Magnetometer Characterization for Space Weather Observation

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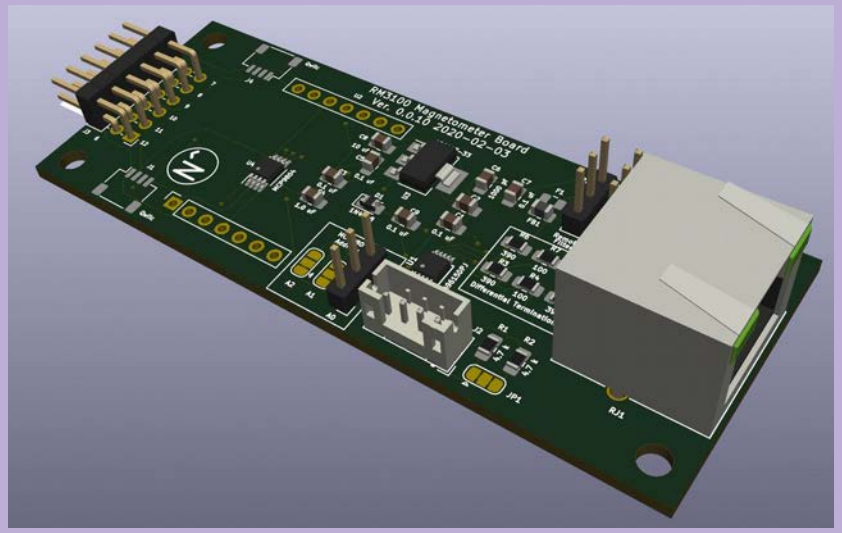
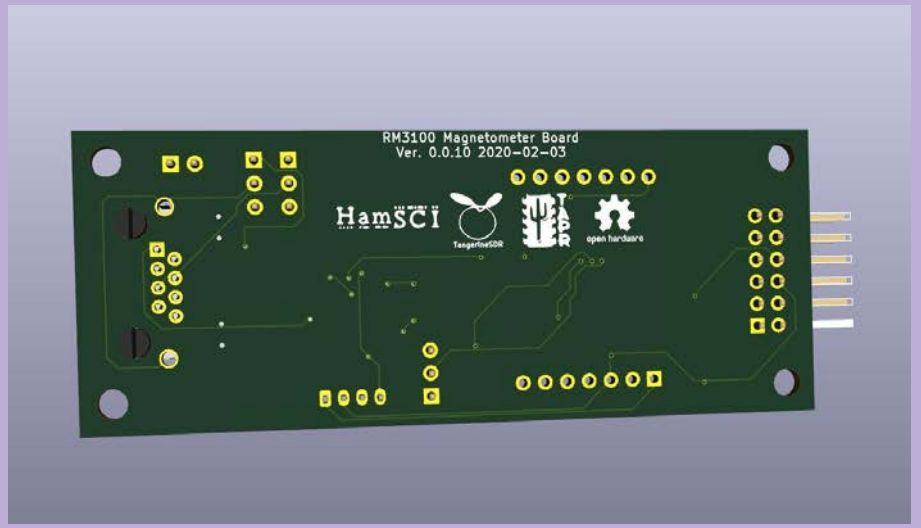
We gratefully acknowledge support to this project from NSF Grants AGS-2002278, AGS-1932997, and AGS-1932972.

Project Goals:
HamSCI Magnetometer Network

- To establish a densely-spaced magnetic field sensor network to observe Earth's magnetic field variations in three vector components.
- Target performance level: ~10 nT field resolution at 1-sec sample rate (note: Earth's magnetic field ranges from 25,000 to 65,000 nT).
- Time-varying field measurement is sufficient: absolute measurement is not necessary.

Prototype 3D Mock-Up





Current Work

- Software driver development
  - Current low level software is evolving.
  - Both low level and user facing software must be created to support further characterization and optimization of the sensors.
  - Support alternative configurations: Arrays, etc.

- Software Utilities
  - Configuration and installation tool.
  - Real Time monitoring.
  - Format translation tools for comparison with calibrated sensors of established quality.

Next Steps

- Evaluate more precise options for specialized experiments.
  - Fluxgate magnetometer modules.
  - Other options.

- Siting and Packaging
  - Optimal packaging for sites in temperate environments.
  - Packaging for extreme environments.

References

PNI Sensor RM-3100 User manual – downloadable from:
https://www.pnicorp.com/download/rm3100-user-manual/

PNI Sensor RM3100 Sales Sheet (datasheet) – downloadable from:
https://www.pnicorp.com/rm3100/

NXP I2C PCA9615 Range Extender IC:
https://cdn.sparkfun.com/assets/a/5/1/3/6/PCA9615.pdf

Microchip MCP9808 Temperature Sensor:
http://ww1.microchip.com/downloads/en/DeviceDoc/25095A.pdf