

p. 4 The Periodic Table and  
Big Data

p. 70 Simulation-Driven  
Engineering

p. 84 Expanding the Scope  
of HPC Facilities

# Computing

in **SCIENCE & ENGINEERING**

Vol. 18, No. 3 | May/June 2016



## BEST OF RESPECT PART 2

 **IEEE**

**AIP**  
cise.aip.org

IEEE  **computer society**

CELEBRATING 70 YEARS

[www.computer.org/cise/](http://www.computer.org/cise/)

## BEST OF RESPECT, PART 2

### 11 Guest Editors' Introduction

**Tiffany Barnes, Jamie Payton, George K. Thiruvathukal, Kristy Elizabeth Boyer, and Jeff Forbes**

Best of RESPECT, Part 2

### 14 African-American Middle School Girls: Influences on Attitudes toward Computer Science

**Ashley Robinson, Manuel A. Pérez-Quiñones, and Glenda Scales**

The number of women in computing is significantly lower than the number of men, with African-American women making up an even smaller segment of this population. A recent study reveals that African-American middle school girls generally have negative attitudes toward computer science, but that those feelings can change through intervention.

### 24 Lesbian, Gay, Bisexual, Transgender, and Queer Students' Sense of Belonging in Computing: An Intersectional Approach

**Jane G. Stout and Heather M. Wright**

The field of computing is rapidly developing, requiring a strong and diverse labor force. However, the results of two studies indicate that LGBTQ undergraduate and graduate students think about leaving computing degree programs due to a low sense of belonging in the computing community.

### 32 Julian Scholars: Broadening Participation of Low-Income, First-Generation Computer Science Majors

**Gloria Childress Townsend and Kay Sloan**

Using funding from the US National Science Foundation, DePauw University launched a program for low-income, first-generation scholars in STEM fields. Cornerstones of the Julian Scholars program include a week-long summer research experience bridging high school and college, common classes for each cohort, mentoring, one-on-one resume and internship/research counseling, and scholarships.

### 44 STARS Computing Corps: Enhancing Engagement of Underrepresented Students and Building Community in Computing

**Jamie Payton, Tiffany Barnes, Kim Buch, Audrey Rorrer, Huifang Zuo, Kinnis Gosha, Kristine Nagel, Nannette Napier, Ebrahim Randeree, and Lawrence Dennis**

A study on the impact of participation in a national community for broadening participation in computing found many benefits for undergraduate computing students who engage in related projects, including academic, career, and personal benefits, with students who are underrepresented in computing experiencing the most benefit.

### 58 Enacting Agency: The Strategies of Women of Color in Computing

**Apriel K. Hodari, Maria Ong, Lily T. Ko, and Janet M. Smith**

Research on marginalized groups in STEM fields commonly overlooks those who persist and succeed, characterizing groups such as women of color as passive victims instead of active agents in their own achievements. Focusing on women of color who are successfully staying in STEM helps us focus on the ways they enact that agency.

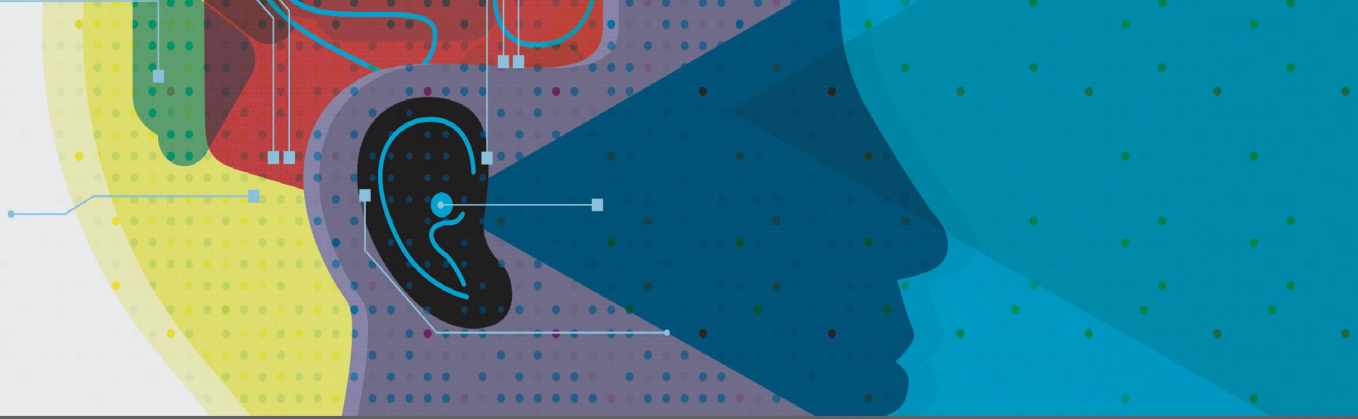


Cover illustration: Andrew Baker  
[www.debutart.com/illustration/andrew-baker](http://www.debutart.com/illustration/andrew-baker)

#### STATEMENT OF PURPOSE

*Computing in Science & Engineering (CiSE)* aims to support and promote the emerging discipline of computational science and engineering and to foster the use of computers and computational techniques in scientific research and education. Every issue contains broad-interest theme articles, departments, news reports, and editorial comment. Collateral materials such as source code are made available electronically over the Internet. The intended audience comprises physical scientists, engineers, mathematicians, and others who would benefit from computational methodologies. All articles and technical notes in *CiSE* are peer-reviewed.





## COLUMNS

- 4 From the Editors**  
**Douglass E. Post**  
The Periodic Table of Elements, an Early Example of “Big Data”
- 96 The Last Word**  
**Charles Day**  
What You Really Wanted

## DEPARTMENTS

- 8 Book Reviews**  
**Kevin Thielen and Vivienne Tien**  
Python and Physical Modeling
- 70 Computer Simulations**  
**Matías Bonaventura, Daniel Foguelman, and Rodrigo Castro**  
Discrete Event Modeling and Simulation-Driven Engineering for the ATLAS Data Acquisition Network

- 84 Leadership Computing**  
**Thomas D. Uram and Michael E. Papka**  
Expanding the Scope of High-Performance Computing Facilities
- 88 Visualization Corner**  
**Julio Toss, João Comba, and Bruno Raffin**  
Parallel Voronoi Computation for Physics-Based Simulations

## RESOURCES

- 10** AIP Membership Information  
**31** IEEE Computer Society Information

**Editorial:** Unless otherwise stated, bylined articles, as well as product and service descriptions, reflect the author's or firm's opinion. Inclusion in *Computing in Science & Engineering* does not necessarily constitute endorsement by IEEE, the IEEE Computer Society, or the AIP. All submissions are subject to editing for style, clarity, and length. IEEE prohibits discrimination, harassment, and bullying. For more information, visit [www.ieee.org/web/aboutus/whatis/policies/p9-26.html](http://www.ieee.org/web/aboutus/whatis/policies/p9-26.html). **Circulation:** *Computing in Science & Engineering* (ISSN 1521-9615) is published bimonthly by the AIP and the IEEE Computer Society. IEEE Headquarters, Three Park Ave., 17th Floor, New York, NY 10016-5997; IEEE Computer Society Publications Office, 10662 Los Vaqueros Cir., Los Alamitos, CA 90720, phone +1 714 821 8380; IEEE Computer Society Headquarters, 2001 L St., Ste. 700, Washington, D.C., 20036; AIP Circulation and Fulfillment Department, 1NO1, 2 Huntington Quadrangle, Melville, NY, 11747-4502. Subscribe to *Computing in Science & Engineering* by visiting [www.computer.org/cise](http://www.computer.org/cise). **Reuse Rights and Reprint Permissions:** Educational or personal use of this material is permitted without fee, provided such use: 1) is not made for profit; 2) includes this notice and a full citation to the original work on the first page of the copy; and 3) does not imply IEEE endorsement of any third-party products or services. Authors and their companies are permitted to post the accepted version of IEEE-copyrighted material on their own web servers without permission, provided that the IEEE copyright notice and a full citation to the original work appear on the first screen of the posted copy. An accepted manuscript is a version that has been revised by the author to incorporate review suggestions, but not the published version with copy-editing, proofreading and formatting added by IEEE. For more information, please go to: [http://www.ieee.org/publications\\_standards/publications/rights/paperversionpolicy.html](http://www.ieee.org/publications_standards/publications/rights/paperversionpolicy.html). Permission to reprint/republish this material for commercial, advertising, or promotional purposes or for creating new collective works for resale or redistribution must be obtained from IEEE by writing to the IEEE Intellectual Property Rights Office, 445 Hoes Lane, Piscataway, NJ 08854-4141 or [pubs-permissions@ieee.org](mailto:pubs-permissions@ieee.org). Copyright © 2016 IEEE. All rights reserved. **Abstracting and Library Use:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy for private use of patrons, provided the per-copy fee indicated in the code at the bottom of the first page is paid through the Copyright Clearance Center, 222 Rosewood Dr., Danvers, MA 01923. **Postmaster:** Send undelivered copies and address changes to *Computing in Science & Engineering*, 445 Hoes Ln., Piscataway, NJ 08855. Periodicals postage paid at New York, NY, 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 the USA.