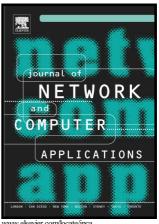# Author's Accepted Manuscript

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Securing Range Free Localization against Wormhole Attack using Distance Estimation and Maximum Likelihood Estimation in Wireless Sensor Networks

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Abstract

Localization has always been considered to be an important factor in Wireless Sensor Networks (WSNs). Along with accuracy of the location estimation, the security of the location information is a critical issue in localization process. Moreover, as the network environment changes from static to mobile, the probability of the wormhole attack increases. Previous research suggests possible solutions but lag behind to find the applicability in the mobile environment and some of the algorithms are not suited for resource constrained WSNs. Therefore, in this paper we have developed a localization algorithm that prevents wormhole attack in mobile environment. The algorithm uses authentication process to identify any unauthorized nodes using distance estimation method and applies Maximum Likelihood Estimation (MLE) to calculate the required location. The comparison of our algorithm with other contemporary algorithms proves that this algorithm performs efficiently.

Keywords: Anchor Nodes, Security, Location, Authentication, Wormhole, Certificate

1. Introduction

The proliferation need of monitoring and controlling in the Wireless Sensor Networks (WSNs) has extended the applications [1][2][3] of sensor networks from static to mobile environment. Dynamic networks also create a concern on the changeable locations of the nodes. Location estimation in such mobile environments attracts various attackers to execute their attack procedures and

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