MATS - Mobile Antenna Tracking System

A Smart Portable Antenna Rotator and Satellite Receiver for Weather Imagery

MSOE UNIVERSITY

Problem Statement

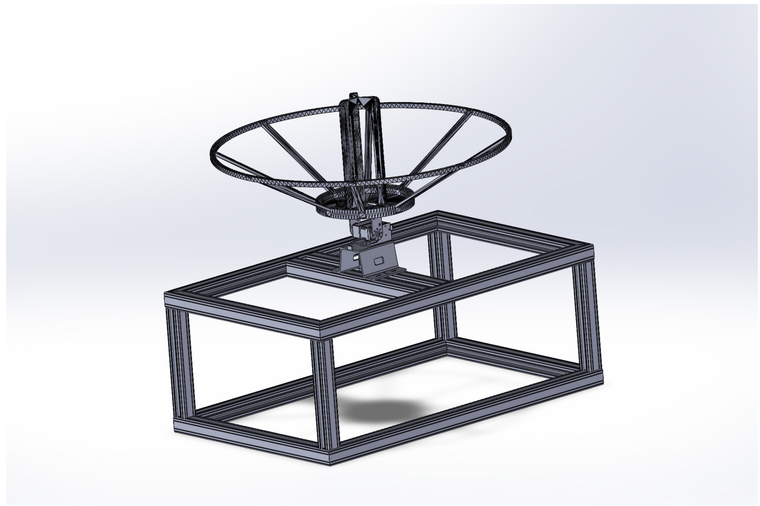
Existing satellite tracking systems are often expensive, proprietary, and difficult to use. MATS provides an open, modular platform for precise, automated multi-axis tracking and reception, designed for off-grid pilots, emergency crews, researchers, and educators.

System Goals

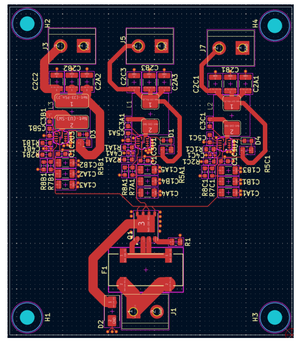
- Low cost, portable, and deployable on aircraft, ships, or field vehicles
- Operates from common on-board power (12-24VDC)
- Compact and Lightweight (<25 lbs, 22x14x9 in)
- Modular design supporting various types of antennas and receivers
- Reliably acquires and decodes L-band and other weather satellite signals
- Uses readily available hardware and open-source software

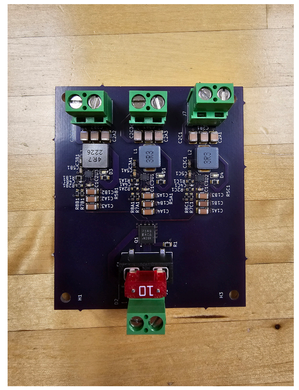
Technical Targets

- Achieve automated azimuth/elevation tracking within 1%
- Integrate GPredict tracking data over I^2C
- Provide modular power rails (7.5 V, 5 V, 3.3 V)
- Support open-source SDR decoding (SatDump)



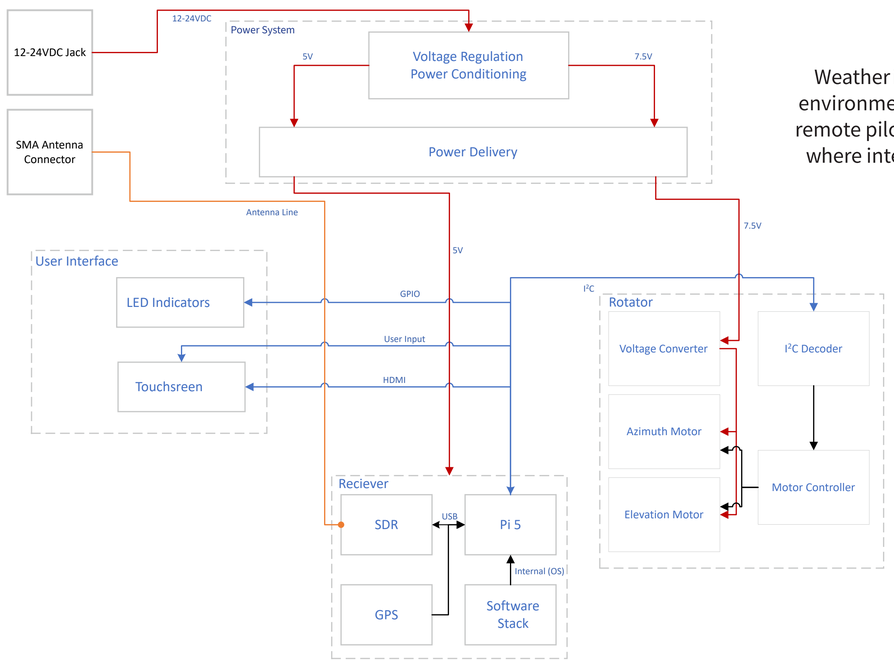
Pictured: Mechanical System



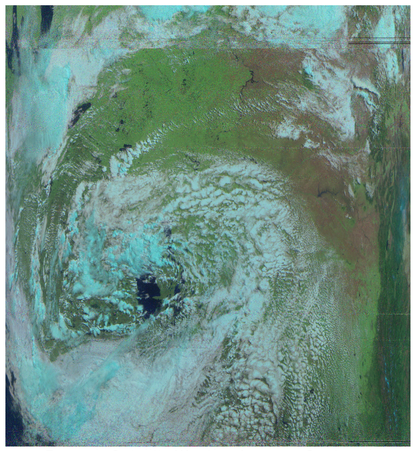


Power System PCB Layout and Assembly

System Block Diagram



Weather imagery provides critical near real time environmental data for emergency response crews, remote pilots, and research crews stationed in areas where internet may not be available or expensive.



Example Satellite Weather Imagery Captured

Find the Project on GitHub

Learn More

Acknowledgments

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