

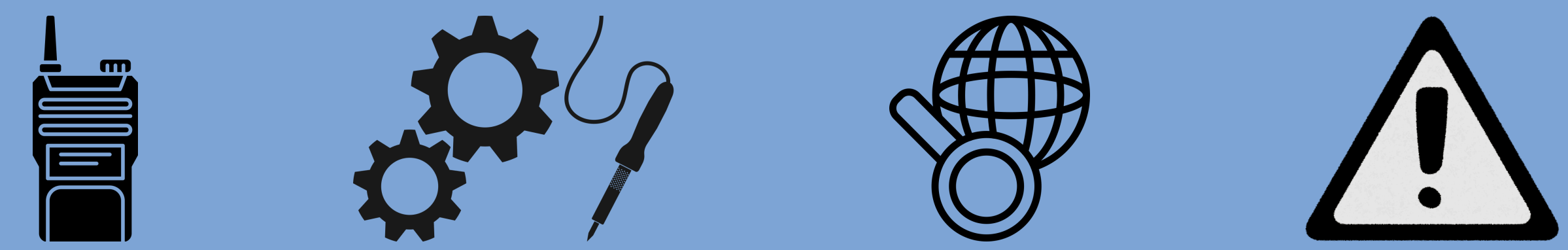
Portable Antenna Rotator

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Background

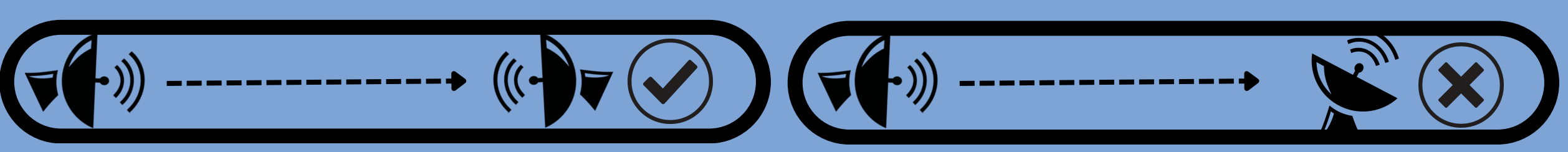
Amateur radio users often conduct adventurous expeditions and support local communities during **emergency situations**.



Two main ways to communicate:

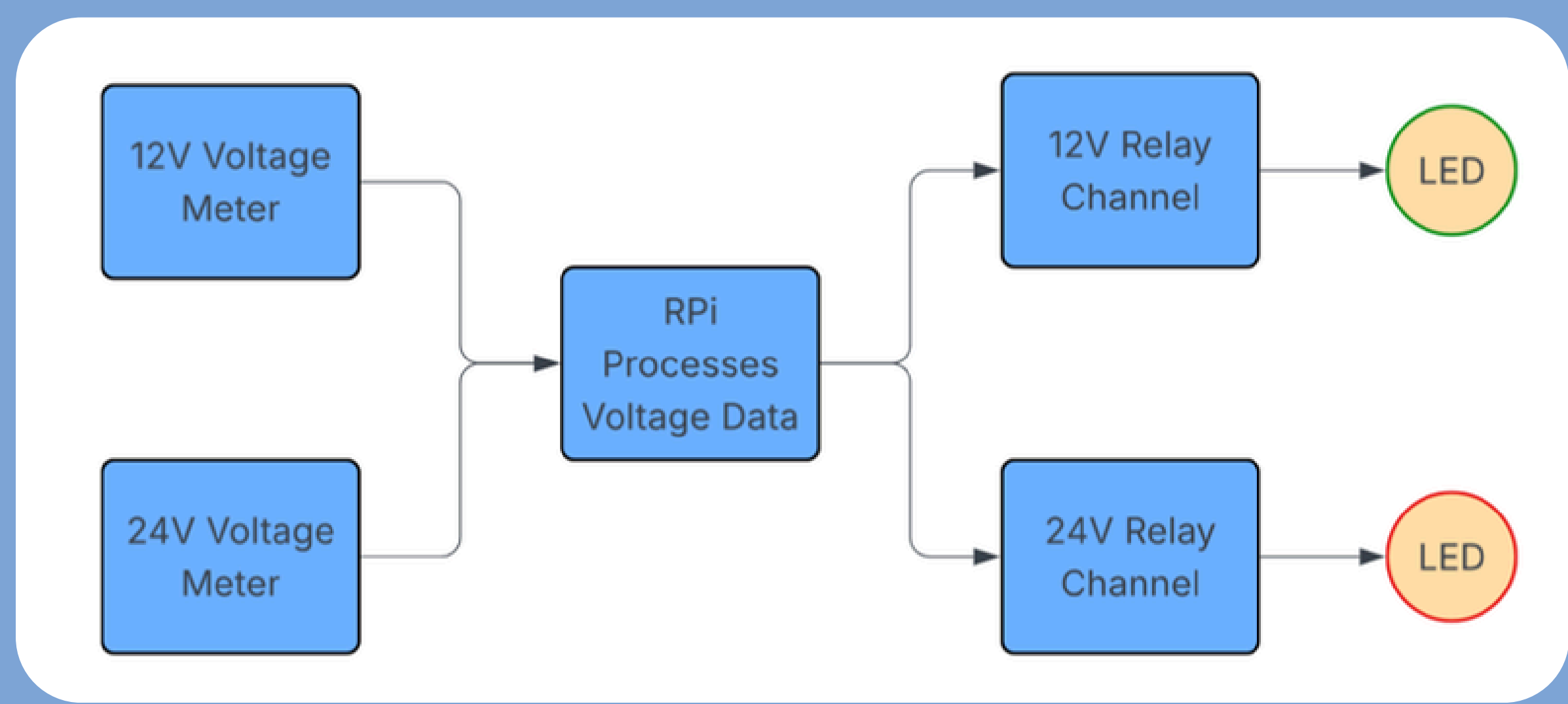
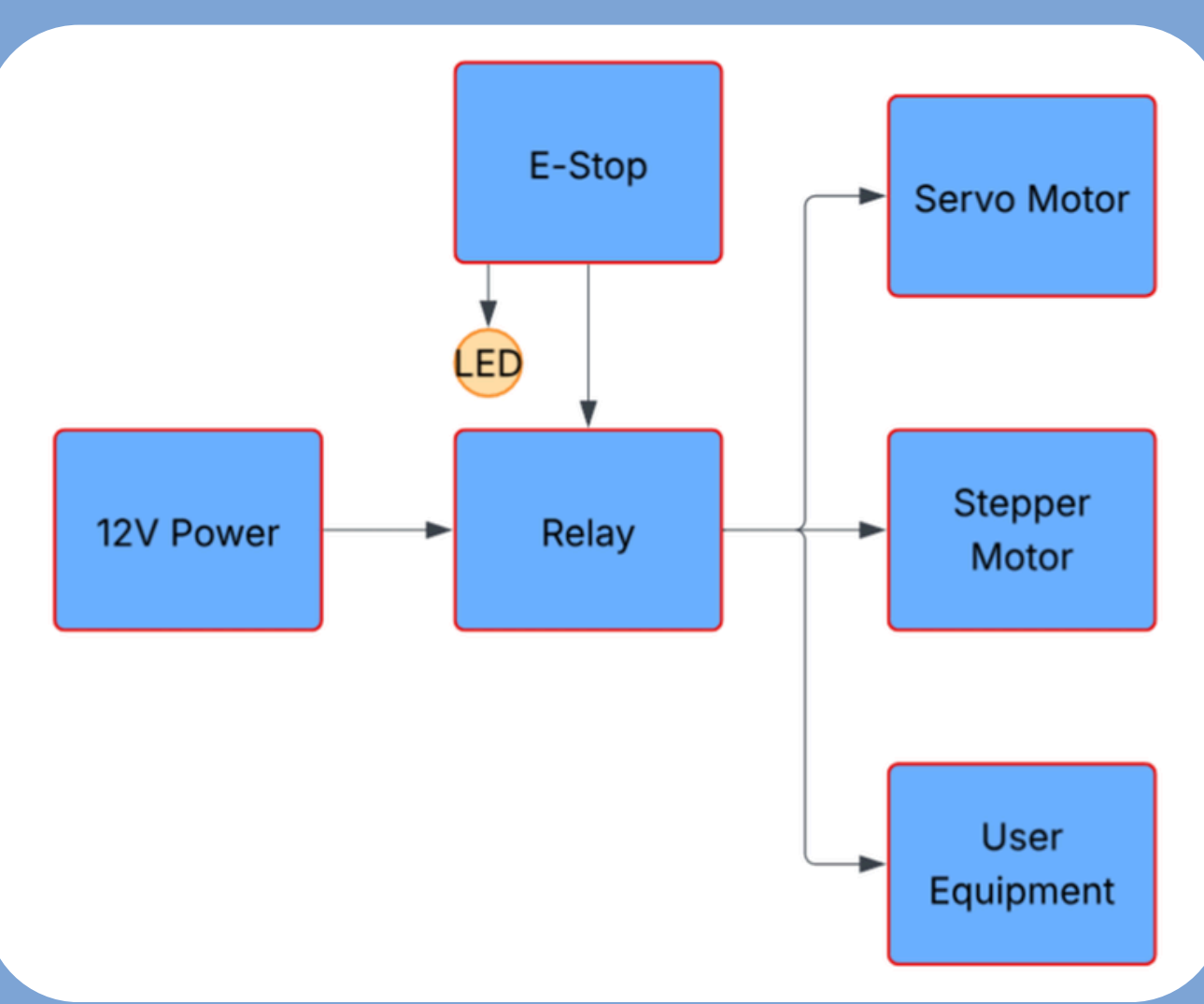
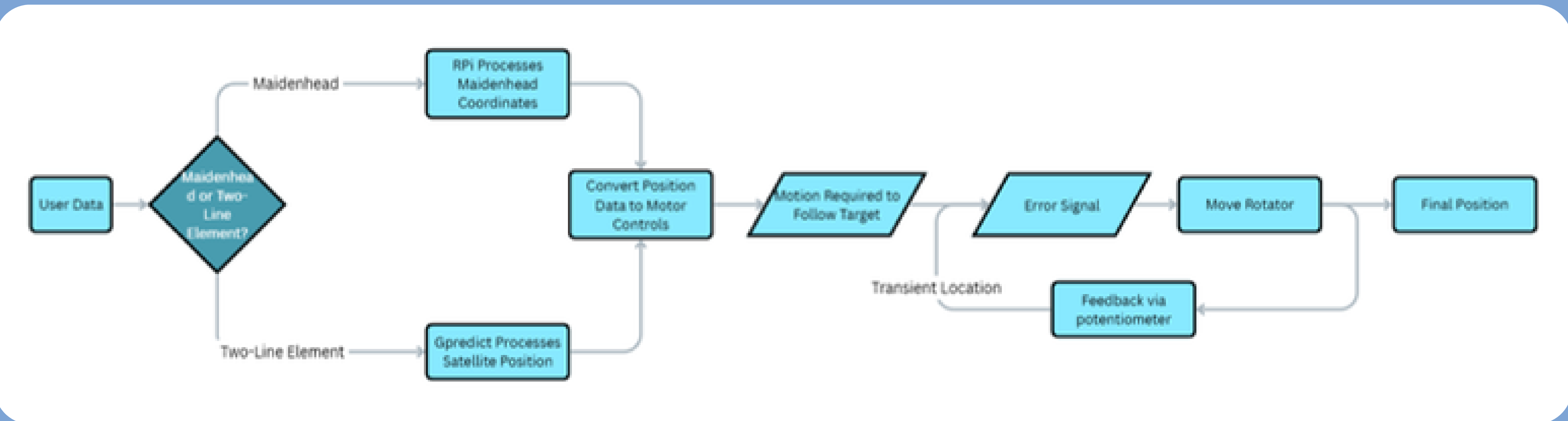


In many cases, long-range communications rely on handheld antenna steering. This method is error prone and consumes precious satellite pass time to figure out.

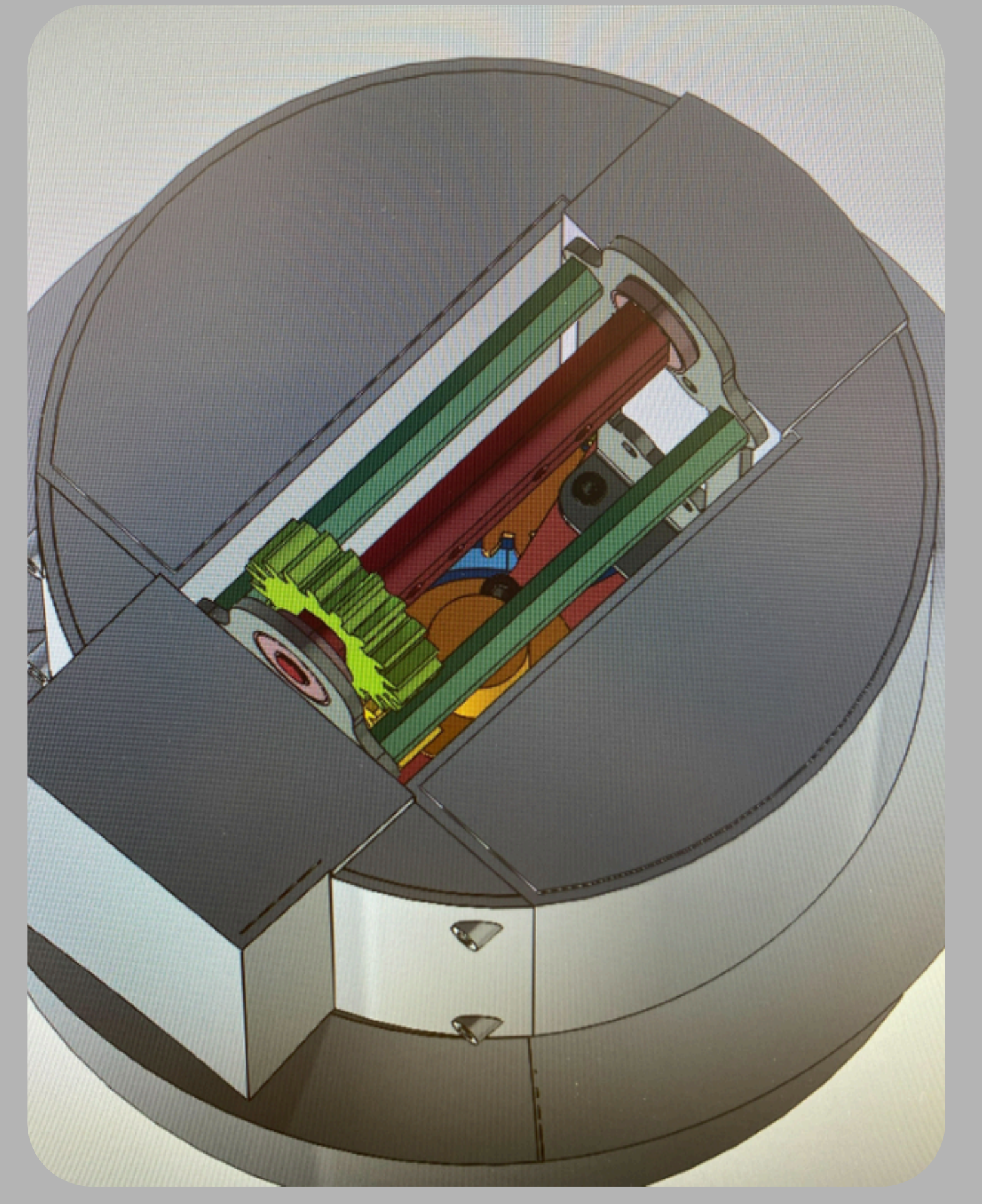
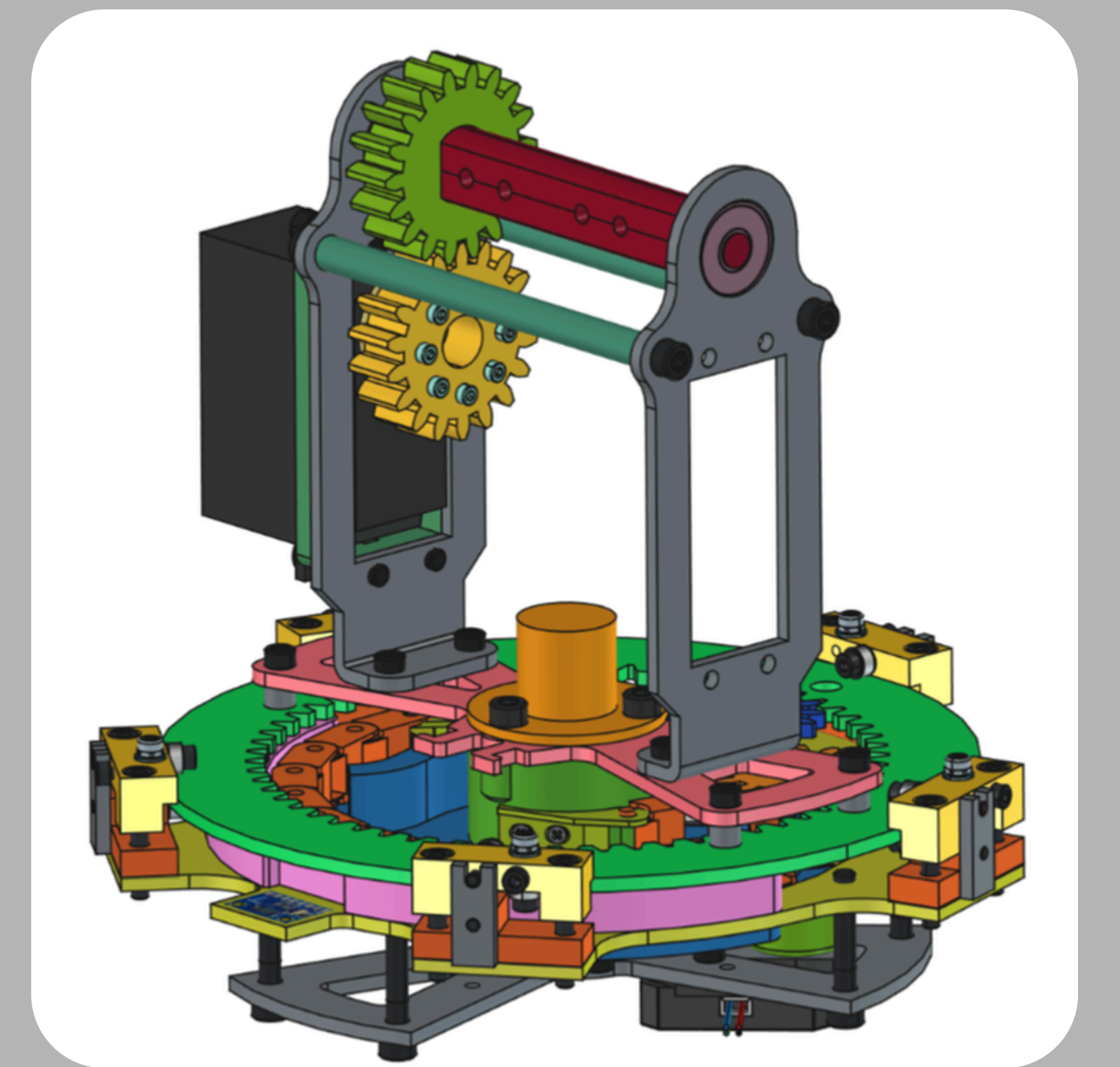


Our project is a **lightweight, portable** antenna rotator which amateur radio users can use to more efficiently communicate over satellite and with other antennas on earth.

How It Works

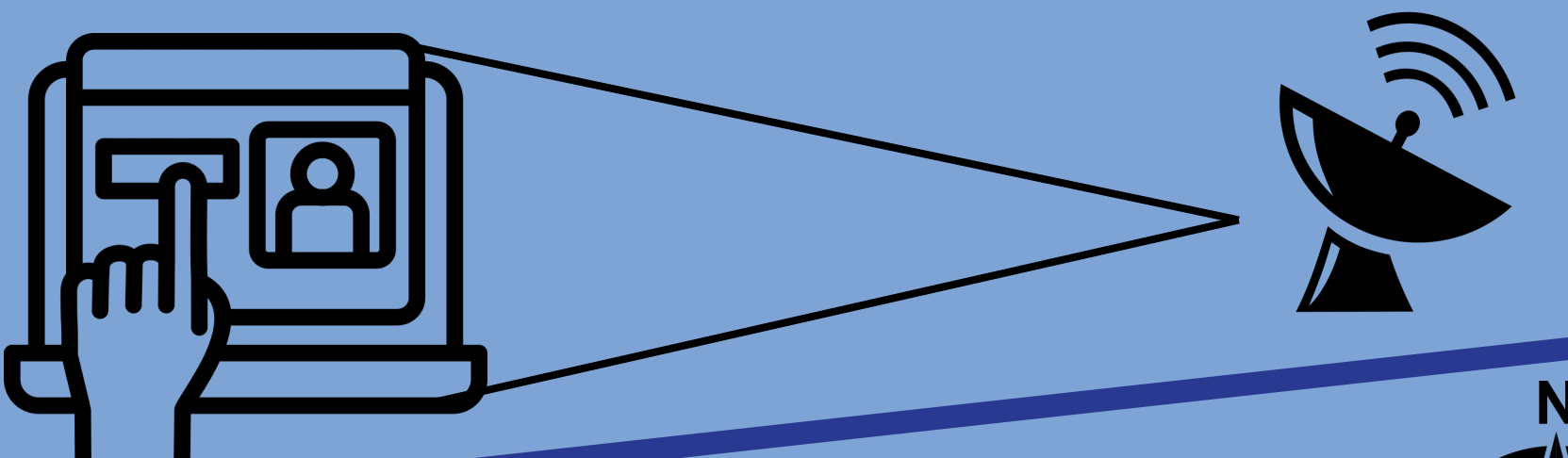


Mechanical Parts



Features

1. Integrated User Interface



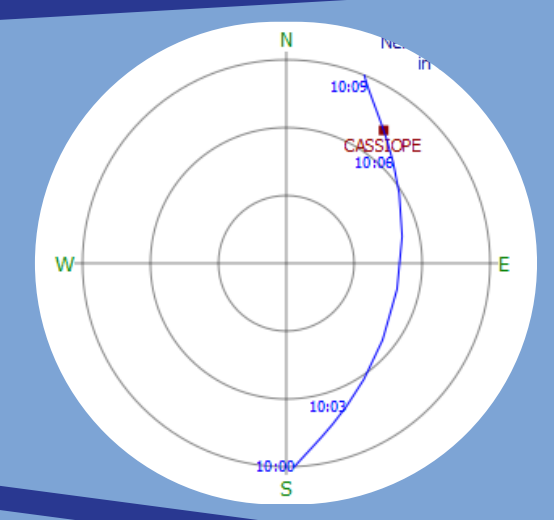
2. Self-Orienting



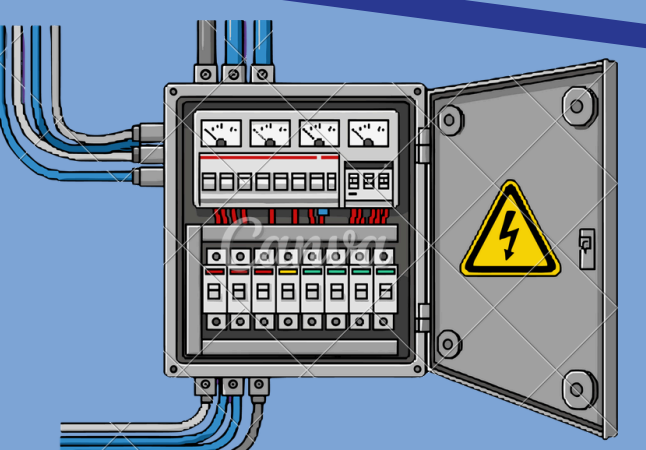
3. Terrestrial Tracking



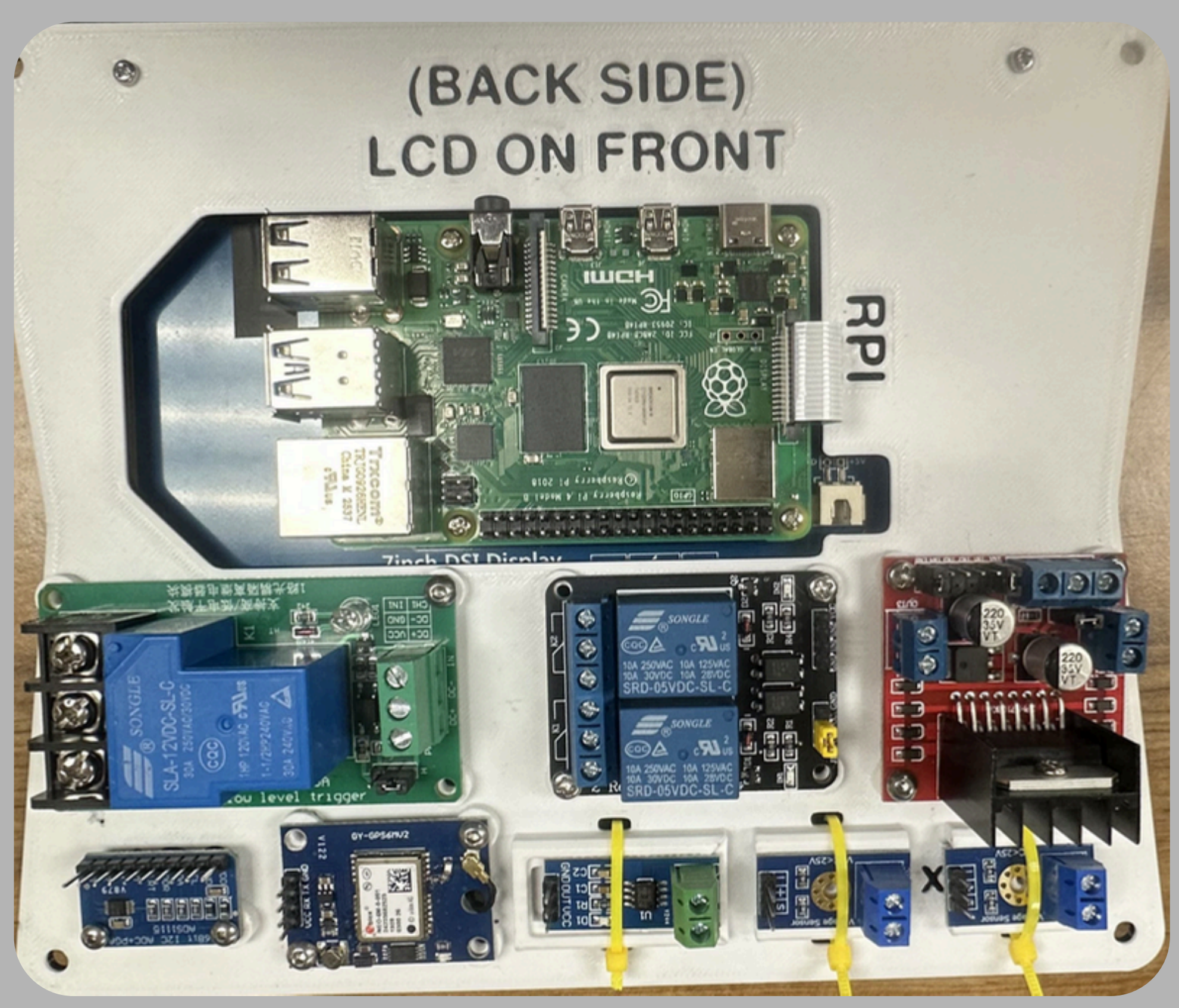
4. Satellite Tracking



5. User Accessible Power Bus

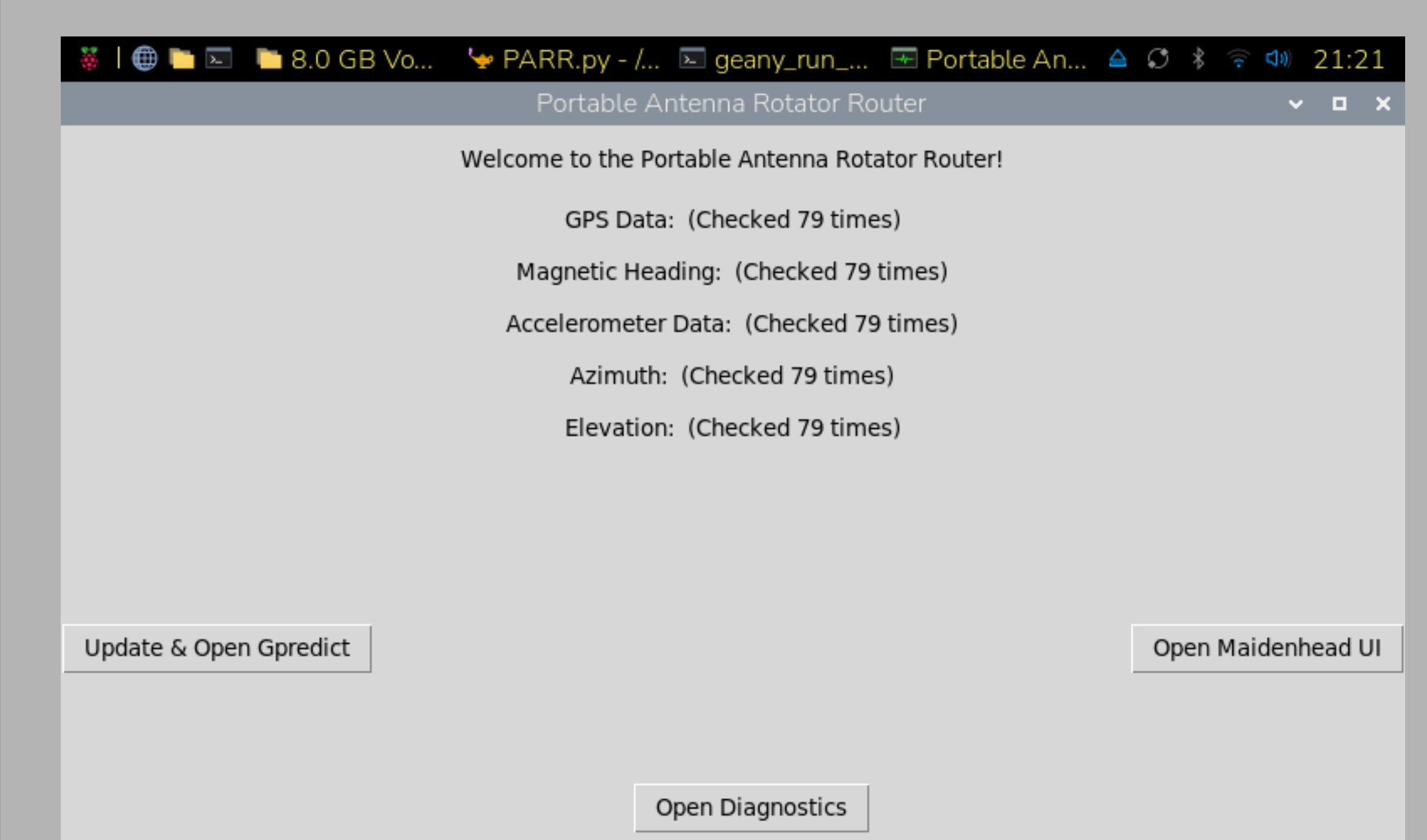


Control Components



A **Raspberry Pi**, **GPS unit**, **magnetometer**, and **accelerometer** control the rotator. **Relays** and **voltage meters** are used to inform the user of abnormal internal power conditions.

P.A.R Router



Gpredict, open source satellite tracking software, processes TLEs and calculates antenna angles.
Maidenhead UI, custom UI for ground station tracking, calculates the required angles to a ground station.
Diagnostics, monitors system voltages, currents, and relay status.

Future Work

- Remove 24V Powerline
- Implement motor protection using relays
- Add UPS to the RPi

Acknowledgements

This project was supported by grants from the Office of Naval Research and the Arctic Amateur Radio Club.