**LEACH PROTOCOL ENHANCEMENT FOR INCREASING WSN LIFETIME**

**[1] Akyildiz, Ian F., et al.:** Wireless Sensor Networks (WSNs) are spatially dispersed networks furnished with a large number of nodes for monitoring and recording various environmental conditions like humidity, temperature, pressure, lightening conditions etc. Since WSNs are restrained in terms of their processing power, storage resources, battery life they are not themselves proficient to perform such diverse task set like localization of nodes, data processing etc. Cloud computing (CC) offers on demand access of the resources like networks, storage, servers and applications. The assimilation of WSN and cloud can provide an open, flexible and reconfigurable platform for various monitoring and controlling applications. In this paper, we try to find out how the integration of WSN and cloud computing can help us to achieve various objectives like. Further we have presented an extensive study of the current WSN-CC integration along with their key issues and the methodology recommended by different authors in detail. The research challenges, existing solutions and approaches as well as the future directions are also discussed in this paper.

**Summary:** Studied about assimilation of WSN and cloud , In addition, studied an analysis of the latest WSN-CC integration, as well as their core problems and the methods suggested by various scholars and discussed the research issues, current ideas and methods, as well as future paths.

**[2] M. Quwaider and S. Biswas**: This paper presents an experimental modeling framework for energy harvesting sensors in Body Sensor Networks (BSN). Most of BSN applications assume that the sensor nodes have infinite and continuous source of energy. But in reality, this may not be true, especially for the implanted sensors. Instead, the energy for the implanted BSN sensors is likely to come from harvested energy sources such as piezoelectric, magnetic, and thermo- electric generators. In this paper we will explore on-body sensors energy harvesting model using acceleration which is getting a lot of attention in the research community. Recharging batteries with harvested energy could not only extend battery life, but may also dissolve the conventional meaning of network life time. While the energy-harvesting sources can vary widely, we will focus primarily on harvesting using vibration of piezoelectric sensors. Since the piezoelectric energy harvesting depends on movements, the amount of energy harvested at a specific on-body sensor node will depend on the movement pattern of the body part that the node is attached to. As a result, the specific energy generation profile at the BSN nodes does depend on the postural body movement patterns over time.

**Summary:** Studied about A piezoelectric generator model has been developed that harvests mechanical vibration energy available on the wearable sensor. The proposed model's performance was tested in a lab setting. It was shown that the amount of harvested energy depends on the posture or the level of physical activity of the body movement and the sensor placement, which should be considered in packet routing.

**[3] Hein zelman, Wendi Rabiner, Anantha Chandrakasan, and Hari Balakrishnan:**

Wireless distributed micro sensor systems will enable the reliable monitoring of a variety of environments for both civil and military applications. In this paper, we look at communication protocols, which can have significant impact on the overall energy dissipation of these networks. Based on our findings that the conventional protocols of direct transmission, minimum-transmission-energy, multi-hop routing, and static clustering may not be optimal for sensor networks, we propose LEACH (Low-Energy Adaptive Clustering Hierarchy), a clustering-based protocol that utilizes randomized rotation of local cluster based station (cluster-heads) to evenly distribute the energy load among the sensors in the network. LEACH uses localized coordination to enable scalability and robustness for dynamic networks, and incorporates data fusion into the routing protocol to reduce the amount of information that must be transmitted to the base station. Simulations show the LEACH can achieve as much as a factor of 8 reduction in energy dissipation compared with conventional outing protocols. In addition, LEACH is able to distribute energy dissipation evenly throughout the sensors, doubling the useful system lifetime for the networks we simulated.

**Summary:** Studied about LEACH outperforms static clustering algorithms by requiring nodes to volunteer to be high-energy cluster-heads and adapting the corresponding clusters based on the nodes that choose to be cluster-heads at a given time. At different times, each node has the burden of acquiring data from the nodes in the cluster, fusing the data to obtain an aggregate signal, and transmitting this aggregate signal to the base station.

**[4] M. Quwaider and S. Biswas,:** This paper presents novel store-and-forward packet [routing algorithms](https://www.sciencedirect.com/topics/computer-science/routing-algorithms) for [Wireless Body Area Networks](https://www.sciencedirect.com/topics/engineering/wireless-body-area-network) (*WBAN*) with frequent postural partitioning. A prototype *WBAN* has been constructed for experimentally characterizing on-body topology disconnections in the presence of ultra short range radio links, unpredictable RF attenuation, and human postural mobility. On-body DTN routing protocols are then developed using a stochastic link cost formulation, capturing multi-scale topological localities in human postural movements. Performance of the proposed protocols are evaluated experimentally and via simulation, and are compared with a number of existing single-copy DTN routing protocols and an on-body packet flooding mechanism that serves as a performance benchmark with delay lower-bound. It is shown that via [multi-scale modeling](https://www.sciencedirect.com/topics/engineering/multiscale-modeling) of the spatio-temporal locality of on-body link disconnection patterns, the proposed algorithms can provide better routing performance compared to a number of existing probabilistic, opportunistic, and utility-based DTN routing protocols in the literature.

**Summary:** Studied about Store-and-forward packet routing protocols for Wireless Body Area Networks (WBAN) have been developed in this paper. The concept of a stochastic link cost was introduced for enabling a probabilistic and a distance vector on body routing protocol in the presence of postural mobility of human body.

**[5] Mhatre, Vivek, and Catherine Rosenberg:** A cost based comparative study of homogeneous and heterogeneous clustered sensor networks. We focus on the case where the base station is remotely located and the sensor nodes are not mobile. Since we are concerned with the overall network dimensioning problem, we take into account the manufacturing cost of the hardware as well as the battery energy of the nodes. A homogeneous sensor network consists of identical nodes, while a heterogeneous sensor network consists of two or more types of nodes (organized into hierarchical clusters). We first consider single hop clustered sensor networks (nodes use single hopping to reach the cluster heads). We use LEACH as the representative single hop homogeneous network, and a sensor network with two types of nodes as a representative single hop heterogeneous network. For multi-hop homogeneous networks (nodes use multi-hopping to reach the cluster head), we propose and analyze a multi-hop variant of LEACH that we call M-LEACH. We show that M-LEACH has better energy efficiency than LEACH in many cases. We then compare the cost of multi-hop clustered sensor networks with M-LEACH as the representative homogeneous network, and a sensor network with two types of nodes (that use in-cluster multi-hopping) as the representative heterogeneous network.

**Summary:** Studied about a cost based comparative analysis of single hop homogeneous and single hop heterogeneous networks. We took into account the hardware as well as the battery cost of the nodes in our analysis.