Autonomous UAV Tracking Antenna

Senior Design Project Description

Sponsored by CU Research and Engineering Center for Unmanned Vehicles (RECUV)

Customer: Dale Lawrence
Existing UAV Communication

- Low gain, fixed antennas
  - Don’t need to be steered, but only work for short range operations
- High-gain antennas
  - Longer range
  - Need to be pointed at the UAV (narrower beam width)
  - Requires additional personnel
Previous Attempt

- Very high gain antenna (29dBi) at 2.4 GHz

- Large/ heavy, difficult to transport and set up
- Needs too much power
- Only used signal strength for pointing
Self-propelled approach
Functional Requirements

- Acquire and maintain comm with a UAV flying up to 30 m/s and at a slant range of up to 30km.
- Be configurable to support either 900MHz or 2.4GHz comm links with radiated power compatible with ISM band limitations, with data rates no smaller than 10k bits/sec.
- Operate with continuous azimuthal coverage, and elevation coverage from -30 to +90 deg.
- Break down for transport and storage into a volume less than 1.0 ft^3 (not including mounting base).
- Be capable of mounting on the roof of an unmodified vehicle, and on a portable base (e.g. tripod), with the capability of being elevated by 5m above the mounting surface.
- Operate continuously, either by an external power source (9-13VDC) or by hot-swappable batteries.
- Communicate with a UAV ground control station via either WiFi (preferred) or USB.
- Antenna operation must be autonomous, i.e. not dependent on the UAV ground control station for its functionality.
Application Cases

• Car/Van/Trailer roof mount

• Stand alone (e.g. tripod) mount