DAFTAR PUSTAKA

- I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "Wireless sensor networks: a survey," *Comput. Networks J.*, vol. 38, pp. 393–422, 2002.
- M. S. Manshahia, "Wireless Sensor Networks : A Survey," Int. J. Sci. Eng. Res., vol. 7, no. 4, pp. 1–7, 2016.
- [3] N. Moussa, A. El Belrhiti El Alaoui, and C. Chaudet, "A novel approach of WSN routing protocols comparison for forest fire detection," *Wirel. Networks*, vol. 26, no. 3, pp. 1857–1867, 2020.
- [4] C. Grumazescu, V. Vlăduță, and G. Subaşu, "WSN solutions for communication challenges in military live simulation environments," in 2016 International Conference on Communications (COMM), 2016, pp. 319–322.
- [5] S. Kodam, N. Bharathgoud, and B. Ramachandran, "A review on smart wearable devices for soldier safety during battlefield using WSN technology," in *Materials Today: Proceedings*, 2020, no. xxxx.
- [6] A. I. Husain and H. Bhardwaj, "A Cluster based WSN for Earthquake and Tsunami: Detection and Mitigation," in 2019 6th International Conference on Computing for Sustainable Global Development (INDIACom), 2019, pp. 847–849.
- [7] Y. Li, C. S. Chen, J. Zhang, and K. Chi, "Optimal relay placement forWSNbased home health monitoring system," in *Lecture Notes in Electrical Engineering*, 2016, vol. 386, pp. 129–137.
- [8] H. Navarro-Hellín, R. Torres-Sánchez, F. Soto-Valles, C. Albaladejo-Pérez, J. A. López-Riquelme, and R. Domingo-Miguel, "A wireless sensors architecture for efficient irrigation water management," *Agric. Water Manag.*, vol. 151, pp. 64–74, 2015.
- [9] C. Nakas, D. Kandris, and G. Visvardis, "Energy efficient routing in wireless sensor networks: A comprehensive survey," *Algorithms*, vol. 13, no. 3, pp. 1–65, 2020.
- [10] A. Sarkar and T. Senthil Murugan, "Routing protocols for wireless sensor networks: What the literature says?," *Alexandria Eng. J.*, vol. 55, no. 4, pp.

3173–3183, 2016.

- [11] T. Deshwal and P. Verma, "Routing Challenges in WSN (Wireless Sensor Networks)," Int. J. Adv. Comput. Res., vol. 02, no. 01, pp. 29–32, 2016.
- [12] T. Ojha, S. Misra, and N. S. Raghuwanshi, "Wireless sensor networks for agriculture: The state-of-the-art in practice and future challenges," *Comput. Electron. Agric.*, vol. 118, pp. 66–84, 2015.
- [13] N. Shabbir and S. R. Hassan, "Routing Protocols for Wireless Sensor Networks (WSNs)," Wirel. Sens. Networks - Insights Innov., no. October, 2017.
- [14] N. Rathi, "A Review on Routing Protocols for Application in Wireless Sensor Networks," *Int. J. Distrib. Parallel Syst.*, vol. 3, no. 5, pp. 39–58, 2012.
- [15] N. Sabor, S. Sasaki, M. Abo-Zahhad, and S. M. Ahmed, "A comprehensive survey on hierarchical-based routing protocols for mobile wireless sensor networks: Review, taxonomy, and future directions," *Wirel. Commun. Mob. Comput.*, vol. 2017, 2017.
- [16] A. Shahraki, A. Taherkordi, Ø. Haugen, and F. Eliassen, "Clustering objectives in wireless sensor networks: A survey and research direction analysis," *Comput. Networks*, vol. 180, p. 107376, 2020.
- [17] W. B. Heinzelman, A. P. Chandrakasan, and H. Balakrishnan, "An application-specific protocol architecture for wireless microsensor networks," *IEEE Trans. Wirel. Commun.*, vol. 1, no. 4, pp. 660–670, 2002.
- [18] W. R. Heinzelman, A. Chandrakasan, and H. Balakrishnan, "Energyefficient communication protocol for wireless microsensor networks," in *Proceedings of the 33rd Annual Hawaii International Conference on System Sciences*, 2000, p. 10 pp. vol.2.
- [19] G. Smaragdakis, I. Matta, and A. Bestavros, "SEP: A Stable Election Protocol for clustered heterogeneous wireless sensor networks," in *Proceedings of SANPA*, 2004, pp. 1–11.
- [20] A. Yousaf, F. Ahmad, S. Hamid, and F. Khan, "Performance Comparison of Various LEACH Protocols in Wireless Sensor Networks," in *Proceedings -*2019 IEEE 15th International Colloquium on Signal Processing and its

Applications, CSPA 2019, 2019, no. March, pp. 108–113.

- [21] M. U. Harnn Al Rasyid, N. R. Mubtadai, and J. Abdulrokhim, "Performance Analysis LEACH Based Genetic Algoritm in Wireless Sensor Network," in Proceedings - 2019 International Seminar on Application for Technology of Information and Communication: Industry 4.0: Retrospect, Prospect, and Challenges, iSemantic 2019, 2019, pp. 394–399.
- [22] A. Razaque, S. Mudigulam, K. Gavini, F. Amsaad, M. Abdulgader, and G. S. Krishna, "H-LEACH: Hybrid-low energy adaptive clustering hierarchy for wireless sensor networks," in 2016 IEEE Long Island Systems, Applications and Technology Conference, LISAT 2016, 2016, pp. 1–4.
- [23] M. Kaddi, K. Benahmed, and M. Omari, "LEACH-KANG: A new routing protocol for WSN based on leach protocol and Kangaroo method," in 2017 International Conference on Mathematics and Information Technology (ICMIT), 2017, pp. 273–278.
- [24] M. Omari and W. H. Fateh, "Enhancing multihop routing protocols in wireless sensor networks using LEACH-1R," in 2015 2nd World Symposium on Web Applications and Networking, WSWAN 2015, 2015, pp. 0–5.
- [25] M. O. Farooq, A. B. Dogar, and G. A. Shah, "MR-LEACH: Multi-hop routing with low energy adaptive clustering hierarchy," in *Proceedings - 4th International Conference on Sensor Technologies and Applications, SENSORCOMM 2010*, 2010, pp. 262–268.
- [26] T. Qiang, W. Bingwen, and D. Zhicheng, "MS-leach: A routing protocol combining multi-hop transmissions and single-hop transmissions," in Proceedings of the 2009 Pacific-Asia Conference on Circuits, Communications and System, PACCS 2009, 2009, pp. 107–110.
- [27] J. Y. Lee, K. D. Jung, S. J. Moon, and H. Y. Jeong, "Improvement on LEACH protocol of a wide-area wireless sensor network," *Multimed. Tools Appl.*, vol. 76, no. 19, pp. 19843–19860, 2017.
- [28] W. Jerbi, A. Guermazi, and H. Trabelsi, "O-LEACH of Routing Protocol for Wireless Sensor Networks," in *Proceedings - Computer Graphics, Imaging* and Visualization: New Techniques and Trends, CGiV 2016, 2016, pp. 399– 404.

- [29] Y. Liu, Q. Wu, T. Zhao, Y. Tie, F. Bai, and M. Jin, "An improved energyefficient routing protocol for wireless sensor networks," *Sensors* (*Switzerland*), vol. 19, no. 20, pp. 1–20, 2019.
- [30] T. Huynh and W. J. Hwang, "Network Lifetime Maximization in Wireless Sensor Networks with a Path-Constrained Mobile Sink," *Int. J. Distrib. Sens. Networks*, vol. 2015, 2015.
- [31] L. D. Astuti, "Peningkatan Network Lifetime Pada Wireless Sensor Network Menggunakan Clustered Shortest Geopath Routing (C-SGP) Protocol," Institut Teknologi Sepuluh Nopember, 2017.
- [32] A. Tripathi, H. P. Gupta, T. Dutta, R. Mishra, K. K. Shukla, and S. Jit, "Coverage and Connectivity in WSNs: A Survey, Research Issues and Challenges," *IEEE Access*, vol. 6, pp. 26971–26992, 2018.
- [33] M. S. and S. S. T. Anamika Walter, "Energy Efficient Routing Protocol in Wireless Sensor Network," *Int. J. Comput. Eng. Technol.*, vol. 11, no. 2, pp. 31–48, 2018.
- [34] P. Kuila and P. K. Jana, *Clustering and routing algorithms for wireless* sensor networks: Energy efficiency approaches. CRC Press, 2017.
- [35] B. Bhushan and G. Sahoo, *Routing protocols in wireless sensor networks*, vol. 776. Springer Berlin Heidelberg, 2019.
- [36] Noman Shabbir; Syed Rizwan Hassan, "Routing Protocols for Wireless Sensor Networks (WSNs)," in *Wireless Sensor Networks Insights and Innovations*, 2017, pp. 23–37.
- [37] F. Fanian and M. Kuchaki Rafsanjani, "Cluster-based routing protocols in wireless sensor networks: A survey based on methodology," J. Netw. Comput. Appl., vol. 142, no. February, pp. 111–142, 2019.
- [38] M. M. Muhklif, M. Ismail, M. A. Altahrawi, M. F. Mansor, and M. K. Abufoul, "Energy Efficient Clustering Techniques in Heterogeneous Wireless Sensor Networks," in *ISTT 2018 - 2018 IEEE 4th International Symposium on Telecommunication Technologies*, 2018, pp. 1–6.
- [39] K. Agarwal, K. Agarwal, and K. Muruganandam, "Low Energy Adaptive Clustering Hierarchy (LEACH) Protocol: Simulation and Analysis using," in 2018 International Conference on Computing, Power and Communication

Technologies (GUCON), 2018, pp. 60-64.

- [40] G. YI XU, G. Sun, T, "A Sparse Low Energy Adaptive Clustering Hierarchy Method for Wireless Sensor Networks," in 2018 Fourth International Conference on Advances in Computing, Communication & Automation (ICACCA), 2018, no. 1.
- [41] J. Anzola, J. Pascual, G. Tarazona, and R. González, "A clustering WSN routing protocol based on k-d tree algorithm," *Sensors (Switzerland)*, vol. 18, no. 9, 2018.
- [42] M. N. Jambli, M. I. Bandan, K. S. Pillay, and S. M. Suhaili, "An analytical study of LEACH routing protocol for wireless sensor network," in 2018 IEEE Conference on Wireless Sensors, ICWiSe 2018, 2019, pp. 44–49.
- [43] J. Y. Lee and D. Lee, "Improvement of CH election in three-level heterogeneous WSN," *Indones. J. Electr. Eng. Comput. Sci.*, vol. 13, no. 1, pp. 272–278, 2019.
- [44] A. Al-Shaikh, H. Khattab, and S. Al-Sharaeh, "Performance comparison of LEACH and LEACH-C protocols in wireless sensor networks," J. ICT Res. Appl., vol. 12, no. 3, pp. 219–236, 2018.
- [45] B. Kundaliya and S. K. Hadia, "Enhancing network lifetime with an improved MOD-LEACH," Int. J. Electr. Comput. Eng., vol. 9, no. 5, pp. 3615–3622, 2019.
- [46] Usman Nazir and M. Usman Saeed, "Analysis of Energy Efficient Hierarchical Routing Protocols in Wireless Sensor Networks," Comsats Institute of Information Technology, 2012.
- [47] P. Nayak, K. Kavitha, and N. Khan, "Cluster Head Selection in Wireless Sensor Network Using Bio-Inspired Algorithm," in *IEEE Region 10 Annual International Conference, Proceedings/TENCON*, 2019, vol. 2019-Octob, pp. 1690–1696.
- [48] A. Ridwan, R. Ferdian, and R. Kurnia, "Optimization of the LEACH Protocol to Increase Stability on the Wireless Sensor Network," *J. RESTI* (*Rekayasa Sist. dan Teknol. Informasi*), vol. 4, no. 1, pp. 193–200, Feb. 2020.
- [49] S. Iqbal, S. B. Shagrithaya, G. P. Sandeep Gowda, and B. S. Mahesh, "Performance analysis of stable election protocol and its extensions in

WSN," in *Proceedings of 2014 IEEE International Conference on Advanced Communication, Control and Computing Technologies, ICACCCT 2014*, 2015, no. 978, pp. 744–748.

- [50] Y. Pant and H. S. Bhadauria, "Performance Study of Routing Protocols in Wireless Sensor Network," in *Proceedings - 2016 8th International Conference on Computational Intelligence and Communication Networks, CICN 2016*, 2017, pp. 134–138.
- [51] D. Gopika and R. Panjanathan, "A Comprehensive Study on Various Energy Conservation Mechanisms in Wireless Sensor Networks," in *International Conference on Emerging Trends in Information Technology and Engineering, ic-ETITE 2020*, 2020, pp. 1–5.
- [52] E. S. V. Janani and P. G. Kumar, "Energy Efficient Cluster Based Scheduling Scheme for Wireless Sensor Networks," *Sci. World J.*, vol. 2015, 2015.
- [53] K. Cengiz and T. Dag, "Energy Aware Multi-Hop Routing Protocol for WSNs," *IEEE Access*, vol. 6, pp. 2622–2633, 2017.
- [54] H. Qabouche, A. Sahel, and A. Badri, "Hybrid energy efficient static routing protocol for homogeneous and heterogeneous large scale WSN," *Wirel. Networks*, vol. 2, 2020.
- [55] A. S. Al-Zubaidi, A. A. Ariffin, and A. K. Al-Qadhi, "Enhancing the stability of the improved-leach routing protocol for wsns," *J. ICT Res. Appl.*, vol. 12, no. 1, pp. 1–13, 2018.
- [56] Ademola P. Abidoye, Elisha O. Ochola, Ibidun C. Obagbuwa, and Desmond W. Govender, "An Improved Ant Colony Optimization Algorithm: A Technique for Extending Wireless Sensor Networks Lifetime Utilization," *Int. J. of Adv. Comp, Scie. and App.*, vol. 11, no. 8, pp.425-437, 2020.
- [57] Digi XBee, "XBee®/XBee-PRO S2C Zigbee®," Xbee Pro X2C datasheet, Sept. 2018.
- [58] Nordic Semiconductor, "nRF24L01 + Single Chip 2.4GHz Transceiver," nRF24L01+ datasheet, Sept. 2008.