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Abstract

In Wireless Sensor Network (WSN) applications it is critical to accurately determine the location of the distributed sensor nodes in order to report the data that is geographically meaningful. Since localization and tracking algorithms have been attracting research and development attention recently, a wide range of existing approaches regarding this topic have emerged. Tracking and localization algorithms have been proposed for different WSN applications including civilian, industrial and safety applications. A few research studies focused on tracking threads through military applications, such as detecting and tracking threads through border security area. Therefore this paper studies and investigates the existing WSN based tracking and localization algorithms and summarizes the potential requirements for localizing and tracking threads through military applications. The existing systems are categorized and discussed. A critical analysis is found in this paper, in order to guide the developer to design and implement a WSN-based tracking system for military applications.

Refer

ences

- Hamdi, M., Boudriga, N., Obaidat, M. S. 2008. WHOMoVeS: An optimized broadband sensor network for military vehicle tracking, *International Journal of Communication Systems*, Vol. 21 , Issue 3, pp. 277-300, ISSN:1074-5351.
- Son, B.; Her, Y.; Kim, J. 2006. A design and implementation of forest-fires surveillance system based on wireless sensor networks for South Korea Mountains. *Int. J. Comput. Sci. Netw. Secur.(IJCSNS)* 6, 124–130.
- Antoine-Santoni, T., Santucci, J., Gentili, E., De; Silvani, X., Morandini, F. 2009. Performance of a protected wireless sensor network in a fire. *Analysis of fire spread and data transmission. Sens. J.* 9, 5878-5893
- Lloret, J., Garcia, M., Bri, D. and Sendra. S. 2009. A Wireless Sensor Network Deployment for Rural and Forest Fire Detection and Verification. *Sensors*. Vol. 9 Issue: 11. pp. 8722-8747.
- Resch, B., Mittlboeck, M., Girardin, F., Britter, R. and Ratti, C. 2009. Real-time Geo-awareness - Sensor Data Integration for Environmental Monitoring in the City. IN: *Proceedings of the IARIA International Conference on Advanced Geographic Information Systems & Web Services – GEOWS2009*, Cancun, Mexico, pp. 92-97.
- Alhmiedat, T., and Yang, S 2007. A Survey: Localization and Tracking Mobile Targets through Wireless Sensor Network, *PGNet International Conference*, ISBN: 1-9025-6016-7.
- Shareef, A., Zhu, Y., and Musavi, M. 2008. Localization Using Neural Networks in Wireless Sensor Networks”, *1st International Conference on Mobile Wireless MiddleWARE, Operating Systems, and Applications*, Innsbruck, Australia.
- Takahashi, S., Wong, J., Miyamae, M., Terada, T., Noma, H., Toriyama, T., Kogure, K., and Nishio, S., 2008. A ZigBee based Sensor Node for Tracking People’s Locations, *ACM International Conference Proceeding Series*; Vol. 281, New York, USA.
- Alhmiedat, T. A. and Yang, S., 2008. A ZigBee-based Mobile Tracking System Through Wireless Sensor Networks”, *Int. Advanced Mechatronic Systems*, 1(1), pp. 63-70.
- Takahashi, S., Wong, J., Miyamae, M., Terada, T., Noma, H., Toriyama, T., Kogure, K., and Nishio, S. 2008. A ZigBee based Sensor Node for Tracking People’s Locations, *ACM International Conference Proceeding Series*; Vol. 281, New York, USA.
- Blumenthal, J., Reichenbach, F. and Timmermann, D. 2005. Position estimation in ad-hoc wireless sensor networks with low complexity, *Joint 2nd Workshop on Positioning, Navigation and Communication (WPNC 05) and 1st Ultra-Wideband Expert Talk*, pp.41–49.
- Blumenthal, J., Grossmann, R., Golatowski, F. and Timmermann, D. 2007. Wighted centroid localization in ZigBee based sensor networks”, *Folien IEEE International Symposium on Intelligent Signal Processing, WISP*, Madrid, Spain.
- Blumenthal, J., Reichenbach, F. and Timmermann, D. 2005. Position estimation in ad-hoc wireless sensor networks with low complexity, *Joint 2nd Workshop on Positioning, Navigation and Communication (WPNC 05) and 1st Ultra-Wideband Expert Talk*, pp.41–49.
- He, T., Huang, C., Blum, B. M., Stankovic, J. A. and Abdelzaher, T. F. 2005. Range-Free Localization and its Impact on Large Scale Sensor Networks, *ACM Transactions on Embedded Computing System*, Vol. 4.
- Boukerche, A., Oliveira, H.A.B.F., Nakamura, E.F., and Loureiro, A.A.F. 2007. Localization Systems for Wireless Sensor Networks, *IEEE Wireless Communications: Wireless Sensor Networking*, pp. 6-12.
- Alhmiedat, T. A, and Yang, S., 2011. Tracking Mobile Targets through Wireless Sensor

Networks, Lap Lambert Academic Publishing AG & Co Kg, ISBN 13: 9783844334609.

- Padmavathi, G., Shanmugapriya, D., and Kalaivani M. 2010. A Study on Vehicle Detection and Tracking Using Wireless Sensor Networks, *Wireless Sensor Network*, 173-185.
- Psiaki, M.L. 2001. Smoother-Based GPS Signal Tracking in a Software Receiver, *Proceedings of ION GPS*, pp. 2900-2913.
- Chadil, N., Russameesawang, A., and Keeratiwintakorn, P. 2008. Real-Time Tracking Management System using GPS, GPRS and Google Earth, in *Proc of the 5th International Conference on Electrical Engineering, Telecommunications and Information Technology*, Thailand.
- Handcock, R., Swain, D., Bishop-Hurley, G., Patison, K., Wark, T., Valencia, P., Corke, P., O'Neill, C. 2009. Monitoring Animal Behaviour and Environmental Interactions Using Wireless Sensor Networks, GPS Collars and Satellite Remote Sensing. *Sensors* 9, 3586-3603.
- Ding, F., Song, G., Yin, K., Li, J., and Song. A. 2009. A GPS-enabled wireless sensor network for monitoring radioactive materials”, *Sensors and Actuators A: Physical* 155, 210-215.
- Matamoros, J. M., Martinez, J. R., and Ollero, A. 2009. Cooperative localization and tracking with a camera-based WSN. *Proceedings of the 2009 IEEE International Conference on Mechatronics*, Malaga, Spain, April.
- Chen, W. T., Chen, P.Y., Lee, W.S., and Huang, C.F. 2008. Design and implementation of a real time video surveillance system with wireless sensor networks, in *Vehicular Technology Conference*. VTC Spring IEEE, p. 218.
- Paniga, S., Borsani, L., Redondi, A., Tagliasacchi, M., and Cesana, M. 2010. Experimental Evaluation of a Video Streaming System for Wireless Multimedia Sensor Networks, *The 10th IFIP Annual Mediterranean Ad Hoc Networking Workshop*, Milano, Italy.
- Jung, B. and Sukhatme, G.S. 2001. Tracking Multiple Moving Targets using a Camera and Laser Rangefinder, *Technical Report IRIS-01-397*, Institute for Robotics and Intelligent Systems (IRIS), University of Southern California.
- Reichenbach, F., Blumenthal, J. and Timmermann, D. 2006. Improved precision of coarse grained localization in wireless sensor networks, *9th DSD Conference*, Dubrovnik, Croatia, pp.630–637.
- Reichenbach, F. and Timmermann, D. 2006. Indoor Localization with low complexity in wireless sensor networks, *Proceeding of the IEEE (INDIN'06)*, pp.1018–1023.
- Paschos, G. S., Vagenas, E. D., and Kotsopoulos, S. A. 2005. Real-time localization for wireless sensor networks with multiple reference transmissions, in *Proceedings of the 5th International Network Conference (INC '05)*, Island of Samos, Greece.
- Li, B., Salter, J., Dempster, A. G., and Rizos, C. 2006. Indoor Positioning Techniques Based on Wireless LAN”, *Proceedings of AusWireless*, Sydney, Australia.
- Li, B., Dempster, A., Rizos, C., and Barnes, J. 2005. Hybrid Method for Localization using WLAN, *Spatial Sciences Conference*, Melbourne, Australia.
- Small, J., Smaliagic, A., and Siewiorek, D. 2000. Determining user Locations For Context Aware Computing Through the Use of a Wireless LAN Infrastructure, *Institute for Complex Engineered Systems*, Carnegie Mellon University, Pittsburgh, PA 15213, USA.
- Ahmad, U., Gavrilov, A., Nasir, U., Iqbal, M., Seong, J. C., and Sungyoung, L. 2006. In-building Localization using Neural Networks, *IEEE International Conference of Intelligent Systems*, Islamabad, Pakistan.

- Battiti, R., Nhat, T. L., and Villani, A. 2002. Location-aware computing: a neural network model for determining location in wireless LANs, Tech. Rep. DIT-02-0083, University of Trento, Trento, Italy.
- Simon, G., and Sujbert, L. 2006. Acoustic source localization in sensor networks with low communication bandwidth, International Workshop on Intelligent Solutions in Embedded Systems.
- Werner-Allen, G., Johnson, J., Ruiz, M., Lees, J., and Welsh, M. 2005. Monitoring volcanic eruptions with a wireless sensor network, In Proc. Second European Workshop on Wireless Sensor Networks (EWSN'05).
- Ko, J. H., Shin, J., Kwon, S. and Kim, C. 2008. Localization of sensor nodes in underwater acoustic sensor networks using two reference points. International Conference on Information Networking, ICOIN.
- Kushwaha, M., Amundson, I., Volgyesi, P., Ahammad, P., Simon, G., Koutsoukos, X., Ledeczi, A., Sastry, S. 2008. Multi-modal target tracking using heterogeneous sensor networks. In: Proc. of ICCCN.
- Meesookho, C., and Mitra, U. 2008. On energy-based acoustic source localization for sensor networks, IEEE Trans. Signal Process., vol. 56, no. 1, pp. 365–377.
- Collier, T.C., Kirschel, A.N.G. and Taylor, C.E. 2010. Acoustic localization of antbirds in a Mexican rainforest using a wireless sensor network. J. Acoust. Soc. Am. 128: 182–189.

Index Terms

Computer Science

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Keywords

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