

06.16

Computer

SECURITY THREATS



TO ROBOT, WITH LOVE, P. 88
FUN WITH SENTIENT TOOLS, P. 95



IEEE  computer society
CELEBRATING 70 YEARS

www.computer.org/computer

Computer



GUEST EDITOR'S INTRODUCTION

Security Threats:
Protecting the New Cyberfrontier

ELISA BERTINO

JUNE 2016

FEATURES

15

The Perils of
Android Security
Configuration

DANIEL VECCHIATO, MARCO
VIEIRA, AND ELIANE MARTINS

22

Privacy and
Security in
Mobile Health:
A Research Agenda

DAVID KOTZ, CARL A. GUNTER,
SANTOSH KUMAR, AND
JONATHAN P. WEINER

31

How to Survive a
Cyber Pearl Harbor

RONALD P. LOUI AND
TERRENCE D. LOUI

ABOUT THIS ISSUE

Evolving technologies, greater openness and transparency in organizations, and increasingly malicious and sophisticated cyberthreats make achieving satisfactory cybersecurity ever more challenging.

FEATURES CONTINUED

38 The DARPA Twitter Bot Challenge

V.S. SUBRAHMANIAN, AMOS AZARIA, SKYLAR DURST, VADIM KAGAN, ARAM GALSTYAN, KRISTINA LERMAN, LINHONG ZHU, EMILIO FERRARA, ALESSANDRO FLAMMINI, AND FILIPPO MENCZER

48 Metamorphic Testing for Cybersecurity

TSONG YUEH CHEN, FEI-CHING KUO, WENJUAN MA, WILLY SUSILO, DAVE TOWEY, JEFFREY VOAS, AND ZHI QUAN ZHOU

RESEARCH FEATURE

56 Brokers or Bridges? Exploring Structural Holes in a Crowdsourcing System

QINGPENG ZHANG, DANIEL DAJUN ZENG, FEI-YUE WANG, RONALD BREIGER, AND JAMES A. HENDLER

COMPUTING PRACTICES

66 Optimizing the Memory Management of a Virtual Machine Monitor on a NUMA System

QIUMING LUO, FENG XIAO, ZHONG MING, HAO LI, JIANYONG CHEN, AND JIANHUA ZHANG



See www.computer.org/computer-multimedia for multimedia content related to the features in this issue

COLUMNS

4 32 & 16 YEARS AGO
Computer,
June 1984 and 2000
NEVILLE HOLMES

77 COMPUTING
EDUCATION
Opening the Instructional
Doors to Computer
Science and IT—Finally
SOREL REISMAN
AND ELI SHMUELI

80 THE IOT
CONNECTION
Demystifying the
Internet of Things
JEFFREY VOAS

84 REBOOTING
COMPUTING
Rebooting Computers
as Learning Machines
ERIK P. DEBENEDICTIS

88 INDISTINGUISHABLE
FROM MAGIC
Social Robots
for the 21st Century
DANIEL ULLRICH
AND ANDREAS BUTZ

95 SCIENCE FICTION
PROTOTYPING
Science Fiction and
the Coming Age
of Sentient Tools
BRIAN DAVID JOHNSON

98 CYBERTRUST
Security-Informed Safety
KATE NETKACHOVA
AND ROBIN E. BLOOMFIELD

120 THE ERRANT
HASHTAG
Scientific Conversations
DAVID ALAN GRIER

Membership News

10 70th Anniversary Milestones MARK PAULK AND LORI CAMERON
102 IEEE Computer Society Information
103 Call and Calendar

Departments

6 Elsewhere in the CS LEE GARBER
8 Spotlight on Transactions MOHAMED IBRAHIM
AND KRISHNENDU CHAKRABARTY
108 Career Opportunities

Circulation: *Computer* (ISSN 0018-9162) is published monthly by the IEEE Computer Society, IEEE Headquarters, Three Park Avenue, 17th Floor, New York, NY 10016-5997; IEEE Computer Society Publications Office, 10662 Los Vaqueros Circle, Los Alamitos, CA 90720; voice +1 714 821 8380; fax +1 714 821 4010; IEEE Computer Society Headquarters, 2001 L Street NW, Suite 700, Washington, DC 20036. IEEE Computer Society membership includes a subscription to *Computer* magazine.

Postmaster: Send undelivered copies and address changes to *Computer*, IEEE Membership Processing Dept., 445 Hoes Lane, Piscataway, NJ 08855. Periodicals Postage Paid at New York, New York, and at additional mailing offices. Canadian GST #125634188. Canada Post Corporation (Canadian distribution) publications mail agreement number 40013885. Return undeliverable Canadian addresses to PO Box 122, Niagara Falls, ON L2E 6S8 Canada. Printed in USA.