

**SPECIAL ISSUE**

**RFID: A UNIQUE RADIO INNOVATION FOR THE 21ST CENTURY**

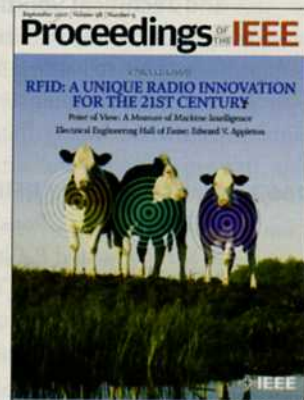
*Edited by R. Gadh, G. Roussos, K. Michael, G. Q. Huang, B. S. Prabhu, and P. Chu*

- 1550 Shunt Behavior in RFID UHF Tag According to ISO Standards and Manufacturer Requirements**  
*By A. Moretto, E. Colin, C. Ripoll, and S. Abou Chakra*  
 | CONTRIBUTED PAPER | Modeling and simulation are used to investigate loading effects and their implications for RFID antenna performance; a model of shunt resistance is used to calculate improved performance in hostile environments.
- 1555 Electromagnetic Modeling of RFID-Modulated Scattering Mechanism. Application to Tag Performance Evaluation**  
*By J. C. Bolomey, S. Capdevila, L. Jofre, and J. Romeu*  
 | CONTRIBUTED PAPER | The authors of this paper use the concept of transfer impedance to characterize RFID systems; they demonstrate how their model can be used to investigate tradeoffs in RFID design.
- 1570 Ultrawide Bandwidth RFID: The Next Generation?**  
*By D. Dardari, R. D'Errico, C. Roblin, A. Sibille, and M. Z. Win*  
 | CONTRIBUTED PAPER | Ultrawideband technology is seen to be a promising means to provide improved area coverage, better resilience to interference, high multiple-access capability, and ranging resolution to RFID systems.
- 1583 RFID: From Supply Chains to Sensor Nets**  
*By S. Roy, V. Jandhyala, J. R. Smith, D. J. Wetherall, B. P. Otis, R. Chakraborty, M. Buettner, D. J. Yeager, Y.-C. Ko, and A. P. Sample*  
 | CONTRIBUTED PAPER | A programmable wireless identification and sensing device is powered through energy harvesting and a software-defined RFID reader provides the means to investigate optimization approaches for RFID systems.
- 1593 Low-Cost, Ubiquitous RFID-Tag-Antenna-Based Sensing**  
*By R. Bhattacharyya, C. Floerkemeier, and S. Sarma*  
 | CONTRIBUTED PAPER | The authors of this paper propose a means for providing low-cost, long-lifetime temperature-threshold sensing, displacement sensing, and fluid level sensing for RFID systems.
- 1601 Progress Towards the First Wireless Sensor Networks Consisting of Inkjet-Printed, Paper-Based RFID-Enabled Sensor Tags**  
*By V. Lakafosis, A. Rida, R. Vyas, L. Yang, S. Nikolaou, and M. M. Tentzeris*  
 | CONTRIBUTED PAPER | This paper discusses the advantages of using inkjet-printed RFID circuits on flexible and paper substrates to provide low-cost and environmentally friendly RFID sensing at high frequencies.
- 1610 The Effect of Conductive Ink Layer Thickness on the Functioning of Printed UHF RFID Antennas**  
*By S. L. Merilampi, T. Björninen, A. Vuorimäki, L. Ukkonen, P. Ruuskanen, and L. Sydänheimo*  
 | CONTRIBUTED PAPER | The authors of this paper investigate the effect of conductive ink layer thickness on performance of RFID antennas, and ways of optimizing tradeoffs between performance characteristics and ink thickness.

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**DEPARTMENTS**

- 1543 POINT OF VIEW**  
 A Measure of Machine Intelligence  
*By P. Cochrane*
- 1546 SCANNING THE ISSUE**  
 RFID—A Unique Radio Innovation for the 21st Century  
*By R. Gadh, G. Roussos, K. Michael, G. Q. Huang, B. S. Prabhu, and P. Chu*
- 1681 SCANNING OUR PAST**  
 Electrical Engineering Hall of Fame:  
 Edward V. Appleton  
*By J. E. Brittain*
- 1683 FUTURE SPECIAL ISSUES/SPECIAL SECTIONS**



**On the Cover:** This month's cover might appear somewhat whimsical, but it illustrates the point that RFID technology is no longer limited to the role of tracking inanimate objects in a warehouse environment, but rather is increasingly being used to monitor living things including cattle and, in certain circumstances, human beings.

## SPECIAL ISSUE: RFID: A UNIQUE RADIO INNOVATION FOR THE 21ST CENTURY

- 1620 Vibration Energy Harvesting for Disaster Asset Monitoring Using Active RFID Tags**  
By A. Hande, R. Bridgelall, and B. Zoghi  
| CONTRIBUTED PAPER | Using highly efficient procedures, piezoelectric vibration energy has been harvested with an energy transducer, power management circuit, and energy storage device, and a comprehensive description has been developed.
- 1629 Long Range Passive UHF RFID System Using HVAC Ducts**  
By P. V. Nikitin, D. D. Arumugam, M. J. Chabalko, B. E. Henty, and D. D. Stancil  
| INVITED PAPER | To provide a potential communications channel, HVAC ducts can function as electromagnetic waveguides; a 30-m read range has been achieved within a free space range of 6 m.
- 1636 Logical RFID Reader Using Hybrid Active-Passive Solution**  
By H. Chen, N. H. Cohen, S. S. Duri, J. M. Reason, and P. B. Chou  
| CONTRIBUTED PAPER | A novel logical reader has been implemented by combining tracking information from passive RFID and position information from active RFID; this provides low-cost, fine-grain, near real-time tracking.
- 1648 Antennas and Propagation of Implanted RFIDs for Pervasive Healthcare Applications**  
By A. Sani, M. Rajab, R. Foster, and Y. Hao  
| CONTRIBUTED PAPER | Active subcutaneous tag antennas were found to have advantages over passive devices in communication range, and in coping with nulls in the radiation patterns.
- 1656 Dual-Frequency Active RFID Solution for Tracking Patients in a Children's Hospital. Design Method, Test Procedure, Risk Analysis, and Technical Solution**  
By G. B. Gentili, F. Dori, and E. Iadanza  
| CONTRIBUTED PAPER | A tracking device that performs active patient identification in a pediatric intensive care unit is found to have distinct advantages over passive devices.
- 1663 Planetary-Scale RFID Services in an Age of Ueberveillance**  
By K. Michael, G. Roussos, G. Q. Huang, A. Chattopadhyay, R. Gadh, B. S. Prabhu, and P. Chu  
| CONTRIBUTED PAPER | This paper discusses possible futures for RFID, including an alternative to bar code tagging, and outlines a vision of a future RFID product service system.
- 1672 Unpacking the RFID Investment Decision**  
By B. W. Keating, T. R. Coltman, S. Fosso-Wamba, and V. Baker  
| CONTRIBUTED PAPER | A recent study dealing with RFID investment decisions finds that while adoption cost is a primary concern, a key factor is the opportunity for strategic benefits.

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