Passive Geolocation with Unmanned Aerial Vehicles using AOA Measurement Processing

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***Abstract*—This paper considers 3 dimensional (3D) angle of arrival (AOA) measurements processing model for positioning a transmitter by cooperation of flying segment based on receiver station aboard Unmanned Aerial Vehicle (UAV) with terrestrial segment including stationary ground receiver station and confirms its practicability for handling Non-Line-Of-Sight (NLOS) problem. Positioning with UAVs is especially relevant in heterogeneous terrain with inherent reflections resulting in primary measurements distortion. NLOS problem was well investigated for 2D scenarios with ground receiver stations, however for 3D UAV based positioning this is a topic of ongoing research. In this paper different measurement processing techniques and results for UAV based location were analyzed to explore advantages and shortcomings of AOA among others. The contribution of the current research is the refinement of mathematical and simulation models for positioning of radio transmitter with one stationary ground and one flying UAV based receiver station using AOA processing and its performance evaluation with handling AOA noise. Resulting estimates agree with known results for UAV based positioning and validate its practicability to face NLOS problem, when AOA deviation is less than 10 degrees.**

***Keyword*—Cramer-Rao bounds, Direction-of-arrival estimation, Position measurement, Radar signal processing, Root mean square, Unmanned aerial vehicles**

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