

**SPECIAL ISSUE**

**SENSOR NETWORK APPLICATIONS**

*Edited by M. Liu, N. Patwari, and A. Terzis*

**1808 Circuit Design Advances for Wireless Sensing Applications**

*By G. Chen, S. Hanson, D. Blaauw, and D. Sylvester*

| INVITED PAPER | Many recent designs for miniature, millimeter-scale, long-lifetime, ultralow-power wireless sensors are described with applications in areas such as medical diagnosis, infrastructure monitoring, and environmental sensing.

**1828 Fundamentals of Large Sensor Networks: Connectivity, Capacity, Clocks, and Computation**

*By N. M. Freris, H. Kowshik, and P. R. Kumar*

| INVITED PAPER | This tutorial paper, designed for both researchers and practitioners, provides useful references and covers fundamental research on connectivity, capacity, clocks, and function computation for wireless networks.

**1847 Gossip Algorithms for Distributed Signal Processing**

*By A. G. Dimakis, S. Kar, J. M. F. Moura, M. G. Rabbat, and A. Scaglione*

| INVITED PAPER | Gossiping allows sensors in a network to ignore routing and just exchange data with their nearest neighbors; this paper explores the effects of gossiping on convergence rates, quantization, and channel coding, and surveys recent results.

**1865 IPv6 in Low-Power Wireless Networks**

*By J. W. Hui and D. E. Culler*

| INVITED PAPER | Recent developments have made it possible, pragmatic, and efficient for the IPv6 protocol to be applied to low-power multihop wireless networks, especially regarding the metrics—such as low memory footprint, high reliability, and low energy use—that are most important for embedded applications.

**1879 Database Abstractions for Managing Sensor Network Data**

*By S. Madden*

| INVITED PAPER | This paper surveys several research systems designed to manage sensor data by using database-like abstractions; these systems are designed to organize data collection and to clean and smooth data.

**1887 Real-Time Search for Real-World Entities: A Survey**

*By K. Römer, B. Ostermaier, F. Mattern, M. Fahrmaier, and W. Kellerer*

| INVITED PAPER | The search for real-world entities (people, places, and things) seems likely to become as important as document searching; this paper surveys relevant approaches and outlines possible solutions.

**1903 Environmental Wireless Sensor Networks**

*By P. Corke, T. Wark, R. Jurdak, W. Hu, P. Valencia, and D. Moore*

| INVITED PAPER | This paper reviews recent experiments with networks for environmental and agricultural applications; it also provides a critical review of recent research and considers future challenges and opportunities.

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**DEPARTMENTS**

**1795 EDITORIAL**

*Ideas are Like Rabbits!*  
*By R. Trew and J. Calder*

**1799 POINT OF VIEW**

*Perceptual Video Processing: Seeing the Future*  
*By A. C. Bovik*

**1804 SCANNING THE ISSUE**

*Special Issue on Sensor Network Applications*  
*By M. Liu, N. Patwari, and A. Terzis*

**1974 SCANNING OUR PAST**

*Francisco Salvá's Electric Telegraph*  
*By A. P. Yuste*

**1978 FUTURE SPECIAL ISSUES/SPECIAL SECTIONS**



**On the Cover:** On this month's cover we highlight the security aspects of the subject of this special issue on sensor network applications through the depiction of a security zone in a large city.



**SPECIAL ISSUE: SENSOR NETWORK APPLICATIONS**

**1918 Measurement Scheduling for Soil Moisture Sensing: From Physical Models to Optimal Control**

By *D. I. Shuman, A. Nayyar, A. Mahajan, Y. Goykhman, K. Li, M. Liu, D. Teneketzis, M. Moghaddam, and D. Entekhabi*

| INVITED PAPER | Scheduling and estimation methods are compared in this paper, and a method that sharply reduces energy consumption is presented; the paper is grounded in the physics of soil moisture.

**1934 Embedded Imagers: Detecting, Localizing, and Recognizing Objects and Events in Natural Habitats**

By *T. Ko, J. Hyman, E. Graham, M. Hansen, S. Soatto, and D. Estrin*

| INVITED PAPER | This paper explores information extraction problems—such as changes in illumination, poor vantage point, and occlusions—using pictures taken by embedded cameras.

**1947 Wireless Sensor Networks for Healthcare**

By *J. Ko, C. Lu, M. B. Srivastava, J. A. Stankovic, A. Terzis, and M. Welsh*

| INVITED PAPER | In healthcare, there is a strong need to collect physiological data and sensor networking; this paper reviews recent studies and points to the need for future research.

**1961 RF Sensor Networks for Device-Free Localization: Measurements, Models, and Algorithms**

By *N. Patwari and J. Wilson*

| INVITED PAPER | This paper considers situations where a person or an object can be examined—even in buildings and through walls—because a wireless network uses RF signals as a probe.

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