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This Folder contains the design files for the AERO-VISTA Auxiliary Sensor Package (ASP). This system provides ~10 nT noise floor magnetic measurements in three axes at 50 Hz datarate with a Raspberry Pi computer serving as the payload computer.

The system integrates two HMC1053 based magnetometers onto a single PCB with a carrier “Hat” interface with a Raspberry Pi Zero and the necessary interface electronics to communicate with the Raspberry Pi Zero via either Ethernet or CAN.

The reference design could be useful for the following sub-applications.

* Adding ethernet to a Raspberry Pi via W5500 SPI-controlled ethernet controller
* Implementing a magnetometer around the Honeywell HMC1053 or other AMR magnetometer
* Using the AD7779 (or any AD777x product line ADC) with a Raspberry Pi or other Linux device
* Performing low noise pseudo-differential amplification with op-amps

The design and documentation is broken up into the following three categories:

1. **Electronics Design:** Altium files + PDF schematic + design justification
2. **Drivers:** Userspace driver / API for running the magnetometers and saving data
3. **Data Processing:** Scripts for initial processing of magnetic data and a more detailed tool + explanation for performing non-linear regression against a reference source

This repository is primarily intended to serve as a long-term reference of our detailed design. The design in its entirety will not likely work out of the box for any future application, but we hope that the details contained here will help guide future designers performing similar work.

Direct questions to Nicholas Belsten. Available at [nbelsten@mit.edu](mailto:nbelsten@mit.edu) as of April 2022