

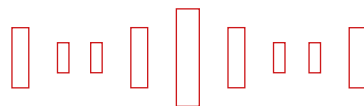
**A TRACKING
ANTENNA SYSTEM
FOR LONG-RANGE
COMMUNICATION
IN UNMANNED
AIRCRAFT SYSTEMS**

White Paper



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A TRACKING ANTENNA SYSTEM FOR LONG-RANGE COMMUNICATION IN UNMANNED AIRCRAFT SYSTEMS

White Paper by Thomas Raggl

ABSTRACT

A long-range communication link in modern Unmanned Aircraft Systems (UAS) highly determines the mission capability of the overall system.

For this reason, an autonomous Tracking Antenna System (TAS) is developed, which is designed as a gimbal-mounted directive antenna, controlled by two orthogonal axes, that is able to follow any arbitrary point in the half-space (in \mathbb{R}^3).

Basically, the antenna's boresight is tracking a moving aircraft, ensuring that the data link from the ground station to the aircraft is permanently maintained. This whitepaper will give an introduction into the world of UAS, continues to state the problem definition and gives insight into the key performance metrics of the respective components and the problem-solving strategies involved.



Unmanned aircraft systems (UAS) are omnipresent these days and have revolutionized the way how we can solve problems that seemed unfeasible not long ago as they do provide a whole set of advantages over manned aircrafts. Whether you look at systems using cameras on aerial vehicles, which provide new perspectives in the film industry or imaging solutions, improve agricultural farming or help science to analyze and better understand our planet's atmosphere - all of them have in common that they don't require a pilot or even an entire crew on board to achieve a certain task. In those systems, the human operator has been relocated to a remote place and can command and control the aircraft where to go and what to do, from a safe distance. Whenever the assignment at hand is dirty, dull or dangerous, UAS show their true strengths. Although these days such machines have enough computational power aboard to make decisions on their own and behave autonomously without external input, there still needs to be a direct communication link from the ground segment to the air segment in order to ensure full control at all times.

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