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"A REVIEW PAPER ON MOBILE SINK IN WIRELESS SENSOR NETWORK"

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Abstract— In Recent years, the popularity of wireless sensor networks has grown rapidly, with various existing and upcoming technologies like healthcare monitoring, home security, IoT, automation and disaster response. Mobile Sink based routing strategies have been widely used to prolong the lifetime of Wireless Sensor Networks (WSNs). With fixed sink node, wireless sensor networks sometimes suffer from hot spot problem. Wireless sensor network always used for efficient data gathering to overcome hot spot problem using mobile sink traversal. In this paper, we present a survey of the existing mobile sink Techniques. Here in this research survey we have gathered information mainly regarding mobile sink traversal issue.

Keywords— Wireless Sensor Network, Mobile Sink, IoT.

I. INTRODUCTION

Wireless Sensor Networks consist of wireless sensor nodes, which are equipped with a radio transceiver, processor, memory, battery and GPS. Wireless Sensor nodes are used in groundwater contamination, habitat and ecosystem, seismic surveillance etc. The key features include robust, energy efficient, scalable, secure and self configurable. For sensing physical attributes Wireless sensor nodes are deployed randomly in the field. After sensing and gathering different physical attributes, further they transmit it for processing. The wireless sensor nodes have limited energy and consume energy during sensing the data and transmission of data. More energy will be consumed during data transmission if the distance of wireless nodes and sink is greater, the greater is the energy consumption the shorter is the network lifetime.
There are two types of modes used in wireless sensor networks – direct and multihop. In first type of mode i.e. direct mode, the distant sensor nodes that are away from the sink node can take more energy to send data and die soon. These dead nodes make the coverage holes, causing information loss. In second type of mode i.e. multihop mode, data are transferred to the sink node via intermediate node and from source to destination a routing table is maintained by different intermediate nodes. In multihop mode these intermediate nodes receive data from different sensor nodes and send this data to the sink. In multihop mode the sensor nodes not directly send the data to sink node, they send through intermediate node so this process minimizes the energy consumption of sensor nodes. In multihop mode the sensor nodes which are near to the sink die quickly because the information is sent to the sink via intermediate node. In addition to the above Clustering schemes are offered to save energy of nodes, in clustering scheme the whole network is divided into different clusters (sub networks). In multihop mode the connection between sensor node and sink node is disconnected and sink node is not able to get data from remote nodes. The direct neighbours of sink node should be changed time to time to balance the load of intermediate node. In this case, an approach towards the balanced system is the use of mobile sink which runs within the network area for data collection.

II-MOBILE SINK TECHNIQUES FOR WIRELESS SENSOR NETWORK

Different mobile sink techniques regarding mobile sink traversal issue are described in below table 01:

Table 1: Mobile Sink Techniques used for WSN

Author(s)	**Description of proposed / implemented work**
Xiliang Ma, Ruiqing Mao (1)	The Research study proved that the self organizing sensor networks using Q-learning can balance the energy consumption of the nodes and increase the lifetime of the networks. (1)
Mariam Akbar, Nadeem Javaid, Wadood Abdul, Sanaa Ghouzali, Abid Khan, Iftikhar Azim Niaz, Manzoor Ilahi (2)	The Research study proved that the proposed schemes perform better than the selected existing schemes in terms of the selected performance metrics. (2)
Mahdi Zareei , A.K.M. Muzahidul Islam, Cesar Vargas Rosales, Nafees Mansoor , Shidrokh	Provides future research directions for mobility-aware MAC protocols. (3)

Goudarzi , Mubashir Husain Rehmani (3)	
Jin Wang, Yiquan Cao, Bin Li, Hye-jin Kim, Sungyoung Lee (4)	Here research showed that in the proposed routing algorithm, energy consumption is reduced, network lifetime is extended and transmission delay is reduced.(4)
Md Azharuddin, Prasanta K. Jana (5)	Here Authors proposed a PSO based scheme to solve hot spot problem caused by multi-hop communication in a cluster based wire-less sensor network. (5)
Hanen Ahmadi, Federico Viani, Ridha Bouallegue (6)	Here Authors proposed an innovative target tracking algorithm which combines learning regression tree approach and filtering methods using Received Signal Strength Indicator (RSSI) metric. (6)
Muhammad Asif, Shafiullah Khan, Rashid Ahmad, Muhammad Sohail, Dhananjay Sing (7)	In This Paper Authors review the QoS protocols and categorize the QoS aware protocols and elaborate their pros and cons. (7)
Can Tunca, Sinan Isik, M. Yunus Donmez, Cem Ersoy (8)	Here, author presents an extensive survey of the existing distributed mobile sink routing protocols. (8)
Majid I. Khan, Wilfried N. Gansterer , Guenter Haring (9)	This article presents the simulation based analysis of the energy efficiency of WSNs with static and mobile sinks. (9)
Yu Gu, Yusheng Ji, Jie Li, Fuji Ren, Baohua Zhao (10)	Here, Authors developed a novel notation Placement Pattern (PP) to bound time varying routes with the placement of sinks. (10)
Amar Kaswan, Kumar Nitesh, Prasanta K. Jana (11)	Here, Authors proposed an algorithm for designing efficient trajectory for Mobile Sink and one another algorithm for the same problem which considers delay bound path formation of the mobile Sink. (11)
Jiqiang Tang, Hongyu Huang, Songtao Guo, Yuanyuan Yang (12)	Here, Authors minimize the travel latency of the mobile sink with the help of delivery latency minimization problem (DLMP) in a randomly deployed WSN. (12)
Nimisha Ghosh, Indrajit Banerjee (13)	In this paper a data gathering approach is proposed in which some mobile collectors visit only certain sojourn points (SPs) or data collection points in place of all sensor nodes. (13)
Andrew Wichmann,Turgay Korkmaz (14)	In this paper Authors focuses on how to use faster mobile sinks, to reduce the physical collection delay while maintaining the other performance improvements. (14)
Guaning Chen, Jiu Shu Cheuh, Min Te Sun, Tsun Chieh Chiang, Andy Ankai Jeng (15)	Here, Authors proposed a framework, called Tree Overlay Grid (TOG), for data collection and dissemination and The simulation results showed that TOG outperforms the best known data collection solution for WSNs with multiple mobile sinks. (15)
Wei Cheng Chu, Kuo Feng Ssu (16)	In this paper Authors developed a cluster-based mobile sink exploration (CMSE) scheme to guide data packets efficiently to mobile sinks. (16)
Songtao Guo, Xiaojian Wang, Yuanyuan Yang (17)	In this paper authors proposed a heuristic topology control algorithm to solve the problem of prolonging network lifetime in large scale wireless sensor networks. (17)
Yu Gu, Yusheng Ji (18)	Authors Provides an up to date survey on the sink mobility issue. (18)
Sheng Yu, Baoxian Zhang, Cheng Li, Hussein T. Mouftah (19)	Authors Presents a survey of the state of the art routing protocols in Wireless Sensor Networks with Mobile Sinks (19)
Gianlorenzo D'Angelo, Daniele Diodati, Alfredo Navarra, Cristina M. Pinotti (20)	Here, Authors proposed a local search algorithm that guarantees a constant approximation factor using Minimum k storage problem (20)
Weimin Wen, Shenghui Zhao, Cuijuan Shang, Chih-Yung Chang (21)	In This paper Authors proposed an energy aware path construction (EAPC) algorithm for Data Collection Using Mobile Sink in Wireless Sensor Networks (21)
Hang Zhang , Xi Wang, Parisa Memarmoshrefi, Dieter Hogrefe (22)	In This Paper Authors presents a comprehensive survey and comparison of various ACO-based routing protocols in MANETs. (22)
Hailong Huang, Andrey V. Savkin, Chao Huang (23)	In this paper Author route, delay sensitive data to mobile nodes within an allowed latency. (23)
Chao Wu, Yuan'an Liu, Fan Wu, Wenhao Fan, Bihua Tang (24)	Here, Authors proposed a comprehensive data gathering scheme based on graphing technique, called double optimization of energy efficiency (DOEE) to optimize the energy consumption of all sensor

	nodes hierarchically. (24)
Catalina Aranzazu Suescun and Mihaela Cardei (25)	In this paper Authors proposed several distributed algorithms for composite event detection and reporting to a mobile sink and analyze the performance of algorithms using WSNet simulator (25)

III- OPEN ISSUES

After through literature survey on mobile sink, we found following open issues related to mobile sink problem in wireless sensor network:

- Minimum constant approximation factor
- Energy efficiency of mobile sink
- Mobile Sink Traversal Shortest path
- Delivery Latency Minimization Problem
- Enhancement of Network life time
- Delay Bound Path Formation

IV-CONCLUSIONS AND FUTURE SCOPE

Wireless sensor network always used for efficient data gathering to overcome hot spot problem using mobile sink traversal. Here in this research survey we have gathered information mainly regarding mobile sink traversal issue. We can use various optimization techniques like PSO, Ant colony optimization, Genetic algorithm and other soft computing techniques to improve mobile sink issue as well other open issues discussed in above section.

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