

Remote powering of Wireless Sensor Nodes through Wireless Power Transmission (WPT)

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Abstract

Wireless Power Transmission has been investigated for many years, exciting a great interest in the community. This project activity is aimed at the development of a specific firmware for WSN nodes, in order to read the voltage received by an array antenna specifically designed to collect the power transmitted by the prototype developed for WPT technology.

Reference Bibliography: Wireless Sensor Networks [1]-[7]; Wireless Power Transmission [8]-[15].

- [1] F. Viani, F. Robol, A. Polo, P. Rocca, G. Oliveri, and A. Massa, "Wireless architectures for heterogeneous sensing in smart home applications - concepts and real implementations," Proc. IEEE, in press.
- [2] F. Viani, G. Oliveri, M. Donelli, L. Lizzi, P. Rocca, and A. Massa, "WSN-based solutions for security and surveillance," 40th European Microwave Conference 2010 (EuMC2010), Paris, France, pp. 1762-1765, Sep. 26 - Oct. 1, 2010.
- [3] F. Viani, P. Rocca, G. Oliveri, and A. Massa, "Pervasive remote sensing through WSNs," 6th European Conference on Antennas Propag. (EuCAP 2012), Prague, Czech Republic, Mar. 26-30, 2012.
- [4] F. Viani, P. Rocca, M. Benedetti, G. Oliveri, and A. Massa, "Electromagnetic passive localization and tracking of moving targets in a WSN-structured environment," Inverse Problems - Special Issue on "Electromagnetic Inverse Problems: Emerging Methods and Novel Applications," vol. 26, pp. 1-15, May 2010.
- [5] F. Viani, P. Rocca, G. Oliveri, D. Trincherio, and A. Massa, "Localization, tracking and imaging of targets in wireless sensor network: An invited review," Radio Science, vol. 46, 2011.
- [6] F. Viani, L. Lizzi, P. Rocca, M. Benedetti, M. Donelli, and A. Massa, "Object tracking through RSSI measurements in wireless sensor networks," Electronics Letters, vol. 44, no. 10, pp. 653-654, 2008.
- [7] F. Viani, P. Rocca, G. Oliveri, and A. Massa, "Electromagnetic tracking of transceiver-free targets in wireless networked environments," 6th European Conference on Antennas Propag. (EuCAP 2011), Rome, Italy, pp. 3808-3811, Apr. 11-15, 2011 (Invited paper).
- [8] A. Massa, G. Oliveri, F. Viani, and P. Rocca, "Array designs for long-distance wireless power transmission - State-of-the-art and innovative solutions," Proceedings of the IEEE - Special Issue on "Wireless Power Technology, Transmission and Applications," vol. 101, no. 6, pp. 1464-1481, June 2013.
- [9] G. Oliveri, L. Poli, and A. Massa, "Maximum efficiency beam synthesis of radiating planar arrays for wireless power transmission," IEEE Trans. Antennas Propag., pp. 2490-2499, vol. 61, no. 5, May 2013.

- [10] G. Franceschetti, P. Rocca, F. Robol, and A. Massa, "Design and optimization of efficient rectenna systems for space solar power applications," International Conference on Electromagnetics and Advanced Applications (ICEAA 2012) - Invited paper, Session title: "Wireless power transmission", Cape Town, South Africa, Sep. 2-7, 2012.
- [11] G. Franceschetti, P. Rocca, F. Robol, and A. Massa, "Innovative rectenna design for space solar power systems," IEEE MTT-S International Microwave Workshop Series on "Innovative Wireless Power Transmission: Technologies, Systems, and Applications" (IMWS-IWPT2012), Kyoto, Japan, pp. 151-153, May 10-11, 2012.
- [12] G. Oliveri, P. Rocca, F. Viani, F. Robol, and Andrea Massa, "Latest advances and innovative solutions in antenna array synthesis for microwave wireless power transmission," IEEE MTT-S International Microwave Workshop Series on "Innovative Wireless Power Transmission: Technologies, Systems, and Applications" (IMWS-IWPT2012), Kyoto, Japan, pp. 71-73, May 10-11, 2012.
- [13] G. Oliveri, P. Rocca, and A. Massa, "Array antenna architectures for solar power satellites and wireless power transmission," XXX URSI General Assembly and Scientific Symposium of International Union of Radio Science (URSI GASS 2011) - Invited paper, Session title: "Solar power satellites and wireless power transmission", Istanbul, Turkey, Aug. 13-20, 2011.
- [14] G. Franceschetti, A. Massa, and P. Rocca, "Innovative antenna systems for efficient microwave power collection," IEEE MTT-S International Microwave Workshop Series on "Innovative Wireless Power Transmission: Technologies, Systems, and Applications" (IMWS-IWPT2011), Uji (Kyoto), Japan, pp. 275-278, May 12-13, 2011 (Invited paper).
- [15] P. Rocca, G. Oliveri, and A. Massa, "Innovative array designs for wireless power transmission," IEEE MTT-S International Microwave Workshop Series on "Innovative Wireless Power Transmission: Technologies, Systems, and Applications" (IMWS-IWPT2011), Uji (Kyoto), Japan, pp. 279-282, May 12-13, 2011 (Invited paper).

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