January/February 2021 Vol. 19. No. 1

Cover art by Barry Downard, www.debutart.com

 $( \bullet )$ 

Digital Object Identifier 10.1109/MSEC.2020.3031994

## LOCI Contents

 $( \blacklozenge$ 

# Requirements for Security, Privacy, and Trust in the Internet of Things

The Internet of Things (IoT) has huge potential to push monitoring, computing, and communication deeply into the home, workplace, medicine, manufacturing, and critical infrastructure. This increased capability offers the hope that urban settings can be transformed in various ways through the innovative deployment of IoT devices. Driven by a decline in the cost of sensors, many cities have adapted a plan to transition services toward being a fully smart city by implementing real-time data-driven management services across urban systems. The four articles chosen for inclusion in this issue of *IEEE Security & Privacy* together give a sense of the breadth of technology issues with smart cities.

**8 Guest Editors' Introduction—Smart Cities** Sabah Mohammed, Tai-hoon Kim, and Wai Chi Fang

12 Security and Privacy in Internet of Things-Enabled Smart Cities: Challenges and Future Directions José L. Hernández-Ramos, Juan A. Martínez, Vincenzo Savarino, Marco Angelini, Vincenzo Napolitano, Antonio F. Skarmeta, and Gianmarco Baldini

24 Security for Shared Electric and Automated Mobility Services in Smart Cities Binod Vaidya and Hussein T. Mouftah

34 Privacy Regulations, Smart Roads, Blockchain, and Liability Insurance: Putting Technologies to Work Lelio Campanile, Mauro Iacono, Alexander H. Levis, Fiammetta Marulli, and Michele Mastroianni

**44** A Self-Healing Mechanism for Internet of Things Devices Guy Amit, Asaf Shabtai, and Yuval Elovici

## Also in This Issue

54 Distributed Financial Exchanges: Security Challenges and Design Principles

Fabio Massacci and Chan Nam Ngo

**65** Detecting Spying Drones

Raz Ben Netanel, Ben Nassi, Adi Shamir, and Yuval Elovici

74 Calculating Risks: Understanding the 2020 Election Experience and Defining the "New Normal"

David Mussington





### Columns

**4 From the Editors** Reflections on the Past, Perspectives on the Future Sean Peisert

**104 Last Word** Attacks on Artificial Intelligence Elisa Bertino

### Departments

### 81 Education

Are We Preparing Students to Build Security In? A Survey of European Cybersecurity in Higher Education Programs Nicola Dragoni, Alberto Lluch Lafuente, Fabio Massacci, and Anders Schlichtkrull

**90 Cybercrime and Forensics** Dealing With COVID-19 Network Traffic Spikes Mahmoud Said Elsayed, Nhien-An Le-Khac, and Anca Delia Jurcut

#### 95 Systems Attacks and Defenses

Whack-a-Meltdown: Microarchitectural Security Games Daniel Genkin and Yuval Yarom

### 99 Building Security In

The Challenges of Software Cybersecurity Certification José L. Hernández-Ramos, Sara N. Matheu, and Antonio Skarmeta

( )

۲

Also in This Issue

7 | IEEE Reliability Society Information

Cover 3 | IEEE Computer Society Information

Postmaster: Send undelivered copies and address changes to *IEEE Security & Privacy*. Membership Processing Dept., IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854-4141. Periodicals postage rate paid at New York, NY, and at additional mailing offices. Canadian GST #125634188. Canada Post Publications Mail Agreement Number 40013885. Return undeliverable Canadian addresses to PO Box 122, Niagara Falls, ON L2E 658. Printed in the USA. **Circula**tion: *IEEE security & Privacy* (ISSN 1540-7993) is published bimonthly by the IEEE Computer Society Headquarters, Three Park Ave., 17th Floor, New York, NY 10016-5997; IEEE Computer Society Publications Office, 10662 Los Vaqueros Circle, Los Alamitos, CA 90720, phone + 1714821 8380; IEEE Computer Society Headquarters, 2001 LS, 518-700, Vashington, D.C. 20036, Subscribe to 16EE Security & Privacy bising www.computer.org/security. *IEEE* Security & Privacy is copublished by the IEEE Computer Society. For more information on computing topics, visit the IEEE Computer Society Digital Library at www.computer.org/csdl.