CLEO mapping unit enclosure design

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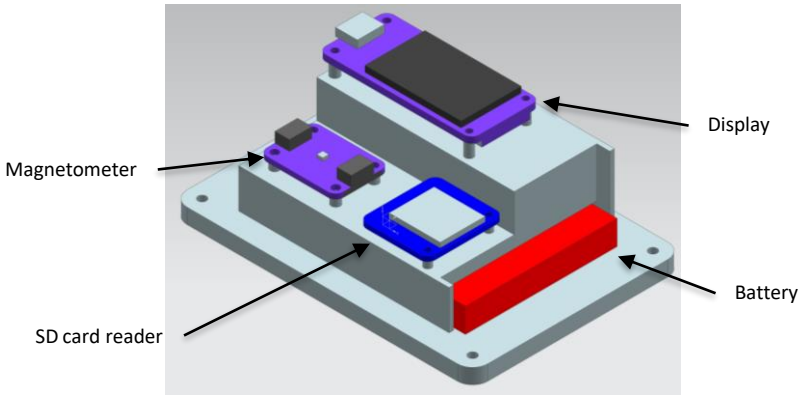
The Hall A CLEO magnet will be mapped using an array of magnetometers. The data acquired by the sensors need to be recorded and saved, as well as displayed locally. Three Adafruit components have been selected to make the measurements (LIS2MDL magnetometer), store (SDIO µSD card reader), and display (ESP32-S3 TFT Feather display) the data. In addition, these components will need a battery connected to supply power (P238D lithium Ion battery).

This month I started the design of an enclosure to accommodate the components using NX12. Once the enclosure design is complete, I will use a 3D printer to produce a prototype.



CLEO mapping unit base

Initially, I researched all the components to get the basic dimensions of each part. Adafruit's database provided the dimensions or the PCB design files for the magnetometer and the SD card reader. The dimensions for the display were incomplete, as the size and locations of the mounting holes were not provided. To get accurate dimensions, I measured the mounting holes and their positions with a micrometer.

- Design basic models of the internal components of the mapping unit
- Design the base of the mapping unit enclosure

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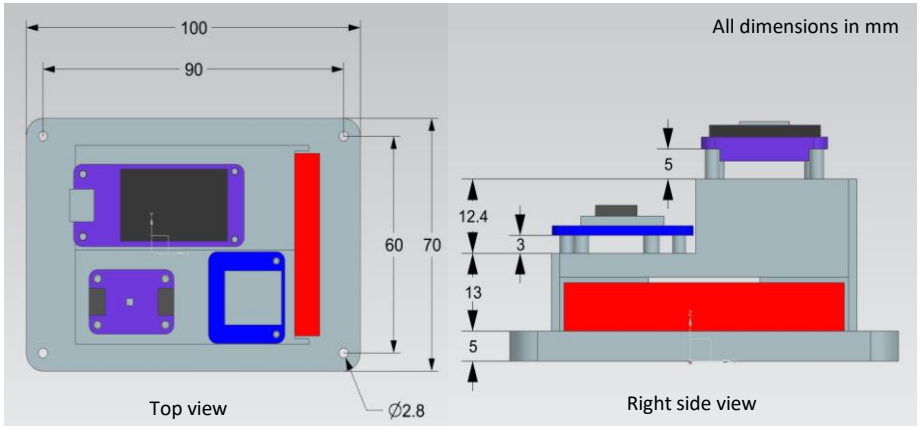
The base design started with a 5mm thick bottom with countersunk holes for screws to secure the enclosure top. After that, I added a 25.4mm (1”) block, and strategically removed material to make a pocket for the battery at the bottom of the block. The battery pocket has a pass-through for the power cable to extend to the display. The display, SD card reader, and magnetometer will be mounted to the top of the block on standoffs. The top of the block is designed so the display sits above the card reader and magnetometer to allow adequate space for routing data, clock, and power wires between the components, while keeping the area over the display clear for viewing.



After the base is complete, I’ll design the top with a cut-out so the display can be viewed from above. When the design for the top is completed, I’ll print a prototype and check for fit and hole positions. After making all necessary changes, a total of eight enclosures will be produced for operational use.