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IMPERATIVE MODIFICATIONS REQUIRED FOR TECHNICAL USAGE OF STAR PATTERN
RECOGNITION ALGORITHM ONBOARD A TYPICAL STAR TRACKER**Abstract**

Following on the work presented last year in IAC2012 in Naples” Robustness study of Non-Dimensional star pattern recognition for a typical star tracker”, additional necessary modifications applied to the mentioned algorithm are presented in this paper. As an abridge reminder of previous work, the overall system errors which are bright point dispositions are implied on pattern features of Non-dimensional star pattern recognition. Afterwards the margin in which the star pattern recognition algorithm can abide the errors and report true recognition is determined. Unfortunately the results are not promising. In this paper further sky simulation tests unravel an essential difference between the concept used in developing Non-Dimensional star pattern recognition algorithm and reality which voids the technical usage. It has been statistically proven that the equivalence of planar angles of star triangles is not acquired through the common projection of stars from celestial sphere onto image plane. Consequently an effort is made to modify the performance by adding another pattern feature. This pattern feature becomes the key element in the pattern recognition procedure, regardless of its type. In this paper the maximum inter-star angle of the star triangle is chosen as the additional pattern feature alongside with the min and max planar angles. The modified method has become dimensional and does not follow the principal attribute acclaimed in Non-Dimensional star patter recognition algorithm. It must be noted that in this section, planar angles are solely used to decrease the search margin dedicated to each entry and their existence are benefiting the search speed and recognition solidity in comparison to methods using only inter-star angles. The results are presenting acceptable improvements which are applicable to a typical star tracker. The modifications have been also inquired on Nasir I student star tracker. Both methods, the distinguished Non-dimensional and the modified dimensional methods are compared in terms of database volume, robustness margins, best performance magnitude and recognition safety traits. The results demonstrate that for the specific configuration of Nasir I star tracker the modified dimensional method is suited constitutionally.