

ABSTRACT

The advancement of drone technology faces significant challenges in maintaining data communication connectivity, particularly for real-time video transmission over long distances. The limitations of conventional omnidirectional antennas lead to video quality degradation and a restricted operational range. This study proposes the design of an antenna tracker based on a directional helix array antenna operating at 5.8 GHz, featuring an automatic tracking mechanism utilizing GPS coordinates. The solution integrates a 1×2 helix antenna design optimized through CST Studio Suite simulations, resulting in technical parameters such as a return loss of -13.213 dB, a VSWR of 1.559, and a directional radiation pattern. The system is implemented using an Arduino Mega 2560 microcontroller and a LoRa module for coordinate data transmission. Field testing demonstrates that the system can maintain video quality at distances up to approximately 600 meters with a transmission power of 100 mW. The system achieves an azimuth angle accuracy of 83% and an elevation angle accuracy of 89%, with the LoRa communication range limited to 800 meters. It is concluded that the proposed antenna tracker effectively enhances the stability of drone video transmission for geographic mapping applications.

Keywords : Antenna tracker, drone, helix array, GPS, video communication.