**AN IMPROVED ENERGY-EFFICIENT CLUSTERING PROTOCOL**

**TO PROLONG THE LIFETIME OF THE WSN-BASED IOT**

**[1] J. Shen, A. Wang, C. Wang, P. C. K. Hung, and C.-F. Lai:** This paper presents Wireless sensor networks (WSNs) distribute hundreds to thousands of inexpensive micro sensor nodes in their regions, and these nodes are important parts of Internet of Things (IoT). In WSN-assisted IoT, the nodes are resource constrained in many ways, such as storage resources, computing resources, energy resources, and so on. Robust routing protocols are required to maintain a long network lifetime and achieve higher energy utilization. In this paper, we propose a new energy-efficient centroid-based routing protocol (EECRP) for WSN-assisted IoT to improve the performance of the network. The proposed EECRP includes three key parts: a new distributed cluster formation technique that enables the self-organization of local nodes, a new series of algorithms for adapting clusters and rotating the cluster head based on the centroid position to evenly distribute the energy load among all sensor nodes, and a new mechanism to reduce the energy consumption for long-distance communications.

**Summary**: Studied about a new energy-efficient centroid-based routing protocol (EECRP) for WSN-assisted IoT to increase the performance of the network. The proposed EECRP involves three main parts: a new distributed cluster forming technique that facilitates the self-organization of local nodes, a new set of algorithms for adjusting clusters and rotating the cluster head centred on the centroid location to equally spread the energy load across all sensor nodes,

**[2] V. Reddy and P. Gayathri:** The Internet of things (IoT) is a major source for technology solutions in many industries. The IoT can consider, Wireless Sensor Network (WSN) as the backbone network to reduce formation or advent of new technology. Integration of these would reduce the burden and form smart sensor node network with nodes given access to internet. WSN is already a major legacy system that has percolated into many industries. Thus by integration of IoT and WSN no huge paradigm shift is needed for the industries.

**Summary:** Studied about Integration of these will alleviate the pressure and result in the creation of a smart sensor node network with nodes connected to the internet.. As a result of the convergence of IoT and WSN, no major paradigm shift in the industries is needed.

**[3] H. P. Gupta, S. V. Rao, A. K. Yadav, and T. Dutta:** An important issue of research in wireless sensor networks (WSNs) is to dynamically organize the sensors into a wireless network and route the sensory data from sensors to a sink. Clustering in WSNs is an effective technique for prolonging the network lifetime. In most of the traditional routing in clustered WSNs assumes that there is no obstacle in a field of interest. Although it is not a realistic assumption, it eliminates the effects of obstacles in routing the sensory data. In this paper, we first propose a clustering technique in WSNs named energy-efficient homogeneous clustering that periodically selects the cluster heads according to a hybrid of their residual energy and a secondary parameter, such as the utility of the sensor to its neighbors. In this way, the selected cluster heads have equal number of neighbors and residual energy. We then present a route optimization technique in clustered WSNs among obstacles using Dijkstra's shortest path algorithm. We demonstrate that our work reduces the average hop count, packet delay, and energy-consumption of WSNs.

**Summary:** Studied about Dijkstra's shortest path algorithm is used to optimise routes in clustered WSNs among obstacles. And also studied about the proposed method decreases the average hop count, packet latency, and energy consumption of wireless sensor networks (WSNs).

**[4] Q. Wang, S. Guo, J. Hu, and Y. Yang:** In wireless sensor networks, sensor nodes are usually powered by battery and thus have very limited energy. Saving energy is an important goal in designing a WSN. It is known that clustering is an effective method to prolong network lifetime. Due to the development of big data, there are more sensor nodes and data needed to process. So how to cluster sensor nodes cooperatively and achieve an optimal number of clusters in a big data WSN is an open issue. In this paper, we first propose an analytical model to give the optimal number of clusters in a wireless sensor network. We then propose a centralized cluster algorithm based on spectral partitioning method. After that, we present a distributed implementation of the clustering algorithm based on fuzzy C-means method. Finally, we conduct extensive simulations, and the results show that the proposed algorithms outperform the hybrid energy-efficient distributed (HEED) clustering algorithm in terms of energy cost and network lifetime

**Summary:** Studied about how suggested algorithms outperform the hybrid energy-efficient distributed (HEED) clustering algorithm in terms of energy cost and network lifespan, according to detailed simulations.

**[5] S. Dehghani, B. Barekatain, and M. Pourzaferani:**

Despite the wide improvement in wireless sensor networks, energy consumption is still considered as the most important challenge in this kind of network. Previous research studies have shown that a routing algorithm based on clustering could be a perfect solution to solve this problem. In this regard, an optimized routing algorithm based on consciously distribution of cluster heads and their load balancing has been suggested in this study. Initially, the network is divided into cells by the algorithm. Then, the genetic algorithm is used to determine the optimal number of nodes. In other words, after placement of the nodes in the environment, given that the base station is aware of the energy of remaining nodes, the chromosome length is set equal to the number of nodes that their residual energy in a specific area is greater than the average energy of neighbouring nodes in the same specified area. Therefore, the chromosome length is reduced and we will move with a faster convergence in reaching the optimal solution. On the other hand, due to the low speed of the genetic algorithm in facing with larger networks after determining the cluster heads in each chromosome, those points are sent as initial points for the K-Means algorithm and this algorithm provides high-speed clustering process. Simulation results using NS2 tool showed that significant improvement has been achieved by using the proposed algorithm in increasing life time, throughput, and residual energy and in decreasing delay of network compared to the two similar algorithms.

**Summary:** Studied about the NS2 tool, it was discovered that using the proposed algorithm resulted in substantial improvements in network life time, throughput, and residual energy, as well as a reduction in network delay, when compared to two equivalent algorithms.