

CHAPTER 59

TECHNOLOGY

COMPUTER ENGINEERING

Doctoral Theses

647. SHARMA (Deepak Kumar)
Efficient Routing Techniques in Infrastructure-Based and Infrastructure-Less Opportunistic Networks.
Supervisors : Dr. Sanjay K. Dhurandher
Th 22575

Contents

1. Introduction 2. Literature survey 3. Horizontal and vertical ferry scheme for infrastructure-based 4. History based prediction for routing in infrastructure-less oppnets 5. Energy-efficient history based prediction for routing protocol 6. Secure history based prediction for routing protocol 7. Genetic algorithm based energy-efficient routing protocol 8. Conclusion and futute work. Publications and bibliography.

648. SINGH (Samayveer)
Design and Performance Evaluation of Techniques for Enhancing the Lifetime in Wireless Sensor Networks.
Supervisors : Dr. Satish Chand and Dr. Bijendra Kumar
Th 22376

Abstract

A wireless sensor network (WSN) helps in monitoring and controlling the physical world. It is especially useful in catastrophic or emergency scenario where human participation may be too dangerous. The energy is a critical factor in order to extend the network lifetime as the sensors once deployed cannot be recharged. In a WSN, the energy consumption can be reduced by using heterogeneity and clustering that in turn prolongs the lifetime of networks. In this thesis, we have proposed the following heterogeneity network models and energy efficient clustering techniques. The first work is '3-Level Heterogeneous Network Model' based on a single model parameter that can describe 1-level, 2-level, and 3-level heterogeneity. We have implemented SEP, DEEC, and HEED protocols naming them as hetSEP, hetDEEC, and hetHEED, respectively, to evaluate the lifetime. The network lifetime increases as the level of heterogeneity increasing in all the cases. The second work is 'energy-efficient clustering using fuzzy logic in HEED protocol' that discusses an energy-efficient clustering using fuzzy logic in HEED protocol for our 3-level heterogeneous model. The third work is '5-level Heterogeneous Network Model for WSNs' that can describe 1-level, 2-level, 3-level, 4-level, and 5-level heterogeneity depending on the value of the model parameter. The HEED implementation for 2-level, 3-level, 4-level, and 5-level heterogeneity increase network lifetime by 39.61%, 117.38%, 182.69%, and

223.7%, corresponding to increase in network energy as 9.2%, 17.40%, 21.80%, and 24%, with respect to the HEED protocol. The last work is 'Multilevel Heterogeneous Network Model for WSNs' that can describe upto any finite level heterogeneity. The HEED implementation for 2-level, 3-level, 4-level, 5-level, 6-level and 7-level heterogeneity increase the network lifetime by 73.05%, 143.40%, 213.17%, 267.90%, 348.60%, and 419.10%, respectively, by increasing the network energy as 40%, 57%, 68.5%, 78%, 84%, and 92.5% with respect to the HEED protocol.

Contents

1. Wireless sensor networks 2. Literature review 3. 3-level heterogeneity in wireless sensor networks 4. Energy efficient clustering using fuzzy logic in heterogeneous wireless sensor networks 5. 5-level heterogeneous network model for WSNs 6. Multilevel Heterogeneous network model for WSNs 7. A novel energy efficient clustering protocol for prolonging lifetime of WSNs 8. Optimum sensor deployment in wireless sensor networks 9 Conclusion and future scope. List of publications. References.