ABSTRAK

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Estimasi Pelacakan Radar Tiga Dimensi dengan Metode *Hybrid* TDOA/AOA menggunakan *Extended Kalman Filter*

Metode *hybrid* TDOA/AOA merupakan teknik pelacakan lokasi berbasis waktu dan sudut, dari *transmitter* ke *receiver*. Tujuan penelitian ini yaitu mencari koordinat posisi dari sinyal *burst* yang diterima oleh *receiver* pada lingkungan NLOS. NLOS merupakan peristiwa ketika sinyal dari *transmitter* tidak langsung mengarah menuju *receiver* melainkan hasil pantulan dari berbagai objek dalam jalur propagasi, sehingga diperlukan identifikasi LOS/NLOS serta EKF untuk mitigasi NLOS. Skenario pengujian dibagi menjadi 3 macam diantaranya, pertama diasumsikan bahwa *receiver* terletak di perbukitan dan *transmitter* berada di lembah. Kedua, diasumsikan bahwa *transmitter* terletak di puncak bangunan tinggi, sedangkan sepasang *receiver* berada di bangunan rendah dan sepasang lainnya di perbukitan. Ketiga diasumsikan bahwa *receiver* terdapat di bangunan rendah dan bangunan tinggi sedangkan *transmitter* berada di lingkungan perkotaan. Model matematika berupa metode *Least Squares* dikembangkan pada penelitian ini untuk mengolah informasi dari *receiver* berupa pengukuran TDOA/AOA serta posisi dari tiap *receiver*. Hasil penelitian membuktikan bahwa solusi LS dapat menemukan posisi *transmitter*, dan algoritma EKF dapat mengurangi *error* NLOS. *Error* pada skenario-1 sebesar 11,96m, pada skenario-2 sebesar 6,99-42m, pada skenario-3 sebesar 35m.

Kata kunci: sinyal *burst*, NLOS, *hybrid* TDOA/AOA, *Least Squares*, EKF

ABSTRACT

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Three-Dimensional Radar Tracking Estimation with Hybrid TDOA/AOA Method using Extended Kalman Filter

The hybrid TDOA/AOA method is a time and angle based location tracking technique, from transmitter to receiver. The aims of this research is to find the position coordinates of the burst signals that are received by receiver in the NLOS environment. NLOS is an event when the signal from the transmitter does not go directly to the receiver but rather the result of reflections from various objects in the propagation path, so LOS/NLOS identification and EKF is required for NLOS mitigation. The test scenario is divided into 3 kinds of them, first it is assumed that the receiver is located in the hills and the transmitter is in the valley. Second, it is assumed that the transmitter is located at the top of a tall building, while a pair of receivers are in a low building and another pair in the hills. A third assumed that the receiver is in a low-rise building and a tall building while the transmitter is in an urban environment. Mathematical model in the form of Least Squares method was developed in this research to process information from the receiver, including TDOA/AOA measurement and the position of each receiver. The results prove that LS solutions can find transmitter positions, and EKF algorithms can reduce NLOS errors. Error in scenario-1 is 11,96m, in scenario-2 is 6,99-42m, in scenario-3 is 35m.

Keywords: burst signals, NLOS, hybrid TDOA/AOA, Least Squares, EKF