

## REFERENCES

- [1] J. Yick, B. Mukherjee, and D. Ghosal, "Wireless sensor network survey," *Computer Networks*, vol. 52, no. 12, pp. 2292-2330. April 2008.
- [2] I. F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cayirci, "A survey on sensor networks," *IEEE Communications Magazine*, vol. 40, no. 8, pp. 102-114. February 2002.
- [3] M. Hussain, P. Khan, and K. Sup, "WSN research activities for military application," in *Proceedings of the 11th International Conference on Advanced Communication Technology ICACT '09*, 15-18 February, Phoenix Park, Korea, vol. 1, 2009, pp. 271-274.
- [4] S. H. Toh, K. H. Do, W. Y. Chung, and S. C. Lee, "Health decision support for biomedical signals monitoring system over a WSN," in *Proceedings of the 2nd International Symposium on Electronic Commerce and Security — ISECS '09*, 22-24 May, Nanchang City, China, vol. 1, 2009, pp. 605-608.
- [5] N. Wirawan, S. Rachman, I. Pratomo, and N. Mita, "Design of low cost wireless sensor networks-based environmental monitoring system for developing country," in *Proceedings of the 14th IEEE Asia-Pacific Conference on Communications APCC '08*, 14-16 October, Tokyo, Japan, 2008, pp. 1-5.
- [6] Werner-Allen, K. Lorincz, M. Ruiz, O. Marcillo, J. Johnson, J. Lees, and M. Welsh, "Deploying a wireless sensor network on an active volcano," *IEEE Internet Computing*, vol. 10, no. 2, pp. 18-25. 2006.
- [7] S. Ratnasamy, B. Karp, L. Yin, F. Yu, D. Estrin, R. Govindan, and S. Shenker, "GHT: A geographic hash table for data-centric storage," in *Proceedings of the 1st ACM International Workshop on Wireless Sensor Networks and Applications WSNA '02*, 28 September, Atlanta, Georgia, USA, 2002, pp. 78-87.
- [8] B. Karp and H. T. Kung, "GPSR: Greedy perimeter stateless routing for wireless networks," in *Proceedings of the 6th Annual International Conference on Mobile*



- Computing and Networking MobiCom '00, 06-11 August, Boston, Massachusetts, USA, 2000, pp. 243-254.
- [9] J. Li, J. Jannotti, D. S. J. De Couto, D. R. Karger, and R. Morris, "A scalable location service for geographic ad hoc routing," in *Proceedings of the 6th Annual International Conference on Mobile Computing and Networking MobiCom '00*, 06-11 August, Boston, Massachusetts, USA, 2000, pp. 120-130.
- [10] Y. C. Hu, A. Perrig, and D. B. Johnson, "Packet leashes: A defense against wormhole attacks in wireless networks," in *Proceedings of the 22nd Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '03*, 30 March 03 April, San Francisco, California, USA, vol. 3, 2003, pp. 1976-1986.
- [11] Y. Xu, J. Heidemann, and D. Estrin, "Geography-informed energy conservation for ad hoc routing," in *Proceedings of the 7th Annual International Conference on Mobile Computing and Networking MobiCom '01*, 16-21 July, Rome, Italy, 2001, pp. 70-84.
- [12] A. Srinivasan and J. Wu, "Wireless sensor networks (WSNs): Secure localization," *Encyclopedia of Wireless and Mobile Communications*, pp. 1545-1571. April 2008.
- [13] D. Lieckfeldt, J. You, and D. Timmermann, "An algorithm for distributed beacon selection," in *Proceedings of the 6th Annual IEEE International Conference on Pervasive Computing and Communication PerCom '08*, 17-21 March, Hong Kong, China, 2008, pp. 318-323.
- [14] B. V. Dasarathy, "More the merrier... or is it? sensor suite augmentation benefits assessment," in *Proceedings of the 3rd International Conference on Information Fusion*, 10-13 July, Paris, France, vol. 2, 2000, pp. WeC3/20-WeC3/25.
- [15] K. Langendoen and N. Reijers, "Distributed localization in wireless sensor networks: A quantitative comparison," *Journal of Computer Networks*, vol. 43, no. 4, pp. 499-518. November 2003.
- [16] S. Slijepcevic, S. Megerian, and M. Potkonjak, "Location errors in wireless embedded sensor networks: Sources, models, and effects on applications," *ACM SIGMOBILE Mobile Computing and Communications Review*, vol. 6, no. 3, pp. 67-78. 2002.



- [17] S. Meguerdichian, S. Slijepcevic, V. Karayan, and M. Potkonjak, "Localized algorithms in wireless ad-hoc networks: Location discovery and sensor exposure," in *Proceedings of the 2nd ACM International Symposium on Mobile Ad Hoc Networking & Computing*, 04 05 October, Long Beach, CA, USA, 2001, pp. 106-116.
- [18] A. Boukerche, H. Oliveira, E. F. Nakamura, and A. A. Loureiro, "Secure localization algorithms for wireless sensor networks," *IEEE Communications Magazine*, vol. 46, pp. 96-101, 2008.
- [19] K. K. Chintalapudi, A. Dhariwal, R. Govindan, and G. Sukhatme, "Ad-hoc localization using ranging and sectoring," in *Proceedings of the 23rd Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '04*, 07-11 March, Hong kong, China, vol. 4, 2004, pp. 2662-2672.
- [20] J. Wang, R. K. Ghosh, and S. K. Das, "A survey on sensor localization," *Journal of Control Theory and Applications*, vol. 8, no. 1, pp. 2-11. 2010.
- [21] F. Franceschini, M. Galetto, D. Maisano, and L. Mastrogiacomo, "A review of localization algorithms for distributed wireless sensor networks in manufacturing," *International Journal of Computer Integrated Manufacturing*, vol. 22, no. 7, pp. 698-716. 2009.
- [22] Q. Shi, H. Huo, T. Fang, and D. Li, "A distributed node localization scheme for wireless sensor networks," *Wireless Personal Communications*, vol. 53, no. 1, pp. 15-33, 2010.
- [23] D. Moore, J. Leonard, D. Rus, and S. Teller, "Robust distributed network localization with noisy range measurements," in *Proceedings of the 2nd International Conference on Embedded Networked Sensor Systems*, 03-05 November, Baltimore, MD, USA, 2004, pp. 50-61.
- [24] J. Liu, Y. Zhang, and F. Zhao, "Robust distributed node localization with error management," in *Proceedings of the 7th ACM International Symposium on Mobile Ad Hoc Networking and Computing*, 22-25 May, Florence, Italy, 2006, pp. 250-261.



- [25] N. Patwari, J. N. Ash, S. Kyperountas, A. O. Hero III, R. L. Moses, and N. S. Correal, "Locating the nodes: cooperative localization in wireless sensor networks," *IEEE Signal Process. Mag.*, vol. 22, pp. 54-69, 2005.
- [26] X. Ji and H. Zha, "Sensor positioning in wireless ad-hoc sensor networks using multidimensional scaling," in *Proceedings of the 23rd Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '04*, 07-11 March, Hong Kong, PR China, vol. 4, 2004, pp. 2652-2661.
- [27] M. Z. Rahman and L. Kleeman, "Paired measurement localization: A robust approach for wireless localization," *IEEE Transactions on Mobile Computing*, vol. 8, no. 8, pp. 1087-1102, 2009.
- [28] H. Lim and J. C. Hou, "Localization for anisotropic sensor networks," in *Proceedings of the 24th Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '05*, 13-17 March, Miami, Florida, USA, vol. 1, 2005, pp. 138-149.
- [29] S. Capkun and J. P. Hubaux, "Secure positioning in wireless networks," *IEEE Journal on Selected Areas in Communications*, vol. 24, no. 2, pp. 221-232. 2006.
- [30] S. Zhang, G. Li, W. Wei, and B. Yang, "A novel iterative multilateral localization algorithm for wireless sensor networks," *Journal of Networks*, vol. 5, no. 1, pp. 112-119. January 2010.
- [31] C. Tran-Xuan, V. H. Vu, and I. Koo, "Calibration mechanism for RSS based localization method in wireless sensor networks," in *Proceedings of the 11th International Conference on Advanced Communication Technology ICACT '09*, 15-18 February, Gangwon-Do, South Korea, vol. 1, 2009, pp. 560-563.
- [32] C. Chai, "Efficient intelligent localization scheme for distributed wireless sensor networks," *Journal of Computers*, vol. 4, no. 11, pp. 1159-1166. November 2009.
- [33] Q. Shi, C. He, H. Chen, and L. Jiang, "Distributed wireless sensor network localization via sequential greedy optimization algorithm," *IEEE Transactions on Signal Processing*, vol. 58, no. 6, pp. 3328-3340. 2010.



- [34] J. Wan, N. Yu, R. Feng, Y. Wu, and C. Su, "Localization refinement for wireless sensor networks," *Computer Communications*, vol. 32, no. 13-14, pp. 1515-1524. 2009.
- [35] H. Jiang, R. Cao, and X. Wang, "Apply modified method of nonlinear optimization to improve localization accuracy in WSN," in *Proceedings of the 5th International Conference on Wireless Communications, Networking and Mobile Computing WiCOM '09*, 24-26 September, Beijing, China, 2009, pp. 1-6.
- [36] A. Savvides, C. C. Han, and M. B. Strivastava, "Dynamic fine-grained localization in ad-hoc networks of sensors," in *Proceedings of the 7th Annual International Conference on Mobile Computing and Networking MobiCom '01*, 16-21 July, Rome, Italy, 2001, pp. 166-179.
- [37] K. Y. Cheng, V. Tam, and K. S. Lui, "Improving aps with anchor selection in anisotropic sensor networks," in *Proceedings of the Joint International Conference on Autonomic and Autonomous Systems and International Conference on Networking and Services ICAS-ICNS '05,* 23-28 October, Papeete, Tahiti, 2005, pp. 49-54.
- [38] K. Sinha and A. Chowdhury, "A beacon selection algorithm for bounded error location estimation in ad hoc networks," in *Proceedings of the IEEE International Conference on Computing: Theory and Applications ICCTA '07*, 05-07 March, Kolkata, India, 2007, pp. 87-93.
- [39] L. M. Kaplan, "Local node selection for localization in a distributed sensor network," *IEEE Transactions on Aerospace and Electronic Systems*, vol. 42, no. 1, pp. 136-146. 2006.
- [40] J. Albowicz, A. Chen, and L. Zhang, "Recursive position estimation in sensor networks," in *Proceedings of the 9th IEEE International Conference on Network Protocols ICNP '01*, 11-14 November, Riverside, California, USA, 2001, pp. 35-41.
- [41] D. Liu, P. Ning, A. Liu, C. Wang, and W. K. Du, "Attack-resistant location estimation in wireless sensor networks," *ACM Transactions on Information and System Security*, vol. 11, no. 4, 2008.



- [42] J. A. Costa, N. Patwari, and A. O. Hero III, "Distributed weighted-multidimensional scaling for node localization in sensor networks," *ACM Transactions on Sensor Networks*, vol. 2, no. 1, pp. 39-64. 2006.
- [43] S. Han, S. Lee, S. Lee, J. Park, and S. Park, "Node distribution-based localization for large-scale wireless sensor networks," *Wireless Networks*, vol. 16, no. 5, pp. 1389-1406. 2010.
- [44] L. Hu and D. Evans, "Using directional antennas to prevent wormhole attacks," in *Proceedings of the 11th Network and Distributed System Security Symposium NDSS '04*, 05-06 February, San Diego, CA, USA, 2004, pp. 131-141.
- [45] K. B. Rasmussen and S. Capkun, "Implications of radio fingerprinting on the security of sensor networks," in *Proceedings of 3rd IEEE International Conference on Security and Privacy in Communications Networks SecureComm '07*, 17-21 September, Nice, France, 2007, pp. 331-340.
- [46] R. Maheshwari, J. Gao, and S. R. Das, "Detecting wormhole attacks in wireless networks using connectivity information," in *Proceedings of the 26th IEEE International Conference on Computer Communications INFOCOM '07*, 06-12 May, Anchorage, AL, USA, 2007, pp. 107-115.
- [47] C. Meadows, P. Syverson, and L. W. Chang, "Towards more efficient distance bounding protocols for use in sensor networks," in *Proceedings of the 2nd International Conference on Security and Privacy in Communication Networks* SecureComm '06, 28 August 01 September, Baltimore, MD, USA, 2006, pp. 1-5.
- [48] S. Tian, X. Zhang, X. Wang, P. Sun, and H. Zhang, "A selective anchor node localization algorithm for wireless sensor networks," in *Proceedings of the International Conference on Convergence Information Technolog ICCIT '07*, 21-23 November, Gyeongju, Korea, 2007, pp. 358-362.
- [49] N. B. Priyantha, H. Balakrishnan, E. Demaine, and S. Teller, "Anchor-free distributed localization in sensor networks," MIT Laboratory for Computer Science, Tech. Rep. 892, April 2003.



- [50] X. Nguyen, M. I. Jordan, and B. Sinopoli, "A kernel-based learning approach to ad hoc sensor network localization," *ACM Transactions on Sensor Networks (TOSN)*, vol. 1, no. 1, pp. 134-152. 2005.
- [51] Y. Shang, W. Rumi, Y. Zhang, and M. Fromherz, "Localization from connectivity in sensor networks," *IEEE Transactions on Parallel and Distributed Systems*, vol. 15, no. 11, pp. 961-974. 2004.
- [52] P. Biswas and Y. Ye, "Semidefinite programming for ad hoc wireless sensor network localization," in *Proceedings of the 3rd International Symposium on Information Processing in Sensor Networks IPSN '04*, 26-27 April, Berkeley, California, USA, 2004, pp. 46-54.
- [53] D. Niculescu and B. Nath, "Ad hoc positioning system (APS)," in *Proceedings of the IEEE Global Telecommunications Conference GLOBECOM '01*, 25-29 November, San Antonio, Texas, USA, vol. 5, 2001, pp. 2926-2931.
- [54] J. Blumenthal, D. Timmermann, C. Buschmann, S. Fischer, J. Koberstein, and N. Luttenberger, "Minimal transmission power as distance estimation for precise localization in sensor networks," in *Proceedings of the International Conference on Wireless Communications and Mobile Computing*, 03-06 July, Vancouver, British Columbia, Canada, 2006, pp. 1331-1336.
- [55] J. Blumenthal, F. Reichenbach, and D. Timmermann, "Precise positioning with a low complexity algorithm in ad hoc wireless sensor networks," *Praxis Der Informationsverarbeitung Und Kommunikation*, vol. 28, no. 2, pp. 80-85. 2005.
- [56] D. Liu, P. Ning, and W. Du, "Detecting malicious beacon nodes for secure location discovery in wireless sensor networks," in *Proceedings of the 25th IEEE International Conference on Distributed Computing Systems ICDCS '05*, 06-10 June, Columbus, Ohio, USA, 2005, pp. 609-619.
- [57] N. Patwari, A. O. Hero, M. Perkins, N. S. Correal, and R. J. O'Dea, "Relative location estimation in wireless sensor networks," *IEEE Transactions on Signal Processing*, vol. 51, no. 8, pp. 2137-2148. 2003.
- [58] D. Lieckfeldt, J. You, and D. Timmermann, "Distributed selection of references for localization in wireless sensor networks," in *Proceedings of the 5th Workshop on*



- Positioning, Navigation and Communication WPNC '08, 22-27 March, Hannover, Germany, 2008, pp. 31-36.
- [59] T. Issariyakul and E. Hossain, *Introduction to Network Simulator (NS2)*. New York, NY, USA: Springer, 2009.
- [60] "The network simulator ns-2," 12 February 2010, http://nsnam.isi.edu/nsnam/index.php/User\_Information. Last accessed on 26 November 2010.
- [61] K. Fall and K. Varadhan, "The Ns Manual," 9 May 2010, http://www.isi.edu/nsnam/ns/doc/ns doc.pdf. Last accessed on 26 November 2010.
- [62] P. Morávek, "Ns-2 simulator capabilities in nodes localization in wireless networks," 2009, http://www.feec.vutbr.cz/EEICT/2009/sbornik/03-Doktorske%20projekty/01-Elektronika%20a%20komunikace/06-xmorav08.pdf. Last accessed on 26 November 2010.
- [63] "The doxygen documentation system," 12 October 2010, http://www.stack.nl/~dimitri/doxygen/. Last accessed on 26 November 2010.
- [64] "The perl programming language," 2010, http://www.perl.org/. Last accessed on 26 November 2010.
- [65] "The gnuplot software," September 2010, http://www.gnuplot.info. Last accessed on 26 November 2010.
- [66] B. V. Dasarathy, "Information fusion what, where, why, when, and how?" *Information Fusion (Editorial)*, vol. 2, no. 2, pp. 75-76. 6 2001.
- [67] E. F. Nakamura, A. A. F. Loureiro, and A. C. Frery, "Information fusion for wireless sensor networks: Methods, models, and classifications," *ACM Computing Surveys* (CSUR), vol. 39, no. 3, pp. Article 9. 2007.
- [68] C. Intanagonwiwat, R. Govindan, and D. Estrin, "Directed diffusion: A scalable and robust communication paradigm for sensor networks," in *Proceedings of the 6th International Conference on Mobile Computing and Networking*, 06-11 August, Boston, MA, USA, 2000, pp. 56-67.



- [69] J. Kulik, W. Heinzelman, and H. Balakrishnan, "Negotiation-based protocols for disseminating information in wireless sensor networks," *Wireless Networks*, vol. 8, no. 2, pp. 169-185. 2002.
- [70] S. Kumar, F. Zhao, and D. Shepherd, "Collaborative signal and information processing in microsensor networks," *IEEE Signal Processing Magazine*, vol. 19, pp. 13-14, 2002.
- [71] M. Sichitiu and V. Ramadurai, "Localization of wireless sensor networks with a mobile beacon," in *Proceedings of the IEEE International Conference on Mobile Ad Hoc and Sensor Systems MASS '04*, 25-27 October, Fort Lauderdale, FL, USA, 2004, pp. 174-183.
- [72] L. Fang, W. Du, and P. Ning, "A beacon-less location discovery scheme for wireless sensor networks," in *Proceedings of the 24th Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '05*, 13-17 March, Miami, Florida, USA, vol. 1, 2005, pp. 161-171.
- [73] Z. Li, W. Trappe, Y. Zhang, and B. Nath, "Robust statistical methods for securing wireless localization in sensor networks," in *Proceedings of the 4th IEEE International Symposium on Information Processing in Sensor Networks IPSN '05*, 24-27 April, Los Angeles, CA, USA, 2005, pp. 91-98.
- [74] R. E. Kalman, "A new approach to linear filtering and prediction problems," *Transactions of the ASME Journal of Basic Engineering*, vol. 82, no. 82 (Series D), pp. 35-45. 1960.
- [75] C. Hongyang, D. Ping, X. Yongjun, and L. Xiaowei, "A robust location algorithm with biased extended kalman filtering of TDOA data for wireless sensor networks," in *Proceedings of the International Conference on Wireless Communications, Networking and Mobile Computing WCNM '05*, 23-26 September, Wuhan, China, vol. 2, 2005, pp. 883-886.
- [76] E. Olson, J. J. Leonard, and S. Teller, "Robust range-only beacon localization," *IEEE Journal of Oceanic Engineering*, vol. 31, no. 4, pp. 949-958. 2006.



- [77] A. Savvides, H. Park, and M. B. Srivastava, "The n-hop multilateration primitive for node localization problems," *Mobile Networks and Applications*, vol. 8, no. 4, pp. 443-451, 2003.
- [78] A. Doucet, N. Freitas, and N. Gordon, Eds., *Sequential Monte Carlo Methods in Practice*. New York, NY, USA: Springer Science + Business Media, Inc, 2001.
- [79] P. J. Nordlund, F. Gunnarsson, and F. Gustafsson, "Particle filters for positioning in wireless networks," in *Proceedings of the XI European Signal Processing Conference EUSIPCO '02*, 03-06 September, Toulouse, France, vol. 2, 2002, pp. 311-314.
- [80] L. Hu and D. Evans, "Localization for mobile sensor networks," in *Proceedings of the 10th Annual International Conference on Mobile Computing and Networking MobiCom '04*, 26 September 01 October, Philadelphia, PA, USA, 2004, pp. 45-57.
- [81] F. Gustafsson and F. Gunnarsson, "Positioning using time-difference of arrival measurements," in *Proceedings of the IEEE International Conference on Acoustics, Speech, and Signal Processing ICASSP '03*, 06-10 April, Hong Kong, China, vol. 6, 2003, pp. 553-556.
- [82] F. Gustafsson, F. Gunnarsson, N. Bergman, U. Forssell, J. Jansson, R. Karlsson, and P. J. Nordlund, "Particle filters for positioning, navigation, and tracking," *IEEE Transactions on Signal Processing*, vol. 50, no. 2, pp. 425-437. 2002.
- [83] J. Miguez and A. Artes-Rodriguez, "A monte carlo method for joint node location and maneuvering target tracking in a sensor network," in *Proceedings of the IEEE International Conference on Acoustics, Speech and Signal Processing ICASSP '06*, 14-19 May, Toulouse, France, vol. 4, 2006, pp. 989-992.
- [84] S. W. Smith, *The Scientist, and Engineer's Guide to Digital Signal Processing*. San Diego, CA, USA: California Technical Publishing, 1999.
- [85] A. Elfes, "Using occupancy grids for mobile robot perception and navigation," *IEEE Computer*, vol. 22, no. 6, pp. 46-57. 1989.



- [86] M. Ribo and A. Pinz, "A comparison of three uncertainty calculi for building sonar-based occupancy grids," *Robotics and Autonomous Systems*, vol. 35, no. 3-4, pp. 201-209, 2001.
- [87] C. Wongngamnit and D. Angluin, "Robot localization in a grid," *Information Processing Letters*, vol. 77, no. 5-6, pp. 261-267. 2001.
- [88] B. Schiele and J. L. Crowley, "A comparison of position estimation techniques using occupancy grids," *Robotics and Autonomous Systems*, vol. 12, no. 3, pp. 163-172. 1993.
- [89] J. Clulow, G. P. Hancke, M. G. Kuhn, and T. Moore, "So near and yet so far: Distance-bounding attacks in wireless networks," in *Security and Privacy in Ad-Hoc and Sensor Networks*, ser. Lecture Notes in Computer Science, L. Buttyan, V. Gligor, and D. Westhoff, Eds., vol. 4357, Berlin, Heidelberg: Springer, 2006, pp. 83-97.
- [90] L. Loukas and P. Radha, "HiRLoc: High-resolution robust localization for wireless sensor networks," *IEEE Journal on Selected Areas in Communications*, vol. 24, no. 2, pp. 233-246. 2006.
- [91] L. Lazos, R. Poovendran, and S. Čapkun, "ROPE: Robust position estimation in wireless sensor networks," in *Proceedings of the 4th International Symposium on Information Processing in Sensor Network IPSN '05*, 24-27 April, Los Angeles, California, 2005, pp. 324-331.
- [92] S. Capkun and J. P. Hubaux, "Secure positioning of wireless devices with application to sensor networks," in *Proceedings of the 24th Annual Joint Conference of the IEEE Computer and Communications Societies INFOCOM '05*, 13-17 March, Miami, Florida, USA, vol. 3, 2005, pp. 1917-1928.
- [93] L. Lazos and R. Poovendran, "SeRLoc: Secure range-independent localization for wireless sensor networks," in *Proceedings of the 3rd ACM Workshop on Wireless Security,* 01 October, Philadelphia, PA, USA, 2004, pp. 21-30.
- [94] Y. Zeng, S. Zhang, S. Guo, and X. Li, "Secure hop-count based localization in wireless sensor networks," in *Proceedings of the International Conference on Computational Intelligence and Security CIS '07,* 15-19 December, Harbin, Heilongjiang, China, 2008, pp. 907-911.



- [95] A. Srinivasan, J. Teitelbaum, and J. Wu, "DRBTS: Distributed reputation-based beacon trust system," in *Proceedings of the 2nd IEEE International Symposium on Dependable, Autonomic and Secure Computing DASC '06*, 29 September 01 October, Indianapolis, IN, USA, 2006, pp. 277-283.
- [96] A. Srinivasan, J. Wu, and J. Teitelbaum, "Distributed reputation-based secure localization in sensor networks," *Journal of Autonomic and Trusted Computing*, 2008.
- [97] S. Zhong, M. Jadliwala, S. Upadhyaya, and C. Qiao, "Towards a theory of robust localization against malicious beacon nodes," in *Proceedings of the 27th IEEE Conference on Computer Communications INFOCOM '08*, 13-18 April, Phoenix, AZ, USA, 2008, pp. 1391-1399.
- [98] Y. Zeng, J. Cao, S. Zhang, S. Guo, and L. Xie, "Pollution attack: A new attack against localization in wireless sensor networks," in *Proceedings of the IEEE Wireless Communications and Networking Conference WCNC '09*, 05-08 April, Budapest, Hungary, 2009, pp. 1-6.
- [99] S. Misra, G. Xue, and S. Bhardwaj, "Secure and robust localization in a wireless ad hoc environment," *IEEE Transactions on Vehicular Technology*, vol. 58, no. 3, pp. 1480-1489. 2009.
- [100] W. Du, L. Fang, and N. Peng, "Lad: Localization anomaly detection for wireless sensor networks," *Journal of Parallel and Distributed Computing*, vol. 66, no. 7, pp. 874-886. 2006.
- [101] J. Hwang, T. He, and Y. Kim, "Detecting phantom nodes in wireless sensor networks," in *Proceedings of the 26th IEEE International Conference on Computer Communications INFOCOM '07*, 06-12 May, Anchorage, AK, USA, 2007, pp. 2391-2395.
- [102] Y. Wei, Z. Yu, and Y. Guan, "Location verification algorithms for wireless sensor networks," in *Proceedings of the 27th International Conference on Distributed Computing Systems ICDCS '07*, 25-27 June, Toronto, Canada, 2007, pp. 70-77.



- [103] E. Ekici, S. Vural, J. McNair, and D. Al-Abri, "Secure probabilistic location verification in randomly deployed wireless sensor networks," *Ad Hoc Networks*, vol. 6, no. 2, pp. 195-209. 2008.
- [104] P. Papadimitratos, M. Poturalski, P. Schaller, P. Lafourcade, D. Basin, S. Capkun, and J. P. Hubaux, "Secure neighborhood discovery: A fundamental element for mobile ad hoc networking," *IEEE Communications Magazine*, vol. 46, pp. 132-139, 2008.
- [105] S. Brands and D. Chaum, "Distance-bounding protocols," in *Advances in Cryptology EUROCRYPT '93*, ser. Lecture Notes in Computer Science, T. Helleseth, Ed., vol. 765, Berlin, Heidelberg: Springer, 1994, pp. 344-359.
- [106] G. P. Hancke and M. G. Kuhn, "An RFID distance bounding protocol," in *Proceedings of the 1st International Conference on Security and Privacy for Emerging Areas in Communication Networks SecureComm '05*, 05-09 September, Athens, Greece, 2005, pp. 67-73.
- [107] J. Munilla and A. Peinado, "Distance bounding protocols for RFID enhanced by using void-challenges and analysis in noisy channels," *Wireless Communications and Mobile Computing*, vol. 8, no. 9, pp. 1227-1232. 2008.
- [108] S. Čapkun, L. Buttyán, and J. P. Hubaux, "SECTOR: Secure tracking of node encounters in multi-hop wireless networks," in *Proceedings of the 1st ACM Workshop on Security of Ad-Hoc and Sensor Network SASN '03*, 31 October, Fairfax, Virginia, USA, 2003, pp. 21-32.
- [109] Y. Desmedt, "Major security problems with the "unforgeable" (feige)-Fiat\_Shamir proofs of identity and how to overcome them," in *Proceedings of the 6th Worldwide Congress on Computer and Communications Security and Protection* SecuriCom '08, 15-17 March, 1988, pp. 147-159.
- [110] Y. C. Hu, A. Perrig, and D. B. Johnson, "Rushing attacks and defense in wireless ad hoc network routing protocols," in *Proceedings of the 2nd ACM Workshop on Wireless Security WiSec '03*, 19 September, San Diego, CA, USA, 2003, pp. 30-40.



- [111] C. Tang, D. O. Wu, T. Syst, and L. Oswego, "Distance-bounding based defense against relay attacks in wireless networks," *IEEE Transactions on Wireless Communications*, vol. 6, no. 11, pp. 4071-4078. 2007.
- [112] B. Waters and E. Felten, "Secure, private proofs of location," Princeton University, Tech. Rep. TR-667-03, 2003.
- [113] V. Nikov and M. Vauclair, "Yet another secure distance-bounding protocol," Cryptology ePrint Archive, Tech. Rep. 319, July 23 2008.
- [114] G. P. Hancke and M. G. Kuhn, "Attacks on time-of-flight distance bounding channels," in *Proceedings of the 1st ACM Conference on Wireless Network Security WiSec '08*, 31 March 02 April, Alexandria, VA, USA, 2008, pp. 194-202.
- [115] D. Singelée and B. Preneel, "Distance bounding in noisy environments," in *Security and Privacy in Ad-Hoc and Sensor Networks*, ser. Lecture Notes in Computer Science, F. Stajano, C. Meadows, S. Capkun, and T. Moore, Eds., vol. 4572, Berlin, Heidelberg: Springer, 2007, pp. 101-115.
- [116] J. Munilla and A. Peinado, "Attacks on a distance bounding protocol," *Computer Communications*, vol. 33, no. 7, pp. 884-889. 2010.
- [117] J. Hightower and G. Borriello, "Location systems for ubiquitous computing," *IEEE Computer*, vol. 34, pp. 57-66, 2001.
- [118] N. O. Tippenhauer and S. Capkun, "ID-based secure distance bounding and localization," in *Computer Security ESORICS '09*, ser. Lecture Notes in Computer Science, M. Backes and P. Ning, Eds., vol. 5789, Berlin, Heidelberg: Springer, 2009, pp. 621-636.
- [119] M. Flury, M. Poturalski, P. Papadimitratos, J. P. Hubaux, and J. Y. Le Boudec, "Effectiveness of distance-decreasing attacks against impulse radio ranging," in *Proceedings of the 3rd ACM Conference on Wireless Network Security WiSec '10*, 22–24 March, Hoboken, New Jersey, 2010, pp. 117-128.
- [120] L. Bussard and W. Bagga, "Distance-bounding proof of knowledge to avoid real-time attacks," in *Security and Privacy in the Age of Ubiquitous Computing*, ser. IFIP Advances in Information and Communication Technology, R. Sasaki, S. Qing, E.



- Okamoto, and H. Yoshiura, Eds., vol. 181, Berlin, Heidelberg: Springer, 2005, pp. 223-238.
- [121] J. Pieprzyk, T. Hardjono, and J. Seberry, *Fundamentals of Computer Security*. Berlin, Heidelberg: Springer, 2003.
- [122] J. Reid, J. M. G. Nieto, T. Tang, and B. Senadji, "Detecting relay attacks with timing-based protocols," in *Proceedings of the 2nd ACM Symposium on Information, Computer and Communications Security,* 20-22 March, Singapore, 2007, pp. 204-213.
- [123] Y. J. Tu and S. Piramuthu, "RFID distance bounding protocols," in *Proceedings of the 1st International EURASIP Workshop on RFID Technology*, 24-25 September, Vienna, Austria, 2007.
- [124] C. H. Kim, G. Avoine, F. Koeune, F. X. Standaert, and O. Pereira, "The swiss-knife RFID distance bounding protocol," in *Information Security and Cryptology ICISC 2008*, ser. Lecture Notes in Computer Science, P. J. Lee and J. H. Cheon, Eds., vol. 5461, Berlin, Heidelberg: Springer, 2009, pp. 98-115.
- [125] C. H. Kim and G. Avoine, "RFID distance bounding protocol with mixed challenges to prevent relay attacks," in *Cryptology and Network Security CANS '09*, ser. Lecture Note in Computer Science, J. A. Garay, A. Miyaji, and A. Otsuka, Eds., vol. 5888, Berlin, Heidelberg: Springer, 2009, pp. 119-133.
- [126] M. Bellare and P. Rogaway, "Entity authentication and key distribution," in *Advances in Cryptology CRYPTO '93*, ser. Lecture Notes in Computer Science, D. R. Stinson, Ed., vol. 773, Berlin, Heidelberg: Springer, 1994, pp. 232-249.
- [127] J. D. Guttmana, F. J. Thayera, and L. D. Zuckb, "The faithfulness of abstract protocol analysis: Message authentication," *Journal of Computer Security*, vol. 12, no. 6, pp. 865-891, 2004.
- [128] P. Peris-Lopez, J. C. Hernandez-Castro, J. M. E. Tapiador, and J. C. A. van der Lubbe, "Shedding some light on RFID distance bounding protocols and terrorist attacks," arXiv.org, Tech. Rep. arXiv:0906.4618v2, June 20 2010.



- [129] G. Avoine, C. Floerkemeier, and B. Martin, "RFID distance bounding multistate enhancement," in *Progress in Cryptology INDOCRYPT '09*, ser. Lecture Notes in Computer Science, B. Roy and N. Sendrier, Eds., vol. 5922, Berlin, Heidelberg: Springer, 2009, pp. 290-307.
- [130] G. Avoine and A. Tchamkerten, "An efficient distance bounding RFID authentication protocol: Balancing false-acceptance rate and memory requirement," in *Information Security*, ser. Lecture Notes in Computer Science, P. Samarati, M. Yung, F. Martinelli, and C. A. Ardagna, Eds., vol. 5735, Berlin, Heidelberg: Springer, 2009, pp. 250-261.
- [131] R. Trujillo-Rasua, B. Martin, and G. Avoine, "The poulidor distance-bounding protocol," in *The 6th Workshop on RFID Security RFIDsec '10,* 07-09 June, Istanbul, Turkey, 2010.
- [132] E. Barker and A. Roginsky, "Recommendation for the transitioning of cryptographic algorithms and key sizes," CiteSeerx, USA, Tech. Rep. NIST Special Publication 800-131, January 2010.
- [133] O. Kara, S. Kardas, M. A. Bingol, and G. Avoine, "Optimal security limits of RFID distance bounding protocols," in *The 6th Workshop on RFID Security RFIDSec* '10, 07-09 June, Istanbul, Turkey, 2010.
- [134] G. P. Hancke, K. E. Mayes, and K. Markantonakis, "Confidence in smart token proximity: Relay attacks revisited," *Computers & Security*, vol. 28, no. 7, pp. 615-627, 2009.
- [135] S. Drimer and S. J. Murdoch, "Keep your enemies close: Distance bounding against smartcard relay attacks," in *Proceedings of 16th USENIX Security Symposium*, 06–10 August, Boston, MA, 2007, pp. 87-102.