**Design Requirements:**

* DEMO: Week of Dec. 4th
* Final Report: Friday of finals week
* Quality fitted specific case built for the unit
* Fabricated circuit board
* Must be able to run for at least 1 hour.
* Must be able to output to three locations at all times.
* Some form of display that will display when GPS is locked on or searching for satellites.
* Device must be battery powered
* Working GUI: Start Display that displays data transferred from the USB stream of connected device. Must fail gracefully if no USB stream available allowing user to return to main screen. Must display 2 sections of data, GPS and IMU and update values in real time as received.
* The GUI should not “scroll” or “list” long data, but update fields for Latitude, Longitude, Elevation, Angular Velocity X, Angular Velocity Y, Angular velocity Z, Magnetic Field X, Magnetic Field Y, Magnetic Field Z, so that only one number is presented for each data field at any given time.
* GUI must include End Display that will return user to the main menu as well as easy method to gracefully close application at any time (Kill switch)
* A continuously growing (as device is powered) CSV log file that can: overwrite the previous file that was on the SD card, time stamp them and save them all until manually erased. ***OR*** append to a file until it is erased. ***Timestamp method is preferred. A header that specifies columns are required.***
* CSV can be USB data steam; must be able to save the stream to a CSV file and open it in a spreadsheet program.
* Interface with 4 separate devices (Processor, IMU, GPS, Radio) using SPI, I2C, or UART
* GPS: Latitude, Longitude, Elevation( model specified: Ellipsoid, Geoid, MSL), Number of Locked satellites.
* IMU: Angular velocity in radians per second for X, Y, and Z axis, Acceleration in m/s^2X, Y, and Z axis, and Magnetic field in uT for X,Y and Z axis of your device.

**Design Constraints:**

* Nothing repurposed for the case
* Budget: $250
* The sample rate will be based on the slowest device connected, possibly slower due to time it takes to read and write from each device.
* Integrated Wifi for raspberry pi and others of that nature are off limits. Devices must be separate from processor
* Look into small embedded solutions and modern processors
* Look for integrated USB and SD card to save time and not build one yourself.
* No all-in-one COTS solutions that echo processor output after connection alone.
* GPS accuracy is not the concern, sending data to SD card and device communication is the priority.
* IMU with 9 degrees of freedom to report magnetic field in uT.
* The outputs must have ability to be active at the same time