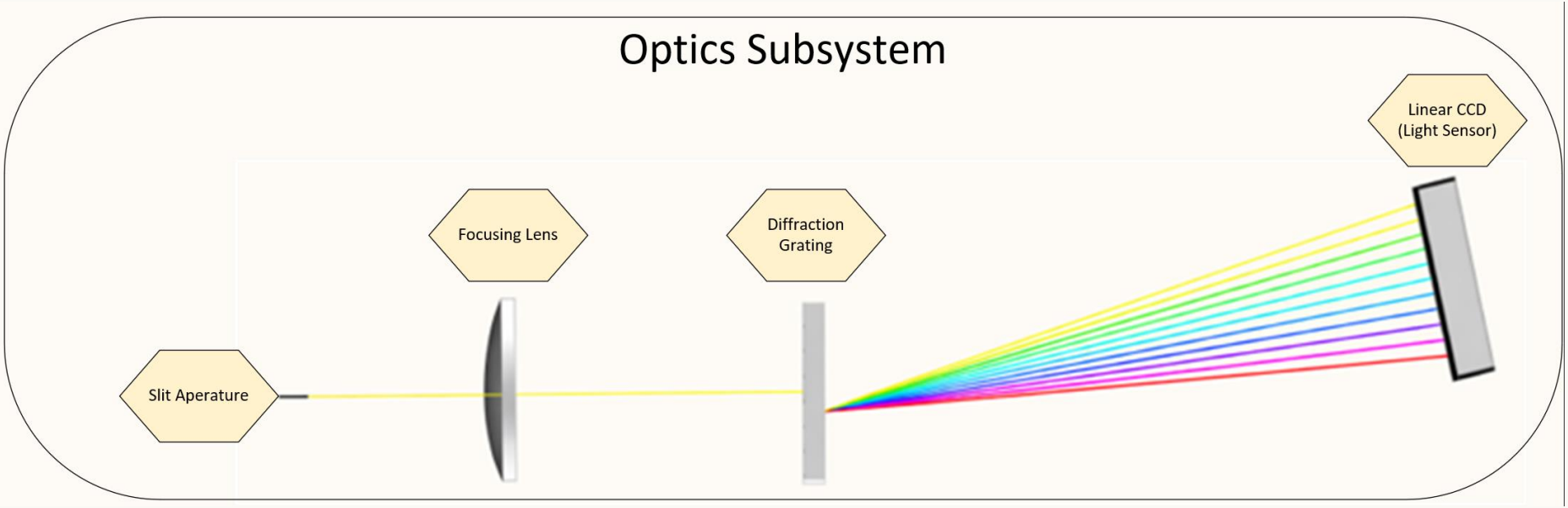
Project VIS-NIR



System Overview



Optics Subsystem



Microcontroller & CCD Subsystem

1

CCD Readout

Output voltage signal generated by CCD

2

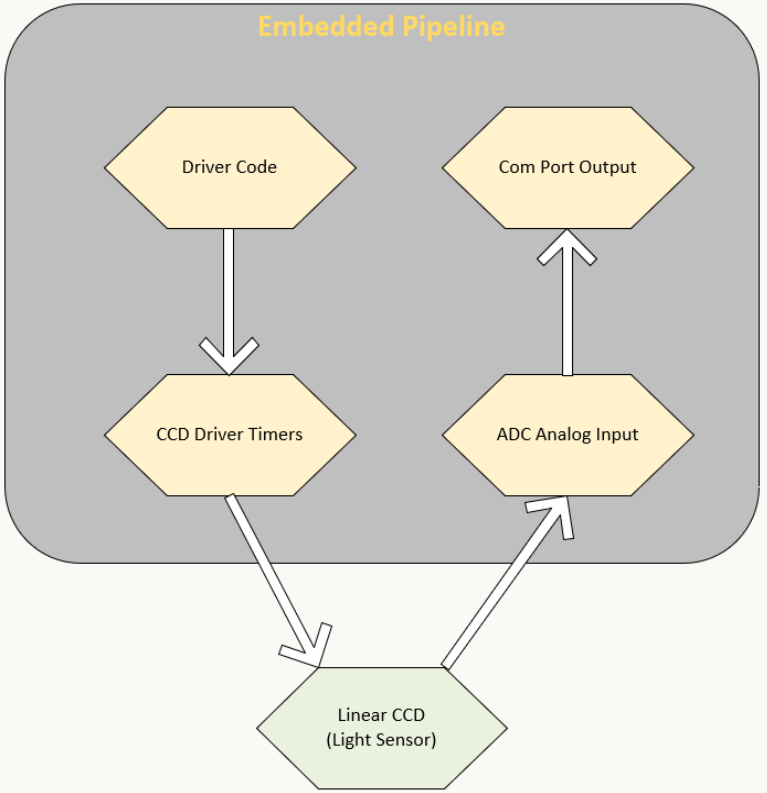
ADC Data Acquisition

Raw pixel array acquired via STM32 ADC + DMA

3

Output to Desktop

USB serial stream to Python host; captures uncalibrated spectrum



Challenges & Mitigations

Challenge	Mitigation Strategy
Stray light contamination	Optical slit aperture, 3D printed enclosure, Coated Lens Filtering
Optical Alignment	Confinement and alignment testing on tabletop prior to 3D printing the housing.
Calibration Procedures	Mapping known wavelengths to the pixel position on the CCD
2nd-order diffraction reflections	Dual operation modes (400–750 nm and 600–1000 nm) or linear edge pass filter

Questions?