









globally optimal links in terms of energy consumption. Secondly, it finds optimal links on the graph using the Belmann Ford shortest path algorithm. MECN is self organizing and dynamically adapts to nodes failure or the deployment of new sensor nodes.

## 6. Conclusion

The main challenges in the design of energy efficient routing protocols for WSNs due to the limited energy resources of sensors. The main objective behind the designing of routing protocol is to keep the sensors operating for as long as possible, thus improvement of the network lifetime. The consumption of energy in the sensors is dominated by data transmission and reception. Therefore, designing of routing protocols for WSNs should be as energy efficient as possible to increase the individual sensor's lifetime and finally the network lifetime.

In this paper, we have surveyed a case of routing protocols by taking into account several classifications, including Data Centric Routing Protocol, Hierarchical Routing Protocol, Location- Base Routing Protocol. For each of these categories, we have discussed a few example protocols.

## References

- [1] Comparative Study of Routing Protocols in Wireless Sensor Network, International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, Issue 9, September 2012.
- [2] I.Akyildiz, W.Su, Y.Sankarasubramaniam, and E. Cayirci, "A survey on sensor networks," IEEE Communications Magazine, vol. 40, no. 8, pp. 102–114, August 2002
- [3] M. Ilyas and I. Mahgoub. "Handbook of sensor networks: compact wireless and wired sensing systems".
- [4] Chandrakasan, Amirtharajah, Cho, Goodman, Konduri, Kulik, Rabiner, and Wang. "Design Considerations for Distributed Microsensor Systems," IEEE 1999 Custom Integrated Circuits Conference (CICC), pages 279–286, May 1999.
- [5] Y. Yao and J. Gehrke, "The Cougar approach to in-network query processing in sensor networks", *SGIMOD Record*, vol. 31, no. 3, Sept. 2002,
- [6] N. Sadagopan, B. Krishnamachari, and A. Helmy, "The ACQUIRE mechanism for efficient querying in sensor networks", Proceedings SNPA'03, Anchorage, AK, May 2003, pp. 149-155
- [7] Q. Li, J. Aslam, and D. Rus, "Hierarchical power-aware routing in sensor networks," Proc. DIMACS Workshop Pervasive Networking, May, 2001.
- [8] W. R. Heinzelman, A. P. Chandrakasan, and H. Balakrishnan, "Energy efficient Communication protocol for wireless Microsensor networks," Proceedings of the 33rd Hawaii International Conference on System Sciences (HICSS-33), January 2000.
- [9] A. Manjeshwar and D.P. Agarwal, "TEEN: a routing protocol for enhanced efficiency in wireless sensor networks," 1st Int. Workshop Parallel Distributed Computing Issues Wireless Networks Mobile Computing, April 2001.
- [10] A. Manjeshwar and D.P. Agarwal, "APTEEN: a hybrid protocol for efficient routing and comprehensive information retrieval in wireless sensor networks," Parallel Distributed Process. Symp., Proc. Int., IPDPS 2002, 195–202.
- [11] Ossama Younis and Sonia Fahmy, "Distributed Clustering in Ad-hoc Sensor Networks: A Hybrid, Energy-efficient Approach", September 2002
- [12] Ossama Younis and Sonia Fahmy "Heed: A hybrid, Energy-efficient, Distributed Clustering Approach for Ad-hoc Networks", IEEE Transactions on Mobile Computing, vol. 3, no. 4, Oct.-Dec. 2004, pp.366-369.
- [13] Y. Yu, R. Govindan, and D. Estrin, "Geographical and energy aware routing: A recursive data dissemination protocol for wireless sensor networks", Technical Report UCLA /CSD-TR-01-0023, UCLA Computer Science Department, May 2001.
- [14] N. Bulusu, J. Heidemann, and D. Estrin, "GPS-less Low Cost Outdoor Localization for Very Small Devices", IEEE Personal Communication Magazine, vol. 7, no. 5, Oct. 2000, pp. 28-34.
- [15] G. Xing, C. Lu, R. Pless, and Q. Huang, "On greedy geographic routing algorithms in sensing-covered networks", Proceedings ACM MobiHoc'04, Tokyo, Japan, May 2004, pp. 31-42.
- [16] M. Stemm and R. H. Katz, "Measuring and reducing energy consumption of network rfacs in hand- held devices", IEICE Transaction on Communications, vol. E80-B, 8, Aug.1997, pp. 1125-1131
- [17] V. Rodoplu and T. H. Meng, "Minimum energy mobile wireless networks", IEEE Journal on Selected Areas in Communications, vol. 17, no. 8, Aug. 1999, pp. 1333-1344.
- [18] Energy Saving Routing Algorithm Based on SPIN Protocol in WSN-Luwei Jing, and Feng Liu College of Science, Huazhong Agricultural University, Wuhan, 430070, Chin, Yuling Li College of Information Engineering, Chutian University of Huazhong Agricultural University, Wuhan, 430205, China-2011
- [19] C. Intanagonwiwat, R. Govindan, and D. Estrin, "Directed diffusion for wireless sensor networks," IEEE/ACM Trans. Networking, 11(1), 2–16, 2003
- [20] A survey of location based routing protocols for WSN, International Journal of Emerging Technology and Advanced Engineering, Volume 3, Issue 9, September 2013