

HYBRID LOCALIZATION TECHNIQUE FOR INDOOR CHILD TRACKING
USING WIRELESS SENSOR NETWORK

by

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A Thesis

Submitted to the Postgraduate Studies Programme

as a Requirement for the Degree of

MASTER OF SCIENCE

INFORMATION TECHNOLOGY

UNIVERSITI TEKNOLOGI PETRONAS

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PERAK

MARCH 2012

ABSTRACT

Child kidnapping causes a lot of concerns among people. Wireless Sensor Network (WSN) could be used for child tracking as a kidnapping prevention tool. Localization is the main issue in tracking applications. There are many localization techniques available for WSN. Each technique was designed for a specific purpose and environment. Accuracy is the most important parameter of any localization technique. However, the other parameters cannot be neglected. Improving accuracy leads to decreasing the performance of the other parameters. Some localization techniques use complex mathematical formulas to improve the accuracy. This leads to high complexity of the algorithm. Keeping complexity of the algorithm low is also important. It defines how long it takes the technique to locate the target. The problem addressed in this thesis is increasing the accuracy without increasing the complexity of the localization technique. The objectives of this thesis are a) to propose a hybrid localization technique that has higher localization accuracy and lower algorithm complexity for its real-time execution, and b) to analyze the localization accuracy and algorithm complexity of hybrid technique of K-Nearest Neighbors (KNN) and Fuzzy Logic Indoor Localization System (FLIPS), Fuzzy-KNN, through experiment, and compare it to other localization techniques for WSN from the literature study. KNN is a fingerprinting-based localization technique. Multilateration and FLIPS are lateration-based localization techniques. These techniques were selected from the literature as being suitable for indoor child tracking. Hybrid technique of KNN and FLIPS can be used to improve the accuracy of localization. After comparing Fuzzy-KNN with Multilateration and FLIPS in real-time localization, the experiment results show that Fuzzy-KNN has higher accuracy than both techniques. The algorithm complexity of Fuzzy-KNN is also lower than Multilateration and FLIPS. Based on the results, Fuzzy-KNN can be used for indoor child tracking in WSN.