SAVE TIME, MEASURE OUTCOMES, AND CATCH PLAGIARISM. LEARN HOW, WITH MIMIR CLASSROOM AT BOOTH 314.
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Cover photos by Cole Rodger Photographics (excludes top right photo)
Welcome to the 50th SIGCSE Technical Symposium on Computer Science Education (the 2019 Symposium), the premiere technical conference for computer science educators. The 2019 Symposium is sponsored by the Association for Computing Machinery (ACM) Special Interest Group on Computer Science Education (SIGCSE).

SIGCSE has the third largest membership of any of ACM’s Special Interest Groups (SIG), and is among the oldest SIGs. Only ten SIGs were founded prior to 1968 when SIGCSE was formed, and two other SIGs shared their 50th anniversary in 2018 with SIGCSE. The SIGCSE Board and many other SIGCSE volunteers celebrated the 50th anniversary last year, but I would like to give a special thanks to two people. Briana Morrison, who is on the SIGCSE Board, created a series of weekly postings about SIGCSE’s anniversary. These postings were shared on the listerv and published on SIGCSE’s web site, and I know that many of you, myself included, enjoyed them. I would also like to thank Jane Prey, who is a long-time SIGCSE volunteer and previous SIGCSE award winner, for her work as the guest editor of a special issue of ACM Inroads celebrating SIGCSE’s anniversary.

However, the celebration for the SIG is far from over. This year marks the 50th Technical Symposium, an achievement that even fewer SIGs share, as only six ACM SIGs have conferences that have been held 50 or more times. Further, the SIGCSE Symposium is thriving. The past several years have seen large increases in attendance at the conference, and this year will be even better thanks in part to the 50th anniversary committee. Adrienne Decker, who is a SIGCSE Board member and chairing the committee, Carl Alphonce, and Kurt Eiselt have worked for more than a year to put together a series of special events at the 50th Symposium. There will be a track focused on anniversary content that includes peer-reviewed papers and panels and invited discussants. Previous conference co-chairs have been invited to attend the conference and will be recognized for their work. The Travel Grant program has been expanded to 50 people for the anniversary, which should bring a new group of educators to our community. There will be special ribbons, stickers, and mementos for all attendees, and there will be a 50th anniversary booth and signage throughout the conference providing information about the conference history. Finally, the committee has worked with a historian, the Charles Babbage Institute, and Computing Educator’s Oral History Project to bring content to attendees and have attendees contribute to the organizations’ initiatives. On behalf of the SIGCSE Board, I would like to thank the 50th anniversary committee for all of their hard work.

Of course, none of the activities at the 2019 Symposium would have been possible without the dedicated effort of conference co-chairs Manuel Pérez-Quiñones and Beth Hawthorne. They have spent countless hours ensuring that the 50th Technical Symposium will be an event to remember. They and their committee of nearly 100 people have put together an engaging and innovative program, created opportunities for networking, and handled all the issues big and small that come with a conference of this size. On behalf of the SIGCSE organization and Board, I thank Manuel and Beth for their hard work, innovative ideas, excellent communication, and sense of humor.
Along with everything else you can expect to see this year, the conference provides us with a chance to honor two people for their contributions to computer science education and the SIGCSE community. The annual SIGCSE award for Outstanding Contribution to Computer Science Education will be given to Mark Guzdial at the University of Michigan. Mark has worked to transform wide-scale teaching practice through contextualized computing education, most notably with the Media Computation curriculum, advocated and supported policy changes supporting computing for all in many states in the U.S., published core research in computing education over decades, and helped to foster the next generation of computing educators through his mentorship. It is difficult to find someone in the SIGCSE community who has not read something written by Mark, including the thousands of regular readers of his long-standing blog on computing education. He has also contributed significantly as an organizer of two SIGCSE conferences and served on the SIGCSE Board. Mark has touched the computing education community and SIGCSE in many ways throughout the years, and our community is better for it. The annual SIGCSE award for Lifetime Service will be given to Gloria Childress Townsend at DePauw University. Gloria has worked tirelessly on behalf of diversity and inclusion in computing. She was a co-founder and co-facilitator of the SIGCSE Committee on Expanding the Women-in-Computing Community, a committee that has led birds-of-a-feather sessions at the Technical Symposium annually since 2005. Gloria worked for decades with ACM-W serving on the Executive Board and as ACM-W chair. She conceived of the idea of small regional celebrations of women in computing and worked as a guide and leader for these celebrations as they spread from the United States across the globe. Her extensive service to the computing education community has helped it to reach people who might not have joined without her hard work. Please join me and the rest of the SIGCSE Board in congratulating both of them on their well-deserved awards.

The 50th SIGCSE Technical Symposium will be an amazing event. I hope that you enjoy the celebrations, learn something new about computing education, meet new colleagues and friends, and stay warm in chilly Minneapolis.

Enjoy the conference!

Amber Settle
SIGCSE Chair, 2016-2019
Welcome to the 50th ACM Technical Symposium on Computer Science Education! Our theme this year is Celebrating the 50 Technical Symposia that has taken us from a small gathering of Computing Education enthusiasts in Texas in 1970 to the largest computing education conference in the world. The first SIGCSE Technical Symposium had over 40 papers submitted, 18 of them were accepted. For the 50th symposium, we received 526 paper submissions and accepted 169. In addition, the program has grown to include the ACM Student Research Competition, posters, demos, birds-of-a-feather, panels, special sessions, pre-symposium events, and workshops. Including all tracks, we received 994 submissions, from over 50 countries, with a total of 2668 unique authors representing over 800 organizations. And the participating organizations cover the gamut of K-12, community colleges, public and private universities and colleges, non-profits, corporate entities, government offices, and national laboratories. The growth of this conference parallels the growth of interest in the understanding and study of computing. We have plenty of reasons to celebrate the 50th gathering of our community.

With the growth of the computing education community, so has grown attendance at SIGCSE. In 1972 attendance was around 300 participants. Last year attendance surpassed 1500, and it was the third year in a row with record attendance. What is often missed is that conferences like SIGCSE are run by volunteers. All reviewers, associate program chairs, committee members, symposium and program chairs, and students are volunteers. All are giving their time to help participate in the dissemination of the greatest ideas and research results having to do with computing education.

The 2019 program continues to grow. This year we have a number of presentations exploring our history - in a special 50th celebration track, alongside of the now traditional coverage of topics in computing education, including active learning, AP exams, CS1, computational thinking, issues of diversity, tools, assessment, curriculum issues, etc. As is customary, we have other events that share our passion for computing education and are co-located with us. RESPECT 2019, the fourth international conference on Research on Equity and Sustained Participation in Engineering, Computing, and Technology will take place on Wednesday. We also have the SIGCSE sponsored New Chairs Roundtable as well as a number of pre-symposia, workshops, sponsored and affiliated events to complement our already robust offerings.

We are honored to have Dr. Freeman Habrowski III, President of the University of Maryland, Baltimore County as our opening keynote. Among his many accomplishments, he chaired the committee that produced the National Academies’ report, Expanding Underrepresented Minority Participation: America’s Science and Technology Talent at the Crossroads. He will share a 50-year perspective on American society with a particular focus on technology, student success, and inclusion in computing.

We are also honored to have Dr. Blair Taylor of Towson University who consults with the NSA’s College of Cyber, as a subject matter expert on long-term strategies to build the nation’s cyber workforce. In the closing keynote, Dr. Taylor will share her experiences and perspectives on the future of integrating cybersecurity into computer science education.

The SIGCSE Symposium promotes high-quality scholarship and community engagement around computer science education. We continued the practice of reviewer discussions, an expanded associate program committee, and three paper submissions tracks, recognizing the differences in scope and review criteria between (1) CS education research, (2) experience reports and tools, and (3) curricula initiatives. In 2019, we changed the paper length up to a full 6 pages of content with a 7th page available for acknowledgments and references. These innovations have made our reviewing process more tailored and transparent. 797 volunteers provided each Paper with at least 5 reviews; and all other submissions with at least 3 reviews. Reviewers, along with 69 Associate Program Chairs and 14 Track Chairs, discussed submissions to come to a consensus. Program Chairs made final selections based on recommendations, importance, novelty, and timeliness. Table 1 shows the number of submissions reviewed and accepted in each category.

<table>
<thead>
<tr>
<th>Track</th>
<th># Submitted</th>
<th># Accepted</th>
<th>Acceptance Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papers (CS Education Research, Experience Reports and Tools, Curricula Initiatives)</td>
<td>526</td>
<td>169</td>
<td>32%</td>
</tr>
<tr>
<td>Panels</td>
<td>40</td>
<td>18</td>
<td>45%</td>
</tr>
<tr>
<td>Special Sessions</td>
<td>28</td>
<td>15</td>
<td>54%</td>
</tr>
<tr>
<td>Workshops</td>
<td>57</td>
<td>30</td>
<td>53%</td>
</tr>
<tr>
<td>ACM Student Research Competition</td>
<td>35</td>
<td>19</td>
<td>54%</td>
</tr>
<tr>
<td>Birds of a Feather</td>
<td>58</td>
<td>30</td>
<td>52%</td>
</tr>
<tr>
<td>Demos</td>
<td>24</td>
<td>11</td>
<td>46%</td>
</tr>
<tr>
<td>Lightning Talks</td>
<td>29</td>
<td>22</td>
<td>76%</td>
</tr>
<tr>
<td>Nifty Assignments</td>
<td>53</td>
<td>6</td>
<td>11%</td>
</tr>
<tr>
<td>Posters</td>
<td>144</td>
<td>90</td>
<td>63%</td>
</tr>
</tbody>
</table>

Table 1: SIGCSE 2019 Submission and Acceptance Statistics
We are privileged to have exhibitors and supporters who champion CS education. This year’s supporters include: Platinum: GitHub Education, Google, and Microsoft; Gold: Codio, Intel, Oracle Academy, Turing’s Craft, and zyBooks; Silver: ABET, IBM, Gradescope by Turnitin, Mimir, and Vocareum; and Bronze: AnitaB.org.

This year the Program Chairs selected three best papers from each of the paper tracks for their accomplishment of high quality, novelty and broad appeal to reviewers. All best papers received at least one nomination from reviewers, high ratings, and excellent comments from reviewers. The top three papers in each track are shown below and highlighted throughout the printed program.

### Best Papers: CS Education Research

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Authors</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>First Things First: Providing Metacognitive Scaffolding for Interpreting Problem Prompts</td>
<td>James Prather, Raymond Pettit, Abilene Christian University; Brett A. Becker, University College Dublin; Paul Denny, The University of Auckland; Dastyni Loksa, University of Washington; Alani Peters, Zachary Albrecht, Krista Masci, Abilene Christian University</td>
<td>Fri 11:10 am</td>
<td>Hyatt Greenway J</td>
</tr>
<tr>
<td>3</td>
<td>Exploring the Value of Different Data Sources for Predicting Student Performance in Multiple CS Courses</td>
<td>Soohyun Nam Liao, University of California, San Diego; Daniel Zingaro, University of Toronto Mississauga; Christine Alvarado, William G. Griswold, Leo Porter, University of California at San Diego</td>
<td>Thurs 11:10 am</td>
<td>Millennium Grand South</td>
</tr>
</tbody>
</table>

### Best Papers: Experience Reports and Tools

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Authors</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Computer Science Principles for Teachers of Blind and Visually Impaired Students</td>
<td>Andreas Stefik, University of Nevada, Las Vegas; Richard E. Ladner, University of Washington; William Allee, University of Nevada, Las Vegas; Sean Mealin, North Carolina State University</td>
<td>Friday 2:10 pm</td>
<td>Millennium Grand South</td>
</tr>
<tr>
<td>2</td>
<td>Developing Soft and Technical Skills Through Multi-Semester, Remotely Mentored, Community-Service Projects</td>
<td>Janet Davis, Whitman College; Samuel A. Pebelsky, Cinninin College</td>
<td>Thursday 11:10 am</td>
<td>Hyatt Greenway J</td>
</tr>
<tr>
<td>3</td>
<td>Visualizing Classic Synchronization Problems: Dining Philosophers, Producers-Consumers, and Readers-Writers</td>
<td>Joël C. Adams, Elizabeth R. Koning, Calvin College; Christian D. Hazlett, University of Illinois at Urbana-Champaign</td>
<td>Friday 4:35 pm</td>
<td>Millennium Grand South</td>
</tr>
</tbody>
</table>

### Best Papers: Curricula Initiatives

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Authors</th>
<th>Time</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DROP TABLE textbooks;--: An Argument for SQL Injection Coverage in Database Textbooks</td>
<td>Cynthia Taylor, Oberlin College; Saheel Sakharkar, University of Illinois at Chicago</td>
<td>Thursday 2:10 pm</td>
<td>Hyatt Greenway A</td>
</tr>
<tr>
<td>2</td>
<td>A Flexible Curriculum for Promoting Inclusion through Peer Mentorship</td>
<td>Heather Pon-Barry, Audrey St. John, Becky Wai-Ling Packard, Barbara Rotundo, Mount Holyoke College</td>
<td>Saturday 12:05 pm</td>
<td>Hyatt Greenway J</td>
</tr>
<tr>
<td>3</td>
<td>PythonSneks: An Open-Source, Instructionally-Designed Introductory Curriculum with Action-Design Research</td>
<td>Austin Cory Bart, University of Delaware; Allie Sarver, Michael Friend, Larry Cox, Virginia Tech</td>
<td>Thursday 1:45 pm</td>
<td>Millennium Grand Central</td>
</tr>
</tbody>
</table>

This event owes many thanks to the SIGCSE Board for their guidance over the years. In addition, many organizations and their representatives had a hand in the success of this event. In no particular order: the planners at dLPLAN Meetings | Events: Dorothea Heck, Peggy Robins, Angelina Palmieri, and Betsy Fenwick; the Symposium Site Coordinators: Bob Beck and Paul Tymann; the ACM staff: April Mosqus and Donna Cappo; representatives from Sheridan: Lisa Tolles; Bill Guckert from WRG Design, Cindy Lathrop from the Hyatt Regency Minneapolis, and Melissa Jetson from Meet Minneapolis. We thank our home institutions for their generous support by allowing us to devote time to serve the SIGCSE community.

Finally, we are tremendously grateful for the engagement and support of the SIGCSE community and countless volunteers over the first 50 Symposia, and we look forward to the continued growth of this vibrant academic community. Let the celebration begin!
SIGCSE 2019 Symposium Committee

Symposium Co-Chairs
Elizabeth K. Hawthorne, Union County College
Manuel A. Pérez-Quinones, University of North Carolina at Charlotte

Program Co-Chairs
Sarah Heckman, North Carolina State University
Jian Zhang, Texas Woman's University

Special Sessions and Panels Co-Chairs
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Alvaro Monge, California State University, Long Beach

Workshops Co-Chairs
Brett Becker, University College Dublin, Ireland
Pam Cutter, Kalamazoo College

ACM Student Research Competition Co-Chairs
Jessica Schmidt, North Carolina State University
Stephen Hughes, Coe College

Birds of a Feather Co-Chairs
Mary Anne Egan, Siena College
Mark Sherriff, University of Virginia

Demos and Lightning Talks Co-Chairs
Lina Battestilli, North Carolina State University
Peter-Michael Osera, Grinnell College

Nifty Assignments Co-Chairs
Nick Parlante, Stanford University
Julie Zelenski, Stanford University

Posters Co-Chairs
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S. Monisha Pulimood, The College of New Jersey

Accessibility Chair
Stacy Branham, University of California, Irvine

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Diana Cukierman, Simon Fraser University, Canada

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Cary Laxer, Rose-Hulman Institute of Technology
Laurence D. Merkle, Air Force Institute of Technology

Publications
Ruth Anderson, University of Washington

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Philip East, University of Northern Iowa

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Jodi Tims, Baldwin Wallace University

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Darakhshan Mir, Bucknell University
Samuel A. Rebelsky, Grinnell College

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Ria Galanos, Thomas Jefferson High School for Science and Technology

Community College Liaison
Cara Tang, Portland Community College

International Liaison
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Kids Camp
Dale-Marie Wilson, University of North Carolina at Charlotte
Meghan Allen, University of British Columbia, Canada

Puzzles, Social, & Board Games
Steven Wolfman, University of British Columbia, Canada
Zach Butler, Rochester Institute of Technology

Publicity and Social Media
Adam Blank, California Institute of Technology
John Lewis, Virginia Tech

Local Arrangements
Jigang Liu, Metropolitan State University

50th Celebration Planning Committee
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Kurt Eiselt, University of California Davis
Carl Alphonce, University at Buffalo

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Miles Berry, University of Roehampton, UK
Karen Bradshaw, Rhodes University, South Africa
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Rita Garcia, Adelaide, Australia
Orit Hazan, Technion, Israel
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Marco Silva, Federal University of Technology, Brazil
Abhijat Vichare, Persistent, India
Hironori Washizaki, Waseda University, Japan
Gary Wong, University of Hong Kong, Hong Kong
Ming Zhang, Peking University, China
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Rajeev Agrawal, US Army Engineer Research and Development Center
Meghan Allen, The University of British Columbia, Canada
Carl Alphonce, University at Buffalo
Christine Alvarado, University of California San Diego
Ruth Anderson, University of Washington
Barbara Anthony, Southwestern University
Julio César Bahamón, University of North Carolina at Charlotte
Mark Bailey, Hamilton College
Tiffany Barnes, North Carolina State University
Brett A. Becker, University College Dublin, Ireland
Marie Bienkowski, SRI International
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Alistair Campbell, Hamilton College
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Abhijat Vichare, Abhijat Research and Software, India
Ellen Walker, Hiram College
Henry Walker, Grinnell College
Charles Wallace, Michigan Technological University
Ursula Wolz, Bennington College
### Wednesday • February 27

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Pre-symposium Events</td>
<td>See pages 16-17</td>
</tr>
<tr>
<td>3:00 pm - 9:30 pm</td>
<td>Registration Open</td>
<td>Hyatt Nicolett Promenade</td>
</tr>
<tr>
<td>7:00 pm - 10:00 pm</td>
<td>Workshops 101-110</td>
<td>See page 17</td>
</tr>
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### Thursday • February 28

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>7:30 am - 9:30 pm</td>
<td>Registration Open</td>
<td>Hyatt Nicollet Promenade</td>
</tr>
<tr>
<td>8:15 am - 9:45 am</td>
<td>Opening Keynote: Dr. Freeman Hrabowski, III</td>
<td>Hyatt Nicollet Ballroom</td>
</tr>
<tr>
<td>10:00 am - 5:00 pm</td>
<td>Exhibit Hall Open</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:00 am - 10:45 am</td>
<td>Break, Demo #1, NSF Showcase #1</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:45 am - 12:00 pm</td>
<td>Technical Session #1</td>
<td>See pages 18-20</td>
</tr>
<tr>
<td>12:00 pm - 1:45 pm</td>
<td>First Timer’s Lunch &amp; Lifestyle Service</td>
<td>Hyatt Nicollet Ballroom</td>
</tr>
<tr>
<td>12:00 pm - 1:45 pm</td>
<td>Lunch Break</td>
<td>On your own</td>
</tr>
<tr>
<td>1:45 pm - 3:00 pm</td>
<td>Technical Session #2</td>
<td>See pages 21-23</td>
</tr>
<tr>
<td>1:45 pm - 5:00 pm</td>
<td>ACM Student Research Competition (Posters)</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>3:00 pm - 3:45 pm</td>
<td>Break, Demo #2, NSF Showcase #2</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>3:45 pm - 5:00 pm</td>
<td>Technical Session #3</td>
<td>See pages 24-26</td>
</tr>
<tr>
<td>3:45 pm - 5:00 pm</td>
<td>Lightning Talks #1</td>
<td>Hyatt Lake Bemidji</td>
</tr>
<tr>
<td>5:30 pm - 6:20 pm</td>
<td>Birds of A Feather: Flock A</td>
<td>See page 50</td>
</tr>
<tr>
<td>6:30 pm - 7:20 pm</td>
<td>Birds of A Feather: Flock B</td>
<td>See page 51</td>
</tr>
<tr>
<td>7:30 pm - 9:30 pm</td>
<td>SIGCSE Reception</td>
<td>Hyatt Nicollet Ballroom</td>
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### Friday • March 1

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
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<tbody>
<tr>
<td>8:00 am - 5:00 pm</td>
<td>Registration Open</td>
<td>Hyatt Nicollet Promenade</td>
</tr>
<tr>
<td>8:15 am – 9:45 am</td>
<td>Outstanding Contribution Awardee: Dr. Mark Guzdial</td>
<td>Hyatt Nicollet Ballroom</td>
</tr>
<tr>
<td>10:00 am – 5:00 pm</td>
<td>Exhibit Hall Open</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:00 am – 10:45 am</td>
<td>Break, Demo #3, NSF Showcase #3</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:00 am – 12:00 pm</td>
<td>Poster Session #1</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:45 am – 12:00 pm</td>
<td>Technical Session #4</td>
<td>See pages 28-30</td>
</tr>
<tr>
<td>12:00 pm – 1:45 pm</td>
<td>Lunch Break</td>
<td>On your own</td>
</tr>
<tr>
<td>1:45 pm – 3:00 pm</td>
<td>Technical Session #5</td>
<td>See pages 31-33</td>
</tr>
<tr>
<td>3:00 pm – 3:45 pm</td>
<td>Break, Demo #4, NSF Showcase #4</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>3:00 pm – 5:00 pm</td>
<td>Poster Session #2</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>3:45 pm – 5:00 pm</td>
<td>Technical Session #6</td>
<td>See pages 33-35</td>
</tr>
<tr>
<td>3:45 pm – 5:00 pm</td>
<td>Undergraduate ACM SRC Semifinalists</td>
<td>Hyatt Greenway F/G</td>
</tr>
<tr>
<td>3:45 pm – 5:00 pm</td>
<td>Graduate ACM SRC Semifinalists</td>
<td>Hyatt Greenway H/I</td>
</tr>
<tr>
<td>5:10 pm – 6:00 pm</td>
<td>SIGCSE Business Meeting</td>
<td>Hyatt Greenway A</td>
</tr>
<tr>
<td>6:00 pm – 7:00 pm</td>
<td>CCSC Business Meeting</td>
<td>Hyatt Greenway B/C</td>
</tr>
<tr>
<td>6:00 pm – 7:00 pm</td>
<td>NCWIT Reception</td>
<td>Hyatt Northstar Ballroom</td>
</tr>
<tr>
<td>7:00 pm – 8:00 pm</td>
<td>Community College Reception</td>
<td>Hyatt Regency</td>
</tr>
<tr>
<td>7:00 pm – 10:00 pm</td>
<td>Workshops 301 – 310</td>
<td>See page 36</td>
</tr>
</tbody>
</table>

### Saturday • March 2

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 am – 8:15 am</td>
<td>Community College Breakfast</td>
<td>Hyatt Regency</td>
</tr>
<tr>
<td>8:00 am – 11:15 am</td>
<td>Registration Open</td>
<td>Hyatt Nicollet Foyer</td>
</tr>
<tr>
<td>8:15 am – 9:30 am</td>
<td>Closing Keynote: Dr. Blair Taylor</td>
<td>Hyatt Nicollet Ballroom</td>
</tr>
<tr>
<td>9:45 am – 10:35 am</td>
<td>Technical Session #7</td>
<td>See pages 38-39</td>
</tr>
<tr>
<td>9:45 am – 10:35 am</td>
<td>Lightning Talks #2</td>
<td>Hyatt Lake Bemidji</td>
</tr>
<tr>
<td>9:45 am – 10:35 am</td>
<td>Demo #5</td>
<td>See page 40</td>
</tr>
<tr>
<td>10:00 am – 12:30 pm</td>
<td>Exhibit Hall Open</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:35 am – 11:15 am</td>
<td>Break, NSF Showcase #5</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>10:35 am – 12:30 pm</td>
<td>Poster Session #3</td>
<td>Hyatt Exhibit Hall</td>
</tr>
<tr>
<td>11:15 am – 12:30 pm</td>
<td>Technical Session #8</td>
<td>See pages 40-42</td>
</tr>
<tr>
<td>11:15 am – 12:30 pm</td>
<td>Nifty Assignments</td>
<td>Hyatt Northstar A</td>
</tr>
<tr>
<td>12:30 pm – 2:00 pm</td>
<td>Lunch &amp; Closing Ceremonies</td>
<td>Hyatt Nicollet Ballroom</td>
</tr>
<tr>
<td>3:00 pm – 6:00 pm</td>
<td>Workshops 401 – 410</td>
<td>See page 43</td>
</tr>
</tbody>
</table>
GitHub Education

Real-world tools, engaged students.

Find us at Booth 208 in the Exhibition Hall.
education.github.com
Thursday, February 28 - Opening Keynote
8:15 am - 9:45 am
Hyatt Nicollet Grand Ballroom

Pursuing the Dream: A 50-Year Perspective on American Society, Technology, and Inclusion in Computing

Dr. Freeman A. Hrabowski, III
President
University of Maryland, Baltimore County (UMBC)

Rapid and dramatic demographic and technological changes require our nation’s schools, colleges, and universities to work with agility in preparing students – particularly those from diverse backgrounds – for careers in science, technology, engineering, and math (STEM) fields, including computer science. Exploring the interplay of technology, education, and inclusion over the past 50 years, Dr. Hrabowski examines what this means for our future work in higher education. Computing education provides a critically important case. As the sector evolves rapidly, many well-paid jobs go unfilled and we must explore ways to draw on talent wherever it is found. Emphasizing themes from his TED talk on student success, Dr. Hrabowski focuses our attention on the importance of high expectations and hard work, building community among students, faculty engagement with students, and rigorous assessment of what works. He assesses the way innovative approaches -- including course re-design, active and experiential learning, research, and partnerships with companies and agencies -- promote student success, inclusive excellence, and achievement for all students both in STEM generally and computer science in particular.

Speaker Bio:
Dr. Freeman A. Hrabowski, President of University of Maryland, Baltimore County (UMBC) since 1992, is a consultant on science and math education to national agencies, universities, and school systems. He was named by President Obama to chair the President’s Advisory Commission on Educational Excellence for African Americans. He also chaired the National Academies’ committee that produced the report, Expanding Underrepresented Minority Participation: America’s Science and Technology Talent at the Crossroads (2011). His 2013 TED talk highlights the “Four Pillars of College Success in Science.”

Named one of the 100 Most Influential People in the World by TIME (2012) and one of America’s Best Leaders by U.S. News & World Report (2008), he also received TIAA-CREF’s Theodore M. Hesburgh Award for Leadership Excellence (2011), the Carnegie Corporation’s Academic Leadership Award (2011), and the Heinz Award (2012) for contributions to improving the “Human Condition.” UMBC has been recognized as a model for inclusive excellence by such publications as U.S. News, which the past eight years has recognized UMBC as a national leader in academic innovation and undergraduate teaching. Dr. Hrabowski’s most recent book, Holding Fast to Dreams: Empowering Youth from the Civil Rights Crusade to STEM Achievement, describes the events and experiences that played a central role in his development as an educator and leader.
Thursday, February 28 - First Timer’s Lunch Keynote & 2019 SIGCSE Award for Lifetime Service to the Computer Science Education Community

12:00 pm - 1:45 pm
Hyatt Nicollet Grand Ballroom

A Top-Ten List for 50-50

Dr. Gloria Childress Townsend
Professor of Computer Science
DePauw University

Recipient of the 2019 SIGCSE Award for Lifetime Service to the Computer Science Education Community

SIGCSE addresses gender issues in computing year after year. At DePauw University, we learned from SIGCSE’s lessons – and those taught by ACM’s Council on Women in Computing – and recently awarded 47% of our computer science undergraduate degrees to women. This talk provides a rapid-fire countdown of ten of our most effective strategies that created our 47% class.

Speaker Bio:
Gloria Childress Townsend, Professor of Computer Science, has taught at DePauw University for thirty-nine years and chaired her department for seven years. She founded ACM Celebrations and chaired the ACM-W Chapters project, during her seventeen-year tenure with ACM’s Council on Women in Computing. Her research interests include evolutionary computation and gender issues in computing.

Friday, March 1 - Morning Keynote & 2019 SIGCSE Award for Outstanding Contribution to Computer Science Education

8:15 am - 9:45 am
Hyatt Nicollet Grand Ballroom

Computing Education as a Foundation for 21st Century Literacy

Dr. Mark Guzdial
Professor of Computer Science & Engineering
University of Michigan

Recipient of the 2019 SIGCSE Award for Outstanding Contribution to CS Education

Teaching programming as a way to express ideas, communicate with others, and understand our world is one of the oldest goals for computing education. The inventor of the term “computer science” saw it as the third leg of STEM literacy. In this talk, I lay out the history of the idea of universal computational literacy, some of what it will take to get there, and how our field will be different when we do.

Speaker Bio:
Mark Guzdial is a Professor in the Computer Science & Engineering Division and in Engineering Education Research at the University of Michigan. He studies how people come to understand computing and how to make that more effective. He led the CSLearning4U project to create ebooks to help high school teachers learn CS. He was one of the PI’s on the NSF alliance “Expanding Computing Education Pathways” which helped 16 US states and Puerto Rico improve and broaden their computing education. He invented “Media Computation” and has published several books on the use of media as a context for learning computing. He is on the editorial boards of the “Journal of the Learning Sciences,” “Computer Science Education,” “ACM Transactions on Computing Education,” and “Communications of the ACM.” With his wife and colleague, Barbara Ericson, he received the 2010 ACM Karl V. Karlstrom Outstanding Educator award. He was also the recipient of the 2012 IEEE Computer Society Undergraduate Teaching Award. He is an ACM Distinguished Educator and a Fellow of the ACM.

http://sigcse2019.sigcse.org
Saturday, March 2 - Closing Keynote
8:15 am - 9:30 am
Hyatt Nicollet Grand Ballroom

Cybersecurity is Not a Fad: Why Cyber is a Game Changer for Computer Science Education

Dr. Blair Taylor
Clinical Associate Professor of Computer and Information Sciences
Towson University

First, the bad news - Cybersecurity is here to stay. Threats are escalating and organizations are increasingly vulnerable. Hackers are smarter, there are more of them, and they continue to wreak havoc across critical infrastructure systems. There is a huge, growing shortfall of cyber talent. All students, and especially computer science students, need to learn cyber, but there is an acute shortage of cybersecurity faculty.

The good news – Cybersecurity is here to stay. We continue to need skilled cyber workers. Students like cyber. Cyber can draw more students to Computer Science and create opportunities for Computer Science faculty.

Dr. Blair Taylor will share her experiences building cyber curriculum from the classroom perspective and from her experience working with NSA to build a National Cybersecurity Curriculum Program.

Speaker Bio:
Dr. Blair Taylor is an award-winning educator with 20+ years’ experience in academia. She is a national expert in cybersecurity education and curriculum development. As a Clinical Associate Professor in the Department of Computer and Information Sciences at Towson University, she has received over $5 million of external funding. Her projects include Security Injections @ Towson, which provides security modules for integrating security across the curriculum and is a national model for teaching secure coding to introductory programming students, and SPLASH, which offers Secure Programming Logic for college credit to high school girls.

Dr. Taylor also works with NSA’s College of Cyber as a Subject Matter Expert on long-term strategies to increase the pipeline of qualified students and build the nations’ cyber workforce. These programs include the National Cybersecurity Curriculum Program and the Cyber Cube.

Dr. Taylor has received the University System of Maryland Regents Award for Teaching, the Fisher College of Science and Mathematics Outstanding Faculty Award and the Business Outreach Award. She has been recognized as one of 50 Women to Watch by the Baltimore Sun Magazine and one of Maryland’s top female tech leaders by MDBIZNews. She holds a B.A. in Mathematical Science and an M.S. in Computer Science from Johns Hopkins University and a doctorate in Applied Information Technology from Towson University.
Microsoft celebrates SIGCSE’s 50th Anniversary

Skills for the 21st century and beyond
Empower your students with classroom tools that maximize student success with comprehensive solutions built on job-ready Microsoft technology.

Come learn more about Microsoft programs and technologies during the following sessions:

Visit us at booth #308

Thursday, February 28 | 10:45am
Create Classroom Labs in the Cloud

Friday, March 1 | 1:45pm
Microsoft MakeCode Arcade

Visit https://aka.ms/SIGCSE2019 to learn more!

Thank you
A big thank you to all the members of the computer science education community. We appreciate all your efforts in teaching the next generation of computer scientists.
# SIGCSE 2019 Schedule of Events

## Wednesday, February 27

### Pre-Symposium Events - Morning

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event</th>
<th>Speakers</th>
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</thead>
<tbody>
<tr>
<td>8:30 am - 12:00 pm</td>
<td>Hyatt Greenway H</td>
<td>Computing for the Social Good in Computer Science Education Associated with RESPECT</td>
<td>Michael Goldweber, Xavier University; Lisa Kaczmarczyk, Lisa Kaczmarczyk PhD Consulting, LLC</td>
</tr>
<tr>
<td>8:30 am - 12:00 pm</td>
<td>Hyatt Greenway G</td>
<td>Peer Teaching Summit</td>
<td>Jeffrey Forbes, Duke University; Kristy Elizabeth Boyer, University of Florida; Ketan Mayer-Patel, University of North Carolina at Chapel Hill</td>
</tr>
<tr>
<td>8:30 am - 12:00 pm</td>
<td>Hyatt Greenway A</td>
<td>Teaching Cybersecurity in CSP (or Any CS Class): Introducing the Security Mindset</td>
<td>Maritza Johnson, International Computer Science Institute; Daniel D. Garcia, University of California, Berkeley; Julia Bernd, International Computer Science Institute, University of California, Berkeley; Buffie Holley, Albemarie High School and University of Virginia</td>
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### Pre-Symposium Events - Afternoon

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event</th>
<th>Speakers</th>
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<tbody>
<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Hyatt Greenway A</td>
<td>Development and Visualization of Computing Competencies</td>
<td>Alison Clear, Eastern Institute of Technology; Allen S. Parrish, Mississippi State University; John Impagliazzo, Hofstra University</td>
</tr>
<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Hyatt Greenway C</td>
<td>What to Teach about Accessibility</td>
<td>Richard E. Ladner, Andrew J. Ko, University of Washington</td>
</tr>
<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Hyatt Greenway G</td>
<td>Computer Science Principles Providers and Teachers Forum</td>
<td>Lauren Mock, Michael Ball, Daniel D. Garcia, University of California, Berkeley; Tiffany Barnes, North Carolina State University</td>
</tr>
<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Hyatt Greenway H</td>
<td>What!? You Want Me to Include Computing Ethics, Too!?!! Using the ACM Code of Ethics in Technical Computing Topics</td>
<td>Don Gotterbarn, East Tennessee State University; Michael S. Kirkpatrick, James Madison University; Marty J. Wolf, Bridgewater State University</td>
</tr>
<tr>
<td>1:30 pm - 5:00 pm</td>
<td>Hyatt Greenway I</td>
<td>FREE Cybersecurity Curriculum</td>
<td>Melissa Dark, Purdue University; Blair Taylor, Siddharth Kaza, Towson University; Maureen Turney, National Security Agency</td>
</tr>
</tbody>
</table>

### Pre-Symposium Events - All Day

<table>
<thead>
<tr>
<th>Time</th>
<th>Room</th>
<th>Event</th>
<th>Speakers</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Hyatt Greenway B</td>
<td>Department Chairs Roundtable</td>
<td>Mary Lou Maher, University of North Carolina at Charlotte; Ran Libeskind-Hadas, Harvey Mudd College</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Hyatt Greenway D</td>
<td>2019 CSAB Computing Accreditation Workshop</td>
<td>Mary Jane Willshire-Fairley, CSAB, Inc.; Liz Glazer, CSAB, Inc.</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Hyatt Greenway E</td>
<td>CS Education Infrastructure for All II: Enabling the Change</td>
<td>Clifford A. Shaffer, Virginia Tech; Peter Bruslovsky, University of Pittsburgh; Kenneth Koedinger, Carnegie Mellon University; Stephen H. Edwards, Virginia Tech</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Hyatt Greenway F</td>
<td>POSSE Roundup</td>
<td>Gregory W. Hislop, Drexel University; Grant Braught, Dickinson College; Darci Burdge, Heidi Ellis, Stoney Jackson, Western New England University; Cameron Macdonell, MacEwan University; Lori Postner, Nassau Community College</td>
</tr>
<tr>
<td>8:30 am - 5:00 pm</td>
<td>Hyatt Greenway J</td>
<td>Professional Development Workshop for Teaching-Track Faculty</td>
<td>Lori Pollock, University of Delaware; Christine Alvarado, University of California, San Diego; Barbara Ryder, Virginia Tech; Mark Sherriff, University of Virginia</td>
</tr>
<tr>
<td>8:30 am - 6:30 pm</td>
<td>Millennium Grand Ballroom</td>
<td>RESPECT 2019: 4th International Conference on Research in Equity and Sustained Participation in Engineering, Computing, and Technology.</td>
<td>Jamie Payton, Temple University; Tiffany Barnes, North Carolina State University</td>
</tr>
</tbody>
</table>
### Pre-Symposium Supporter Sessions • 8:30 am - 5:00 pm

<table>
<thead>
<tr>
<th>Google Supporter Session</th>
<th>Integrating Cloud Computing into the Computer Science Curriculum: Beginner Level (See page 45 for abstract)</th>
</tr>
</thead>
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<tr>
<td>Room: Hyatt Lakeshore A</td>
<td></td>
</tr>
<tr>
<td>Google Supporter Session</td>
<td>Integrating Cloud Computing into the Computer Science Curriculum: Advanced Topics (See page 45 for abstract)</td>
</tr>
<tr>
<td>Room: Hyatt Lakeshore B</td>
<td></td>
</tr>
</tbody>
</table>

### Wednesday Workshops • 7:00 pm - 10:00 pm

| Workshop 101 | Embracing our Future: CS Courses and Curriculum for Non-CS-majors  
Paul Ruvolo, Olin College; Darakhshan J. Mir, Bucknell University; Zachary Dodds, Harvey Mudd College |
<table>
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<tbody>
<tr>
<td>Room: Hyatt Greenway A</td>
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</tbody>
</table>
| Workshop 102 | Exploring Parallel Computing with OpenMP on the Raspberry Pi  
Suzanne J. Matthews, United States Military Academy; Joel C. Adams, Calvin College; Richard A Brown, St. Olaf College; Elizabeth Shoop, Macalester College |
| Room: Hyatt Greenway B |                                                                                                   |
| Workshop 103 | Transform Your Computer Science Course with Specifications Grading  
James W. McGuffee, Christian Brothers University; David L. Largent, Ball State University; Christian Roberson, Florida Southern College |
| Room: Hyatt Greenway C |                                                                                                   |
| Workshop 104 | Narratives and Evaluation: How to Write Competitive NSF CS Education Proposals  
Stephanie E. August, National Science Foundation & Loyola Marymount University; S. Megan Che, Eileen T. Kraemer, Clemson University; Mark Pauley, National Science Foundation; Murali Sitaraman, Clemson University |
| Room: Hyatt Greenway D |                                                                                                   |
| Workshop 105 | Bringing Real-World Data and Visualizations of Student-Implemented Data Structures into Sophomore CS Courses Using BRIDGES  
Kalpathi Subramanian, University of North Carolina at Charlotte; Jamie Payton, Temple University; Erik Saule, University of North Carolina at Charlotte |
| Room: Hyatt Greenway E |                                                                                                   |
| Workshop 106 | Guiding Students to Discover CS Concepts and Develop Process Skills Using POGIL  
Chris Mayfield, James Madison University; Debra M. Duke, Virginia Commonwealth University; Margarethe Posch, Salt Lake Community College |
| Room: Hyatt Greenway J |                                                                                                   |
| Workshop 107 | Security Labs for Software Defined Networks in CloudLab  
Younghee Park, San Jose State University; Hongxin Hu, Clemson University; Xiaohong Yuan, North Carolina A&T University |
| Room: Hyatt Greenway I |                                                                                                   |
| Workshop 108 | Programming Smart Contracts in Ethereum Blockchain Using Solidity  
Debasis Bhattacharya, Mario Canul, Saxon Knight, University of Hawaii Maui College; Mohammad Q. Azhar, BMCC, The City University of New York; Rajiv Malkan, Lone Star College |
| Room: Hyatt Greenway H |                                                                                                   |
| Workshop 109 | Assessing Writing in CS: A Hands-on Workshop  
Phillip Barry, University of Minnesota; Mia Minnes, University of California, San Diego; Stephanie R. Taylor, Colby College |
| Room: Hyatt Greenway G |                                                                                                   |
| Workshop 110 | Computing Infrastructure and Curriculum Design for Introductory Data Science  
Mine Cetinkaya-Rundel, Duke University + RStudio |
| Room: Hyatt Greenway F |                                                                                                   |

Thursday, February 28

**Keynote Session**

8:15 am - 9:45 am  
Room: Hyatt Nicollet Grand Ballroom  

**Welcome to the 50th SIGCSE Technical Symposium!**  
Elizabeth K. Hawthorne, Union County College; Manuel A. Pérez-Quiñones, University of North Carolina at Charlotte  

**OPENING KEYNOTE: Pursuing the Dream: A 50-Year Perspective on American Society, Technology, and Inclusion in Computing**  
Dr. Freeman A. Hrabowski, III, University of Maryland, Baltimore County (UMBC)

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**Break, Exhibits & NSF Showcase • 10:00 am - 10:45 am**

10:00 am - 10:45 am  
Room: Hyatt Exhibit Hall  

**Break & Exhibits**  
NSF Showcase #1 (See page 58 for complete listing of NSF Showcases)

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**Demos • 10:00 am - 10:45 am**

10:00 am - 10:45 am  
Room: Hyatt Exhibit Hall  

**Demo Session #1:**  
Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College  
Applying Bioinformatics to Assignment Evaluation: A New Approach for Pattern Recognition in Open-Ended CS Assignments  
Keren Perry-Shamir, Seth Haberman, Sense Education  
Integrating Computational Modeling in K-12 STEM Classrooms  
Gautam Biswas, Nicole Hutchins, Ákos Lédeczi, Vanderbilt University; Shuchi Grover, Looking Glass Ventures, LLC.; Satabdi Basu, SRI International

---

**Paper Sessions • 10:45 am - 12:00 pm**

**PAPER SESSIONS**  
10:45 AM  11:10 AM  11:35 AM

**Data**  
Chair: Yingjun Cao, University of California, San Diego  
Room: Hyatt Greenway A  

- A Module-based Approach to Teaching Big Data and Cloud Computing Topics at CS Undergraduate Level  
  Debzani Deb, Muztaba Fuad, Keith Irwin, Winston-Salem State University  
- Embracing the Liberal Arts in an Interdisciplinary Data Analytics Program  
  Jessen Havill, Denison University  
- A Novel Course in Data Systems with Minimal Prerequisites  
  Thomas C. Bressoud, Gavin Thomas, Denison University

**Collaboration & Communication**  
Chair: James Vanderhyde, Saint Xavier University  
Room: Hyatt Greenway J  

- Investigating the Impact of Group Size on Non-Programming Exercises in CS Education Courses  
  L.D. Miller, Leen-Kiat Soh, Markaya S. Peteranetz, University of Nebraska - Lincoln  
- Developing Soft and Technical Skills Through Multi-Semester, Remotely Mentored, Community-Service Projects  
  Janet Davis, Whitman College; Samuel A. Rebelsky, Grinnell College  
- Does Social Sensitivity Impact Virtual Teams?  
  Lisa L. Lacher, Cydnee Biehl, University of Houston - Clear Lake

**Enrollment & Retention**  
Chair: Eric Aaron, Colby College  
Room: Hyatt Greenway B/C  

- Student Performance in Computing Courses in the Face of Growing Enrollments  
  Daniel T. Fokum, Daniel N. Coore, Eyton Ferguson, Gunjan Mansingh, Carl Beckford, University of the West Indies, Mona  
- Understanding Who Enrolls in Introductory Computing Courses at Community Colleges  
  Beth A. Quinn, Wendy M. DuBow, University of Colorado Boulder; David Sul, Sul & Associates  
- Can Sending First and Second Year Computing Students to Technical Conferences Help Retention?: An Analysis of National Survey Data  
  Heather M. Wright, N. Burçın Tamer, Computing Research Association
## Paper Sessions • 10:45 am - 12:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Chair</th>
<th>Room</th>
<th>Speaker(s)</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:45 AM</td>
<td><strong>Tools 1</strong>&lt;br&gt;Chair: Charles Dierbach, Towson University&lt;br&gt;Room: Hyatt Greenway D/E</td>
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<td>Stride in BlueJ - Computing for All in an Educational IDE&lt;br&gt;Michael Kölling, Neil C. C. Brown, Hamza Hamza, Davin McCall, King’s College London</td>
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<td>uAssign: Scalable Interactive Activities for Teaching the Unix Terminal&lt;br&gt;Jacob Bailey, Craig Zilles, University of Illinois at Urbana-Champaign</td>
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<td>MYR: A Web-Based Platform for Teaching Coding Using VR&lt;br&gt;Christopher Berns, Grace Chin, Joel Savitz, Jason Kiesling, Fred Martin, University of Massachusetts Lowell</td>
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<tr>
<td>11:10 AM</td>
<td><strong>Practice &amp; Problems</strong>&lt;br&gt;Chair: Paul Denny, The University of Auckland&lt;br&gt;Room: Millennium Grand North</td>
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<td>Exploring the Applicability of Simple Syntax Writing Practice for Learning Programming&lt;br&gt;Antti Leinonen, Henrik Nygren, Nea Pirttinen, Arto Hellas, Juho Leinonen, University of Helsinki</td>
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<td>Stochastic Tree-Based Generation of Program-Tracing Practice Questions&lt;br&gt;Anderson Thomas, Troy Stopera, Pablo Frank-Bolton, Rahul Simha, George Washington University</td>
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<td>Exploring the Impact of Worked Examples in a Novice Programming Environment&lt;br&gt;Rui Zhi, Thomas W. Price, Samiha Marwan, Alexandra Milliken, Tiffany Barnes, Min Chi, North Carolina State University</td>
</tr>
<tr>
<td>11:35 AM</td>
<td><strong>Process &amp; Performance</strong>&lt;br&gt;Chair: Razvan Alexandru Mezei, Saint Martin’s University&lt;br&gt;Room: Millennium Grand South</td>
<td></td>
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<td>Coding Demonstration Videos for CS1&lt;br&gt;Ben Stephenson, University of Calgary</td>
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<td>3rd BEST PAPER CS Education Research&lt;br&gt;Exploring the Value of Different Data Sources for Predicting Student Performance in Multiple CS Courses&lt;br&gt;Soohyun Nam Liao, University of California, San Diego; Daniel Zingaro, University of Toronto Mississauga; Christine Alvarado, William G. Griswold, Leo Porter, University of California, San Diego</td>
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<td>The PyramidSnapshot Challenge: Understanding Student Process from Visual Output of Programs&lt;br&gt;Lisa Yan, Nick McKeown, Chris Plech, Stanford University</td>
</tr>
<tr>
<td>11:50 AM</td>
<td><strong>Autograders</strong>&lt;br&gt;Chair: Karen Jin, University of New Hampshire&lt;br&gt;Room: Millennium Grand Central</td>
<td></td>
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<td>Approaches for Coordinating eTextbooks, Online Programming Practice, Automated Grading, and More into One Course&lt;br&gt;Margaret Ellis, Clifford A. Shaffer, Stephen H. Edwards, Virginia Tech</td>
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<td>Autograding Distributed Algorithms in Networked Containers&lt;br&gt;Evan Maicus, Matthew Peveler, Stacy Patterson, Barbara Cutler, Rensselaer Polytechnic Institute</td>
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<td>Comparing Jailed Sandboxes vs Containers Within an Autograding System&lt;br&gt;Matthew Peveler, Evan Maicus, Barbara Cutler, Rensselaer Polytechnic Institute</td>
</tr>
<tr>
<td>12:05 PM</td>
<td><strong>Capstones &amp; Projects</strong>&lt;br&gt;Chair: Michelle Friend, University of Nebraska Omaha&lt;br&gt;Room: Hyatt Greenway F/G</td>
<td></td>
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<td>Trial by Flyer: Building Quadcopters From Scratch in a Ten-Week Capstone Course&lt;br&gt;Steven Swanson, University of California, San Diego</td>
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<td>Redesigning a Software Development Course as a Preparation for a Capstone: An Experience Report&lt;br&gt;Yekaterina Kharitonova, University of California, Santa Barbara; Yi Luo, Harvey Mudd College; Jeho Park, Claremont McKenna College</td>
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<td>Experiential Learning of Software Project Management and Software Development via Course Collaboration&lt;br&gt;Stefan C. Christov, Mark E. Hoffman, Quinnipiac University</td>
</tr>
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</table>
## Paper Sessions • 10:45 am - 12:00 pm

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<thead>
<tr>
<th>PAPER SESSIONS</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
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</thead>
<tbody>
<tr>
<td><strong>Sister Session #1</strong>  &lt;br&gt; RESPECT  &lt;br&gt; Chairs: Jamie Payton, Temple University; Tiffany Barnes, North Carolina State University  &lt;br&gt; Room: Hyatt Lake Bemidji</td>
<td>Vlog Commentary YouTube Influencers as Effective Advisors in College and Career Readiness for Minorities in Computing: An Exploratory Study  &lt;br&gt; Robert Cummings, Morehouse College; Earl Huff, Clemson University; Naja Mack, University of Florida; Kevin Womack, Morehouse College; Amber Reid, Clark Atlanta University; Brandon Ghoram, Morehouse College; Juan Gilbert, University of Florida; Kinnis Gosha, Morehouse College</td>
<td>Equity in the Who, How and What of CS Learning: K12 School District Conceptualizations of Equity in CSforAll Initiatives  &lt;br&gt; Rafi Santo, Leigh Ann DeLyser, CSforALL; June Ahn, University of California, Irvine; Anthony Pellicone, University of Wisconsin-Madison; Julia Aguiar, Stephanie Wortel-London, CSforAll</td>
<td>Teaching Professional Morality &amp; Ethics to Undergraduate Computer Science Students through Cognitive Apprenticeships &amp; Case Studies: Experiences in CS-HU 130 ‘Foundational Values’  &lt;br&gt; Don Winiecki, Noah Salzman, Boise State University</td>
</tr>
</tbody>
</table>

## Panel, Special, SIGCSE@50 and Supporter Sessions • 10:45 am - 12:00 pm

<table>
<thead>
<tr>
<th>Panel Session  &lt;br&gt; Room: Hyatt Northstar A</th>
<th>Rethinking Debugging as Productive Failure for CS Education  &lt;br&gt; Yasmin B. Kafai, University of Pennsylvania; David DeLiema, University of California, Berkeley; Deborah A. Fields, Utah State University; Gary Lewandowski, Xavier University; Colleen M. Lewis, Harvey Mudd College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Session  &lt;br&gt; Room: Hyatt Regency</td>
<td>Cybersecurity Program Accreditation: Benefits and Challenges  &lt;br&gt; Rajendra K. Raj, Rochester Institute of Technology; Vijay Anand, Southeast Missouri State University; David Gibson, United States Air Force Academy; Siddharth Kaza, Towson University; Andrew Phillips, United States Naval Academy</td>
</tr>
<tr>
<td>Special Session  &lt;br&gt; Room: Hyatt Greenway H/I</td>
<td>Propagating Educational Innovations  &lt;br&gt; Heather Bort, Marquette University; David P. Bunde, Knox College; Zack Butler, Rochester Institute of Technology; Christopher Lynnly Hovey, University of Colorado Boulder; Cynthia Taylor, Oberlin College</td>
</tr>
<tr>
<td>Special Session  &lt;br&gt; Room: Hyatt Northstar B</td>
<td>Process Skills in Computer Science  &lt;br&gt; Helen H. Hu, Westminster College; Chris Mayfield, James Madison University; Clifton Kussmaul, Muhlenberg College</td>
</tr>
<tr>
<td><strong>SIGCSE@50:</strong> Hot Topics in the SIGCSE Community  &lt;br&gt; Room: Hyatt Great Lakes A1 &amp; A2</td>
<td>What Have We Talked About? An Analysis of the SIGCSE-Members Listserv  &lt;br&gt; Austin Cory Bart, University of Delaware; Clifford A. Shaffer, Virginia Tech  &lt;br&gt; CS Education Then and Now: Recollections and Reflections  &lt;br&gt; Melinda McDaniel, Georgia Institute of Technology; John Cigas, Park University; Briana B. Morrison, University of Nebraska Omaha; Henry M. Walker, Grinnell College</td>
</tr>
<tr>
<td>Microsoft Supporter Session  &lt;br&gt; Room: Hyatt Lakeshore A</td>
<td>Create Classroom Labs in the Cloud (See page 45 for abstract)  &lt;br&gt; Ji Eun Kwon, Microsoft Corporation</td>
</tr>
<tr>
<td>Google Supporter Session  &lt;br&gt; Room: Hyatt Lakeshore B</td>
<td>Content, Curricula, and Career Readiness: New Offerings from Google (See page 45 for abstract)  &lt;br&gt; Karen Gheno, Emily Kemp, Chris Stephenson, Google</td>
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### Paper Sessions • 1:45 pm - 3:00 pm

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<tr>
<th>Time</th>
<th>Session</th>
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<tbody>
<tr>
<td>1:45 PM</td>
<td><strong>Databases</strong>&lt;br&gt;Chair: James H. Davenport, University of Bath&lt;br&gt;Room: Hyatt Greenway A&lt;br&gt;A Learning Platform for SQL Injection&lt;br&gt;Nada Basit, Abdeltawab Hendawi, Joseph Chen, Alexander Sun, University of Virginia</td>
</tr>
<tr>
<td>2:10 PM</td>
<td><strong>1st BEST PAPER</strong>&lt;br&gt;Curricula Initiatives&lt;br&gt;’) DROP TABLE textbooks: An Argument for SQL Injection Coverage in Database Textbooks&lt;br&gt;Cynthia Taylor, Oberlin College; Saheel Sakharkar, University of Illinois at Chicago</td>
</tr>
<tr>
<td>2:35 PM</td>
<td><strong>What to Expect and What to Focus on in SQL Query Teaching</strong>&lt;br&gt;Toni Taipalus, Piia Perälä, University of Jyvaskyla</td>
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<tr>
<th>Time</th>
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<tr>
<td>1:45 PM</td>
<td><strong>Software Engineering</strong>&lt;br&gt;Chair: Suzanne J. Matthews, United States Military Academy&lt;br&gt;Room: Hyatt Greenway J&lt;br&gt;Perceived Benefits and Challenges of Learning Startup Methodologies for Software Engineering Students&lt;br&gt;Jorge Melegati, Free University of Bozen-Bolzano; Rafael Chanin, PUCRS; School of Technology; Xiaofeng Wang, Free University of Bozen-Bolzano; Afonso Sales, Rafael Prikладник, PUCRS, School of Technology</td>
</tr>
<tr>
<td>2:10 PM</td>
<td><strong>Motivating Students Beyond Course Requirements with a Serious Game</strong>&lt;br&gt;Stacey Watson, Nazareth College; Heather Richter Lipford, University of North Carolina at Charlotte</td>
</tr>
<tr>
<td>2:35 PM</td>
<td><strong>Active Learning with LEGO for Software Requirements</strong>&lt;br&gt;Stan Kurkovsky, Central Connecticut State University; Stephanie Ludi, University of North Texas; Linda Clark, Central Connecticut State University</td>
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<th>Time</th>
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<tr>
<td>1:45 PM</td>
<td><strong>Advanced Topics</strong>&lt;br&gt;Chair: Ahmed Abukmail, University of Houston - Clear Lake&lt;br&gt;Room: Hyatt Greenway B/C&lt;br&gt;Effects of a Pathfinding Program Visualization on Algorithm Development&lt;br&gt;Nicholas Lytle, North Carolina State University; Mark Floryan, University of Virginia; Tiffany Barnes, North Carolina State University</td>
</tr>
<tr>
<td>2:10 PM</td>
<td><strong>Teaching Android Mobile Security</strong>&lt;br&gt;Jean-François Lalande, Valérie Viet Triem Tong, Pierre Graux, Guillaume Hiet, CentraleSupélec, Inria, Univ Rennes, CNRS, IRISA; Wojciech Mazurczyk, Institute of Telecommunications, Warsaw University of Technology; Habiba Chaoui, National School of Applied Sciences, Ibn Tofail University; Pascal Berthomé, INSA Centre Val de Loire, LIFO</td>
</tr>
<tr>
<td>2:35 PM</td>
<td><strong>Allowing and Fully Supporting Multiple Programming Languages in a Computer Graphics Course: An Experience</strong>&lt;br&gt;Amit Shesh, Northeastern University</td>
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</table>
### Paper Sessions • 1:45 pm - 3:00 pm

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<th>Feedback</th>
<th>1:45 PM</th>
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<th>Active Learning</th>
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<tbody>
<tr>
<td>Chair: Brian Railing, Carnegie Mellon University</td>
<td>On the Effects of Active Learning Environments in Computing Education</td>
<td>Supporting Guided Inquiry with Cooperative Learning in Computer Organization</td>
<td>POGIL in Computer Science: Faculty Motivation and Challenges</td>
</tr>
<tr>
<td>Room: Millennium Grand North</td>
<td>Tyler Greer, Qiang Hao, Western Washington University; Mengguo Jing, University of Wisconsin-Madison; Bradley Barnes, University of Georgia</td>
<td>Yeajin Ham, Brandon Myers, University of Iowa</td>
<td>Aman Yadav, Michigan State University; Clifton Kussmaul, Muhlenberg College; Chris Mayfield, James Madison University; Helen H. Hu, Westminster College</td>
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<th>Gender</th>
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<th>2:10 PM</th>
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<tbody>
<tr>
<td>Chair: Arno Pasternak, TU Dortmund, Fritz-Steinhoff-Schule Hagen</td>
<td>Living-Learning Community for Women in Computer Science at Rutgers</td>
<td>Achieving Gender Balance through Creative Expression</td>
<td>Gender-balanced TAs from an Unbalanced Student Body</td>
</tr>
<tr>
<td>Room: Millennium Grand South</td>
<td>Rebecca N. Wright, Sally J.Nadler, Thu D. Nguyen, Cynthia N. Sanchez Gomez, Rutgers University; Heather M. Wright, Computing Research Association</td>
<td>William H. Bares, Bill Manaris, Renée McCauley, Christine Moore, College of Charleston</td>
<td>Amir Kamil, James Juett, Andrew DeOrio, University of Michigan</td>
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<tr>
<th>Curriculum Issues 1</th>
<th>1:45 PM</th>
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<th>2:35 PM</th>
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<tbody>
<tr>
<td>Chair: Becky Grasser, Lakeland Community College</td>
<td>3rd BEST PAPER</td>
<td>Defining and Designing Computer Science Education in a K12 Public School District</td>
<td>Developing Implementation Measures for K-12 Computer Science Curriculum Materials</td>
</tr>
<tr>
<td>Room: Millennium Grand Central</td>
<td>Curricula Initiatives</td>
<td>Chris Proctor, Stanford University; Maxwell Bigman, Harvard University; Paulo Blickstein, Columbia University</td>
<td>Daisy W. Rutstein, Yuning Xu, Kevin McElhaney, Marie Bienkowski, SRI International</td>
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<td></td>
<td>PythonSneks: An Open-Source, Instructionally-Designed Introductory Curriculum with Action-Design Research</td>
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<td>Austin Cory Bart, University of Delaware; Allie Sarver, Michael Friend, Larry Cox, Virginia Tech</td>
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<tr>
<th>Sister Session TOCE #1</th>
<th>1:45 PM</th>
<th>2:10 PM</th>
<th>2:35 PM</th>
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<tbody>
<tr>
<td>Chair: Chris Hundhausen, Washington State University</td>
<td>RecurTutor: An Interactive Tutorial for Learning Recursion</td>
<td>Digital and Physical Fabrication as Multimodal Learning: Understanding Youth Computational Thinking When Making Integrated Systems Through Bidirectionally Responsive Design</td>
<td>Learning IS Child's Play: Game-Based Learning in Computer Science Education</td>
</tr>
<tr>
<td>Room: Hyatt Lake Bemidji</td>
<td>Sally Hamouda, Rhode Island College; Stephen H. Edwards, Virginia Tech; Hicham G. Elmongui, Alexandria University and Umm Al-Qura University; Jeremy V. Ernst, Clifford A. Shaffer, Virginia Tech</td>
<td>Gabriela Richard, Sagun Giri, Pennsylvania State University</td>
<td>Hadi Hosseini, Rochester Institute of Technology; Maxwell Hartt, Cardiff University; Mehrnaz Mostafapour, University of Waterloo</td>
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<tr>
<th>Panel, Special, SIGCSE@50 and Supporter Sessions • 1:45 pm - 3:00 pm</th>
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<tr>
<td><strong>Panel Session</strong></td>
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<tr>
<td><strong>Room: Hyatt Greenway F/G</strong></td>
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<tr>
<th>Panel Session</th>
<th><strong>The New NSF Requirement for Broadening Participation in Computing (BPC) Plans: Community Advice and Resources</strong></th>
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<tr>
<td><strong>Room: Hyatt Northstar A</strong></td>
<td>Tracy Camp, Colorado School of Mines; Wendy M. DuBow, University of Colorado Boulder; Diane Levitt, Cornell Tech; Linda J. Sax, University of California, Los Angeles; Valerie Taylor, CMD-IT; Colleen M. Lewis, Harvey Mudd College</td>
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### Thursday, February 28

#### Panel, Special, SIGCSE®50 and Supporter Sessions • 1:45 pm - 3:00 pm

<table>
<thead>
<tr>
<th>Special Session</th>
<th>Where Are We Now? Results from a National Study of Computer Science Teachers and Teaching&lt;br&gt;Eric R. Banilower, Evelyn M. Gordon, Horizon Research, Inc.</th>
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<tr>
<td>Room: Hyatt Greenway H/I</td>
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<tr>
<td>Special Session</td>
<td>Shaping Curricular Guidelines for Associate-Degree Cybersecurity Programs&lt;br&gt;Cara Tang, Portland Community College; Cindy S. Tucker, Bluegrass Community and Technical College; Christian Servin, El Paso Community College; Markus Geissler, Cosumnes River College; Melissa Stange, Lord Fairfax Community College</td>
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<tr>
<td>Room: Hyatt Northstar B</td>
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<tr>
<td>Special Session</td>
<td>SIGCSE Reads 2019: Discussion and Q &amp; A&lt;br&gt;Rebecca Bates, Minnesota State University, Mankato; Valerie Summet, Rollins College; Nanette Veilleux, Simmons University; Judy Goldsmith, University of Kentucky; Naomi Kritzer, Self</td>
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<tr>
<td>Room: Hyatt Regency</td>
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<tr>
<td>SIGCSE®50: CS1</td>
<td>1:45 pm - 2:10 pm&lt;br&gt;50 Years of CS1 at SIGCSE: A Review of the Evolution of Introductory Programming Education Research&lt;br&gt;Brett A. Becker, University College Dublin; Keith Quille, Institute of Technology Tallaght</td>
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<td>Chair: James Caristi, Valparaiso University</td>
<td>2:10 pm - 3:00 pm&lt;br&gt;Discussion&lt;br&gt;Brett A. Becker, University College Dublin; Donna Gavin, University of Wisconsin, Platteville; David G. Kay, University of California Irvine</td>
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<td>Room: Hyatt Great Lakes A &amp; A</td>
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<tr>
<td>Turing’s Craft, Inc. Supporter Session</td>
<td>Customized Auto-Grading and Homework Project Management with CodeLab (See page 45 for abstract)&lt;br&gt;David Arnow, Brooklyn College</td>
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<td>Room: Hyatt Lakeshore A</td>
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<tr>
<td>GitHub Supporter Session</td>
<td>#Get To Near-total Automation with GitHub: Teacher Stories (See page 46 for abstract)&lt;br&gt;Dan Wallach, Rice University; Paul Salvador Inventado, California State University Fullerton; Vanessa Gennarelli, Github Education</td>
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<td>Room: Hyatt Lakeshore B</td>
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#### ACM Student Research Competition • 1:45 pm - 5:00 pm

| 1:45 pm - 5:00 pm | ACM Student Research Competition - First Round of Competition (Posters)<br>Chairs: Jessica Schmidt, North Carolina State University; Stephen Hughes, Coe College (See page 59 for a complete listing of ACM Student Research Competition Posters) |
| Room: Hyatt Exhibit Hall |                                                                                   |

#### Break, Exhibits & NSF Showcase • 3:00 pm - 3:45 pm

| 3:00 pm - 3:45 pm | Break & Exhibits<br:NSF Showcase #2 (See page 58 for complete listing of NSF Showcases) |
| Room: Hyatt Exhibit Hall |                                                                                   |

#### Demos • 3:00 pm - 3:45 pm

| 3:00 pm - 3:45 pm | Demo Session #2:<br>Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College<br>Building Simple Games With BRIDGES<br>David Burlinson, Erik Saule, Kalpathi Subramanian, University of North Carolina at Charlotte<br>Engaging in Logical Code Reasoning with an Activity-Based Online Tool<br>Joseph E. Hollingsworth, Rose-Hulman Institute of Technology; Eileen T. Kraemer, Murali Sitaraman, Clemson University |
| Room: Hyatt Exhibit Hall |                                                                                   |

http://sigcse2019.sigcse.org
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<tr>
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<th>3:45 PM</th>
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<tr>
<td><strong>Camps</strong>&lt;br&gt;Chair: William H. Bares, College of Charleston&lt;br&gt;Room: Hyatt Greenway A</td>
<td>Camp or College?: Student Perspectives from College Computer Science Departments &amp; Coding Boot Camps on Skills Learned&lt;br&gt;Quinn Burke, Digital Promise Global; Cinamon Sunrise Bailey, College of Charleston</td>
<td>A Middle-School Code Camp Emphasizing Digital Humanities&lt;br&gt;Yesheng Chen, Zhen Chen, Shyamala Gumidyala, Annabella Koures, Seoyeon Lee, James Msekela, Halle Remash, Nolan Schoene, Sarah Dahlyb Albright, Samuel A. Rebelsky, Grinnell College</td>
<td>A Middle-School Camp Emphasizing Data Science and Computing for Social Good&lt;br&gt;Caelin Bryant, Yesheng Chen, Zhen Chen, Jonathan Gilmour, Shyamala Gumidyala, Beatriz Herce-Hagjwara, Annabella Koures, Seoyeon Lee, James Msekela, Anh Thu Pham, Halle Remash, Marli Remash, Nolan Schoene, Jonah Zimmerman, Sarah Dahlyb Albright, Samuel A. Rebelsky, Grinnell College</td>
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<tr>
<td><strong>Story &amp; Video</strong>&lt;br&gt;Chair: Caroline Budwell, Virginia Commonwealth University&lt;br&gt;Room: Hyatt Greenway J</td>
<td>Podcast Highlights: Targeted Educational Videos From Repurposed Lecture-capture Footage&lt;br&gt;Mia Minnes, Christine Alvarado, Max Geisinger, Joyce Fang, University of California, San Diego</td>
<td>Student-Generated Videos for Promoting Better Attitudes towards Cryptography&lt;br&gt;Ana I. González-Tablas, Pablo Martín-González, Universidad Carlos III de Madrid</td>
<td>Story Programming: Explaining Computer Science Before Coding&lt;br&gt;Jennifer Parham-Mocello, Shannon Ernst, Martin Erwig, Lily Shellhammer, Emily Domínguez, Oregon State University</td>
</tr>
<tr>
<td><strong>Games &amp; Gamification</strong>&lt;br&gt;Chair: Kalpathi Subramanian, University of North Carolina at Charlotte&lt;br&gt;Room: Hyatt Greenway B/C</td>
<td>OneUp: Engaging Students in a Gamified Data Structures Course&lt;br&gt;Darina Dicheva, Keith Irwin, Christo Dichev, Winston-Salem State University</td>
<td>Program Wars: A Card Game for Learning Programming and Cybersecurity Concepts&lt;br&gt;John Anvik, Vincent Cote, Jace Riehl, University of Lethbridge</td>
<td>Analyzing Gamification Impact on a Mastery Learning Introductory Programming Course&lt;br&gt;Rafael G. de Pontes, UFCG; Dalton D. Serey Guerrero, Federal University of Campina Grande; Jorge C. A. de Figueiredo, UFCG</td>
</tr>
<tr>
<td><strong>Testing 1</strong>&lt;br&gt;Chair: Mohsen Dorodchi, University of North Carolina at Charlotte&lt;br&gt;Room: Hyatt Greenway D/E</td>
<td>2nd BEST PAPER – CS Education Research&lt;br&gt;Assessing Incremental Testing Practices and Their Impact on Project Outcomes&lt;br&gt;Ayaan M. Kazerouni, Clifford A. Shaffer, Stephen H. Edwards, Francisco Servant, Virginia Tech</td>
<td>Pragmatic Software Testing Education&lt;br&gt;Mauricio Aniche, Delft University of Technology; Feliene Hermans, Leiden Institute of Advanced Computer Science; Arie van Deursen, Delft University of Technology;</td>
<td>Software Testing in Introductory Programming Courses: A Systematic Mapping Study&lt;br&gt;Lilian Passos Scatallon, University of São Paulo (ICMC-USP); Jeffrey C. Carver, University of Alabama; Rogério Eduardo Garcia, São Paulo State University (PCT-Unesp); Ellen Francine Barbosa, University of São Paulo (ICMC-USP)</td>
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<tr>
<td><strong>Computation Thinking 1</strong>&lt;br&gt;Chair: Debzani Deb, Winston-Salem State University&lt;br&gt;Room: Millennium Grand North</td>
<td>The Zones of Proximal Flow Tutorial: Designing Computational Thinking Cliffhangers&lt;br&gt;Ashok Basawapatna, State University of New York, College at Old Westbury; Alexander Repenning, University of Applied Sciences and Arts Northwestern Switzerland; Mark Savignano, Minnesota State University, Mankato</td>
<td>Infusing Computational Thinking Across Disciplines: Reflections &amp; Lessons Learned&lt;br&gt;Lori Pollock, Chrystalla Mouza, Kevin R. Guidry, Kathleen Pusecker, University of Delaware</td>
<td>Building Computational Creativity in an Online Course for Non-Majors&lt;br&gt;Markaya S. Peteranetz, Leen-Kiat Soh, Elizabeth Ingraham, University of Nebraska-Lincoln</td>
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### Paper Sessions • 3:45 pm - 5:00 pm

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<tr>
<th>Assessment 1</th>
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<th>4:10 PM</th>
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<tbody>
<tr>
<td>Chair: James W. McGuffee, Christian Brothers University</td>
<td>Facilitating Course Assessment with a Competitive Programming Platform</td>
<td>Development of a Lean Computational Thinking Abilities Assessment for Middle Grades Students</td>
<td>On the Fairness of Multiple-Variant Multiple-Choice Examinations</td>
</tr>
<tr>
<td>Room: Millennium Grand South</td>
<td>Daniel N. Coore, Daniel T. Fokum, University of the West Indies, Mona</td>
<td>Eric Wiebe, North Carolina State University; Jennifer London, London &amp; Associates; Osman Aksit, Dharhan Ahliyya Schools; Bradford W. Mott, North Carolina State University; Kristy Elizabeth Boyer, University of Florida; James C. Lester, North Carolina State University</td>
<td>Paul Denny, Sathiamoorthy Manoharan, Ulrich Speidel, Giovanni Russello, Angela Chang, The University of Auckland</td>
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### Teaching Practice 1

<table>
<thead>
<tr>
<th>Chair: Diana Franklin, The University of Chicago</th>
<th>Teaching Explicit Programming Strategies to Adolescents</th>
<th>Teachers’ Experiences of using PRIMM to Teach Programming in School</th>
<th>Survey Results on Why CS Faculty Adopt New Teaching Practices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Millennium Grand Central</td>
<td>Andrew J. Ko, University of Washington; Thomas D. LaToza, Stephen Hull, George Mason University; Eilen A. Ko, Juanita High School; William Kwok, Jane Quichocho, Harshitha Akkaraju, University of Washington; Resin Pandit, Thomas Jefferson High School for Science &amp; Technology</td>
<td>Sue Sentance, King’s College London; Jane Waite, Queen Mary University of London; Maria Kallia, King’s College London</td>
<td>Christopher Lynny Hovey, Lecia Barker, Vaughan Nagy, University of Colorado Boulder</td>
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### Panel, Special, SIGCSE@50 and Supporter Sessions • 3:45 pm - 5:00 pm

<table>
<thead>
<tr>
<th>Panel Session</th>
<th>Room: Hyatt Greenway F/G</th>
<th>Broadening Participation in Computing: Putting Our Work in Context</th>
<th>Jennifer M. Blaney, Utah State University; Linda J. Sax, University of California, Los Angeles; David Feldon, Utah State University; Ann Gates, University of Texas at El Paso</th>
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<tbody>
<tr>
<td>Panel Session</td>
<td>Room: Hyatt Northstar A</td>
<td>The Reality of Inclusion: The Role of Relationships, Identity, and Academic Culture in Inclusive and Equitable Practices for Broadening Participation in Computing Education</td>
<td>Jamika D. Burge, black computHER; Jamie Payton, Temple University; Jill Denner, Education, Training, Research; Yolanda Rankin, Florida State University; Celine Latulipe, University of North Carolina at Charlotte</td>
</tr>
<tr>
<td>Panel Session</td>
<td>Room: Hyatt Regency</td>
<td>CS Principles Higher Education Pathways</td>
<td>Crystal Furman, College Board; Owen Astrachan, Duke University; Daniel D. Garcia, University of California, Berkeley; David Musicant, Carleton College; Jennifer Rosato, College of St. Scholastica</td>
</tr>
<tr>
<td>Special Session</td>
<td>Room: Hyatt Greenway H/I</td>
<td>AI for K-12 Guidelines Initiative</td>
<td>David Touretzky, Carnegie Mellon University; Fred Martin, University of Massachusetts Lowell; Deborah Seehorn, CSTA; Emily Reid, A4ALL, Miles Berry, Roehampton University</td>
</tr>
<tr>
<td>Special Session</td>
<td>Room: Hyatt Northstar B</td>
<td>ACM Task Force on Data Science Education: Draft Report and Opportunity for Feedback</td>
<td>Andrea Danyluk, Williams College; Paul Leidig, Grand Valley State University; Lillian (Boots) Casari, Villanova University; Christopher Servin, El Paso Community College</td>
</tr>
<tr>
<td>SIGCSE@50: Computing Education Research</td>
<td>Room: Hyatt Great Lakes A1 &amp; A2</td>
<td>Negotiating Varied Research Goals in Computing Education Research</td>
<td>Mark Guzdial, University of Michigan; Colleen M. Lewis, Harvey Mudd College; Lauren Margulieux, Georgia State University; Greg L. Nelson, University of Washington; Leo Porter, University of California, San Diego</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
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<tr>
<td><strong>Supporter Sessions</strong> • 3:45 pm - 5:00 pm</td>
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<tr>
<td>3:45 pm - 5:00 pm</td>
<td><a href="#">Lightning Talks</a> (See page 60 for complete list of Lightning Talks) Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College</td>
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<tr>
<td><strong>Birds of a Feather</strong> • 5:30 pm - 6:20 pm</td>
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<tr>
<td>5:30 pm - 6:20 pm</td>
<td><a href="#">Birds of a Feather Flock A</a> (See page 50 for complete list of Birds of a Feather) Chairs: Mary Anne Egan, Siena College; Mark Sherriff, University of Virginia</td>
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<tr>
<td><strong>Supporter Sessions</strong> • 5:30 pm - 6:20 pm</td>
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<tr>
<td>6:30 pm - 7:20 pm</td>
<td><a href="#">ABET Supporter Session</a> (See page 46 for abstract) John K. Estell, Ohio Northern University; David S. Gibson, United States Air Force Academy; Rajendra Raj, Rochester Institute of Technology</td>
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<tr>
<td><strong>Birds of a Feather</strong> • 6:30 pm - 7:20 pm</td>
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<tr>
<td>6:30 pm - 7:20 pm</td>
<td><a href="#">Birds of a Feather Flock B</a> (See page 51 for complete list of Birds of a Feather) Chairs: Mary Anne Egan, Siena College; Mark Sherriff, University of Virginia</td>
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<tr>
<td><strong>Supporter Session</strong> • 6:30 pm - 7:20 pm</td>
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<tr>
<td>6:30 pm - 7:20 pm</td>
<td><a href="#">IBM Supporter Session</a> (See page 47 for abstract) Misty Decker, Valinda Kennedy, IBM</td>
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<tr>
<td><strong>Thursday Reception</strong></td>
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<tr>
<td>7:30 pm - 9:30 pm</td>
<td>SIGCSE Reception</td>
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### Supporting Sessions

<table>
<thead>
<tr>
<th>Session</th>
<th>Room</th>
<th>Abstract</th>
</tr>
</thead>
<tbody>
<tr>
<td>zyBooks Supporter Session</td>
<td>Hyatt Lakeshore A</td>
<td>Is Your CS Course Too Complex? How Are You Handling Growth? (See page 46 for abstract) Smita Bakshi, zyBooks; Frank Vahid, zyBooks/University of California Riverside; Roman Lysecky, zyBooks/University of Arizona; Alex Edgcomb, zyBooks/University of California Riverside</td>
</tr>
<tr>
<td>Google Supporter Session</td>
<td>Hyatt Lakeshore B</td>
<td>Teaching with the Cloud (See page 46 for abstract) Laurie White, Google</td>
</tr>
<tr>
<td>ABET Supporter Session</td>
<td>Hyatt Lakeshore A</td>
<td>Computer Science Accreditation - What You Should Know (See page 46 for abstract) John K. Estell, Ohio Northern University; David S. Gibson, United States Air Force Academy; Rajendra Raj, Rochester Institute of Technology</td>
</tr>
<tr>
<td>Mimir Supporter Session</td>
<td>Hyatt Lakeshore B</td>
<td>How FLCC Uses Mimir Classroom and OER to Improve Course Outcomes (See page 47 for abstract) Prahasith Veluvolu, Mimir; Dave Ghidiu, Finger Lakes Community College</td>
</tr>
<tr>
<td>IBM Supporter Session</td>
<td>Hyatt Lakeshore A</td>
<td>Shortcuts for keeping your CS Curriculum Current (See page 47 for abstract) Misty Decker, Valinda Kennedy, IBM</td>
</tr>
</tbody>
</table>
Teach without limits

From simulating the effects of climate change to training an algorithm to help detect cancer cells, Google Cloud is helping transform computer science education.

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• Dependable security at scale
• Pre-trained ML models
• Education grants for faculty

Google Cloud

For more information visit https://edu.google.com/higher-ed-solutions/CS/
### Friday, March 1

#### Keynote Session

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>8:15 am - 9:45 am</td>
<td>General Information</td>
</tr>
<tr>
<td></td>
<td>Elizabeth K. Hawthorne, Union County College; Manuel A. Pérez-Quiñones, University of North Carolina at Charlotte</td>
</tr>
</tbody>
</table>

**KEYNOTE:** Computing Education as a Foundation for 21st Century Literacy  
2019 SIGCSE Award for Outstanding Contribution to Computer Science Education  
Dr. Mark Guzdial, University of Michigan

#### Break, Exhibits & NSF Showcase • 10:00 am - 10:45 am

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>10:00 am - 10:45 am</td>
<td>Break &amp; Exhibits</td>
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<tr>
<td></td>
<td>NSF Showcase #3 (See page 58 for complete listing of NSF Showcases)</td>
</tr>
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</table>

#### Demos • 10:00 am - 10:45 am

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10:00 am - 10:45 am</td>
<td>Demo Session #3:</td>
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<tr>
<td></td>
<td>Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College</td>
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<tr>
<td></td>
<td>Hands-on Cybersecurity Exercises that are Easy to Access</td>
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<tr>
<td></td>
<td>Richard Weiss, Evergreen State College; Jens Mache, Lewis and Clark College</td>
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<td></td>
<td>Gamifying Computer Science Courses with OneUp</td>
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<td></td>
<td>Keith Irwin, Austin Hodge, Darina Dicheva, Winston-Salem State University</td>
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#### Poster Session • 10:00 am - 12:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>10:00 am - 12:00 pm</td>
<td>Poster Session #1 (See pages 53-56 for complete listing of Posters)</td>
</tr>
<tr>
<td></td>
<td>Chairs: Laurence D. Merkle, Air Force Institute of Technology; S. Monisha Pulimood, The College of New Jersey</td>
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</tbody>
</table>

#### Paper Sessions • 10:45 am - 12:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>10:45 AM</td>
<td>Online</td>
</tr>
<tr>
<td></td>
<td>Chair: Bernd Bruegge, Technical University Munich</td>
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<tr>
<td></td>
<td>Room: Hyatt Greenway A</td>
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<tr>
<td></td>
<td>Understanding Learning Curves and Trajectories in CSS Layout</td>
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<tr>
<td></td>
<td>Meen Chul Kim, Drexel University; Thomas H. Park, Codepip; Ruixue Liu, Worcester Polytechnic Institute; Andrea Forte, Drexel University</td>
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<tr>
<td>11:10 AM</td>
<td>Captioning Online Course Videos: An Investigation into Knowledge Retention and Student Perception</td>
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<td>Michael Whitney, Winthrop University; Bryan Dallas, Northern Illinois University</td>
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<tr>
<td>11:35 AM</td>
<td>Facing Backwards While Stumbling Forwards: The Future of Teaching Web Development</td>
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<td>Randy Connolly, Mount Royal University</td>
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<td>Mistakes and Errors</td>
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<td>Chair: Ben Stephenson, University of Calgary</td>
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<td>Room: Hyatt Greenway J</td>
</tr>
<tr>
<td></td>
<td>The Error Behind The Message: Finding the Cause of Error Messages in Python</td>
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<td>Tobias Kohn, University of Cambridge</td>
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<td>1st BEST PAPER CS Education Research</td>
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<td></td>
<td>First Things First: Providing Metacognitive Scaffolding for Interpreting Problem Prompts</td>
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<td></td>
<td>James Prather, Raymond Pettit, Abilene Christian University; Brett A. Becker, University College Dublin; Paul Denny, The University of Auckland; Dastyni Loksa, University of Washington; Alan Peters, Zachary Albrecht, Krista Masci, Abilene Christian University</td>
</tr>
<tr>
<td></td>
<td>The Error Landscape: Characterizing the Mistakes of Novice Programmers</td>
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<td></td>
<td>Rebecca Smith, Scott Rixner, Rice University</td>
</tr>
</tbody>
</table>
## Paper Sessions • 10:45 am - 12:00 pm

<table>
<thead>
<tr>
<th>Instruments 1</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Steven Bogaerts, DePauw University</td>
<td>How Many Abilities Can We Measure in Computational Thinking? A Study on Bebras Challenge</td>
<td>(Re)Validating Cognitive Introductory Computing Instruments</td>
<td>A Topical Review of Evaluation Instruments for Computing Education</td>
</tr>
<tr>
<td>Room: Hyatt Greenway B/C</td>
<td>Ana Liz Souto O. Araujo, Federal University of Paraíba; Wilkerson L. Andrade, Dalton D. Serey Guerrero, Monilly Ramos Araujo Melo, Federal University of Campina Grande</td>
<td>Ryan Bockmon, Stephen Cooper, University of Nebraska - Lincoln; Jonathan Gratch, Texas Woman's University; Mohsen Dorodchi, University of North Carolina at Charlotte</td>
<td>Adrienne Decker, University at Buffalo; Monica M. McGill, Knox College</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Testing 2</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Clifford A. Shaffer, Virginia Tech</td>
<td>Automating Systems Course Unit and Integration Testing: Experience Report</td>
<td>Gamifying a Software Testing Course with Code Defenders</td>
<td>Measuring Unit Test Accuracy</td>
</tr>
<tr>
<td>Room: Hyatt Greenway D/E</td>
<td>Dee A. B. Weikle, Michael O. Lam, Michael S. Kirkpatrick, James Madison University</td>
<td>Gordon Fraser, Alessio Gambi, Marvin Kreis, University of Passau; José Miguel Rojas, University of Leicester</td>
<td>Kevin Buffardi, Pedro Valdivia, Destiny Rogers, California State University, Chico</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Teaching Practice 2</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Matthew Hertz, University at Buffalo</td>
<td>An Analysis of Using Many Small Programs in CS1</td>
<td>Reducing Instructor Workload in an Introductory Robotics Course via Computational Design</td>
<td>Frequency of Instructor- and Student-Centered Teaching Practices in Introductory CS Courses</td>
</tr>
<tr>
<td>Room: Millennium Grand North</td>
<td>Joe Michael Allen, University of California, Riverside; Frank Vahid, Alex Edgcomb, University of California, Riverside &amp; zyBooks; Kelly Downey, Kris Miller, University of California, Riverside</td>
<td>Devon J. Merrill, Steven Swanson, University of California, San Diego</td>
<td>Christopher Lynnly Hovey, Lecia Barker, Margaret Luebs, University of Colorado Boulder</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Assessment 2</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Millennium Grand South</td>
<td>Sam Saarinen, Shriram Krishnamurthi, Kathi Fisler, Preston Turnell Wilson, Brown University</td>
<td>Peter Ohmann, College of Saint Benedict/Saint John's University</td>
<td>Brian Harrington, Jingyiran Li, Mohamed Moustafa, Marziah Ahmadzadeh, Nick Cheng, University of Toronto Scarborough</td>
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</tbody>
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<thead>
<tr>
<th>CS1</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
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</thead>
<tbody>
<tr>
<td>Chair: Eric Fouh, University of Pennsylvania</td>
<td>Beauty and Joy of Computing: 2016-17 Findings from an AP CS Principles Course</td>
<td>Implementing EarSketch: Connecting Classroom Implementation to Student Outcomes</td>
<td>Food for Thought: Supporting African American Women's Computational Algorithmic Thinking in an Intro CS Course</td>
</tr>
<tr>
<td>Room: Millennium Grand Central</td>
<td>June Mark, Kelsey Klein, Education Development Center</td>
<td>Tom McKlin, Dana Wanzier, Taneisha Lee, The Findings Group; Brian Magenko, Doug Edwards, Sabrina Grossman, Jason Freeman, Georgia Institute of Technology</td>
<td>Yolanda A. Rankin, Florida State University; Jakita O. Thomas, Auburn University; India Irish, Georgia Tech</td>
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<thead>
<tr>
<th>Sister Session SIGGRAPH Education Approaches</th>
<th>10:45 AM</th>
<th>11:10 AM</th>
<th>11:35 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Erik Brunvand, The University of Utah</td>
<td>Real-Time Motion Capture for Performing Arts and Stage</td>
<td>Creating Compelling Virtual Reality and Interactive Content for Higher Education</td>
<td>Groovy Graphics Assignments</td>
</tr>
<tr>
<td>Room: Hyatt Lake Bemidji</td>
<td>Serguei Mokhov, Amandeep Kaur, Mehak Talwar, Keerthana Gudavalli, Miao Song, Sudir Mudar, Concordia University</td>
<td>Ralph Vituccio, Entertainment Technology Center; Jaeehe Cho, Tsung-Yu (Jack) Tsai, Sarabeth Boak, Stitchbridge, Inc.</td>
<td>Andrew Duchowski, Clemson University</td>
</tr>
</tbody>
</table>
### Friday, March 1

**Panel, Special, SIGCSE@50 and Supporter Sessions • 10:45 am - 12:00 pm**

<table>
<thead>
<tr>
<th>Panel Session</th>
<th>Room: Hyatt Greenway F/G</th>
<th>This is What Diversity Looks Like: Making CS Curriculum Culturally Relevant for Spanish-speaking Communities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td>Joseph Carroll-Miranda, University of Puerto Rico; Patricia Ordóñez, University of Puerto Rico, Rio Piedras; Edusmildo Orozco, Milagros Bravo, Michelle Borrero, Luis Lopez, Gerianni Houser, Eliud Gerena, University of Puerto Rico; Dale Reed, The University of Chicago; Brenda Santiago, Agustín Corchado, Andreshka Santana, University of Puerto Rico</td>
</tr>
<tr>
<td>Panel Session</td>
<td>Room: Hyatt Greenway H/I</td>
<td>Civic Engagement Across the Computing Curriculum</td>
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<tr>
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<td>Mark Goadrich, Hendrix College; Michael Goldweber, Xavier University; Matthew Jadud, Bates College; S. Monisha Pulimood, The College of New Jersey; Samuel A. Rebelsky, Grinnell College</td>
</tr>
<tr>
<td>Panel Session</td>
<td>Room: Hyatt Northstar B</td>
<td>Four Models for Including Community Colleges in Broadening Participation: A Call to Action</td>
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<td>Amardeep Kahlon, Austin Community College; Deborah Boisvert, University of Massachusetts Boston; Louise Ann Lyon, Education, Training, and Research; Melanie Williamson, Bluegrass Community and Technical College; Wendy M. DuBow, University of Colorado Boulder</td>
</tr>
<tr>
<td>Special Session</td>
<td>Room: Hyatt Northstar A</td>
<td>Exploring our Privilege: Activities and Discussions</td>
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<tr>
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<td>Miranda Parker, Georgia Tech; Jason T. Black, Florida A&amp;M University; Helen H. Hu, Westminster College; Colleen M. Lewis, Harvey Mudd College</td>
</tr>
<tr>
<td>Special Session</td>
<td>Room: Hyatt Regency</td>
<td>A Discussion of Research Practice Partnerships in CS Education</td>
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<tr>
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<td>Leigh Ann DeLyser, Joshua Elder, CSforALL; Alan Peterfreund, Stacey Sexton, Sagefox Consulting Group</td>
</tr>
<tr>
<td>SIGCSE@50: Equity</td>
<td>Room: Hyatt Great Lakes A1 &amp; A2</td>
<td>Going Beyond the Platitude of Equity: Developing a Shared Vision for Equity in Computer Science Education</td>
</tr>
<tr>
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<td>Jean Ryoo, University of California; Los Angeles; Gail Chapman, Exploring Computer Science; Julie Flapan, University of California, Los Angeles; Joanna Goode, University of Oregon; Jane Margolis, University of California, Los Angeles; Christine Ong, CREST; Cynthia Estrada, University of California, Los Angeles; Max Skorodinsky, University of Oregon; Tiera Tanksley, University of California, Los Angeles; Jamika D. Burge, black computHER; Ryoko Yamaguchi, Plus Alpha Research; Frieda McAlear, Allison Scott, Alexis Martin, Sonia Koshy, Kapor Center; Kamau Bobb, Lien Diaz, Georgia Tech</td>
</tr>
<tr>
<td>Intel Supporter Session</td>
<td>Room: Hyatt Lakeshore A</td>
<td>Jump Start Parallel Programming Education in Data Science, Artificial Intelligence and More (See page 47 for abstract)</td>
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<tr>
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<td>Henry Gabb, Intel Corporation</td>
</tr>
<tr>
<td>Vocareum Supporter Session</td>
<td>Room: Hyatt Lakeshore B</td>
<td>Delivering Cutting Edge Compute Resources to the Classroom - Jupyter, Clusters, Container Networks, &amp; More (See page 48 for abstract)</td>
</tr>
<tr>
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<td>Sanjay Srivastava, Vocareum</td>
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</table>

**Friday Afternoon Events • 12:00 pm - 1:45 pm**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>12:00 pm - 1:45 pm</td>
<td>Lunch (on your own)</td>
</tr>
<tr>
<td>12:00 pm - 1:45 pm</td>
<td>International Committee Lunch</td>
</tr>
<tr>
<td>1:00 pm - 1:45 pm</td>
<td>SIGCSE Volunteer/Conference Info</td>
</tr>
<tr>
<td>PAPER SESSIONS</td>
<td>1:45 PM</td>
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<tr>
<td><strong>Professional Tools &amp; Practice</strong>&lt;br&gt;Chair: Roberto Hoyle, Oberlin College&lt;br&gt;Room: Hyatt Greenway A</td>
<td>Interactive Peer-Led Code Reviews In CS2 Curricula&lt;br&gt;Ryan Rybarczyk, Butler University; Lingma Acheson, Indiana University-Purdue University</td>
</tr>
<tr>
<td><strong>Student Success</strong>&lt;br&gt;Chair: Craig Zilles, University of Illinois at Urbana-Champaign&lt;br&gt;Room: Hyatt Greenway J</td>
<td>Early Programming Education and Career Orientation: The Effects of Gender, Self-Efficacy, Motivation and Stereotypes&lt;br&gt;Efthimia Aivaloglou, Open University of the Netherlands; Feliene Hermans, Leiden Institute of Advanced Computer Science</td>
</tr>
<tr>
<td><strong>Instruments 2</strong>&lt;br&gt;Chair: Emily Lovell, Berea College&lt;br&gt;Room: Hyatt Greenway B/C</td>
<td>An Item Response Theory Evaluation of a Language-Independent CS1 Knowledge Assessment&lt;br&gt;Benjamin Xie, Matthew J. Davidson, Min Li, Andrew J. Ko, University of Washington</td>
</tr>
<tr>
<td><strong>Security 1</strong>&lt;br&gt;Chair: Sotirios Kentros, Salem State University&lt;br&gt;Room: Hyatt Greenway D/E</td>
<td>Evaluation of Peer Instruction for Cybersecurity Education&lt;br&gt;Pranita Deshpande, University of New Orleans; Cynthia B. Lee, Stanford University; Irfan Ahmed, Virginia Commonwealth University</td>
</tr>
<tr>
<td><strong>Misconceptions</strong>&lt;br&gt;Chair: Stephen H. Edwards, Virginia Tech&lt;br&gt;Room: Millennium Grand North</td>
<td>Automated Critique of Early Programming Antipatterns&lt;br&gt;LeO C. Ureel II, Charles Wallace, Michigan Technological University</td>
</tr>
</tbody>
</table>
# Paper Sessions • 1:45 pm - 3:00 pm

## Accessibility
Chair: N. Burçin Tamer, Computing Research Association
Room: Millennium Grand South

### Educational Experiences of Blind Programmers
Catherine M. Baker, Creighton University; Cynthia L. Bennett, University of Washington; Richard E. Ladner, University of Washington

1st BEST PAPER Experience Reports and Tools

### Accessible AST-Based Programming for Visually-Impaired Programmers
Emmanuel Schanzer, Bootstrap/Brown University; Sina Bahram, Prime Access Consulting; Shriram Krishnamurthi, Brown University

## Curriculum Issues 2
Chair: Afonso Sales, PUCRS, School of Technology
Room: Millennium Grand Central

### From Clusters to Content: Using Code Clustering for Course Improvement
David A. Joyner, Ryan Arrison, Mehnaz Rukhsana, Evi Salguero, Zida Wang, Ben Wellington, Kevin Yin, Georgia Institute of Technology

### Applying Machine Learning to Improve Curriculum Design
Robert Ball, Linda Duhadway, Kyle Feuz, Joshua Jensen, Brian Raguse, Drew Weidman, Weber State University

## Sister Session: Incorporating History in STEM Education
Room: Hyatt Lake Bemidji

### The Charles Babbage Institute: An Overview of its Resources for CS Education
Jeffrey R. Yost, Charles Babbage Institute and University of Minnesota

### Archives in STEM Education
Amanda Wick, Charles Babbage Institute and University of Minnesota

### The SIGCSE Story – Getting the Scoop
Barbara Boucher Owens, Southwestern University; Vicki Almstrum, Texas State University

## Panel & Special Sessions • 1:45 pm - 3:00 pm

### Panel Session
Room: Hyatt Northstar B

Wrestling with Retention in the CS Major: Report from the ACM Retention Committee
Alison Derbenwick Miller, Oracle; Christine Alvarado, University of California, San Diego; Mehran Sahami, Stanford University; Elsa Villa, University of Texas at El Paso; Stuart Zweben, The Ohio State University

### Panel Session
Room: Hyatt Regency

Why and How to Spend a Sabbatical in Industry
Ryan McFall, Hope College; Zachary Kurmas, Grand Valley State University; Phillip T. Conrad, University of California, Santa Barbara; Dennis Frailey, Raytheon Company (Retired), University of Texas at Arlington

### Special Session
Room: Hyatt Greenway F/G

ACM Code of Ethics: Looking Back and Forging Ahead
Marty J. Wolf, Bemidji State University; Don Gotterbarn, East Tennessee State University; Michael S. Kirkpatrick, James Madison University

### Panel Session
Room: Hyatt Greenway H/I

Computing Curricula 2020: Introduction and Community Engagement
Alison Clear, Eastern Institute of Technology; Allen S. Parrish, Mississippi State University; John Impagliazzo, Hofstra University; Ming Zhang, Peking University

### Special Session
Room: Hyatt Northstar A

Leading Conversations about Microaggressions, Bias, and Other Difficult Topics
Colleen M. Lewis, Harvey Mudd College; Wendy M. DuBow, University of Colorado Boulder; Kyla McMullen, University of Florida
### Friday, March 1

#### SIGCSE@50 and Supporter Sessions • 1:45 pm - 3:00 pm

<table>
<thead>
<tr>
<th>SIGCSE@50: CS0</th>
<th>1:45 pm - 2:10 pm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Leigh Ann DeLyser, CSforALL</td>
<td><strong>Punch Cards to Python: A Case Study of a CS0 Core Course</strong>&lt;br&gt;Thomas Babbitt, Charles Schooler, Kyle King, United States Military Academy</td>
</tr>
<tr>
<td>Room: Hyatt Great Lakes A1 &amp; A2</td>
<td><strong>Discussion</strong>&lt;br&gt;Victoria Eisele, Front Range Community College; Daniel D. Garcia, University of California, Berkley; Henry M. Walker, Grinnell College</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Microsoft Supporter Session</th>
<th>Microsoft MakeCode Arcade (See page 48 for abstract)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Lakeshore A</td>
<td>Jacqueline Russell, Microsoft Corporation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CODIO Supporter Session</th>
<th>A Powerful, Flexible Platform for Instructors to Deliver and Assess Student Learning Experiences (See page 48 for abstract)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Lakeshore B</td>
<td>Elise Deitrick, Codio</td>
</tr>
</tbody>
</table>

#### Break, Exhibits & NSF Showcase • 3:00 pm - 3:45 pm

<table>
<thead>
<tr>
<th>3:00 pm - 3:45 pm</th>
<th>Break &amp; Exhibits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Exhibit Hall</td>
<td>NSF Showcase #4 (See page 58 for complete listing of NSF Showcases)</td>
</tr>
</tbody>
</table>

#### Demo Session • 3:00 pm - 3:45 pm

<table>
<thead>
<tr>
<th>3:00 pm - 3:45 pm</th>
<th>Demo Session #4:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Exhibit Hall</td>
<td><strong>Chair: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Code Defenders: A Mutation Testing Game</strong>&lt;br&gt;Gordon Fraser, University of Passau</td>
</tr>
<tr>
<td></td>
<td><strong>An Interactive, Graphical Simulator for Teaching Operating Systems</strong>&lt;br&gt;Joshua W. Buck, Saverio Perugini, University of Dayton</td>
</tr>
</tbody>
</table>

#### Poster Session • 3:00 pm - 5:00 pm

<table>
<thead>
<tr>
<th>3:00 pm - 5:00 pm</th>
<th>Poster Session #2 (See pages 53-56 for complete listing Posters)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Exhibit Hall</td>
<td>Chairs: Laurence D. Merkle, Air Force Institute of Technology; S. Monisha Pulimood, The College of New Jersey</td>
</tr>
</tbody>
</table>

#### Paper Sessions • 3:45 pm - 5:00 pm

<table>
<thead>
<tr>
<th>PAPER SESSIONS</th>
<th>3:45 PM</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Physical Computing</strong></td>
<td><strong>Designing a Middle School Science Curriculum That Integrates Computational Thinking and Sensor Technology</strong>&lt;br&gt;Alexandra Gendreau Chakarov, University of Colorado Boulder; Mimi Recker, Utah State University; Jennifer Jacobs, Katie Van Horne, Tamara Sumner, University of Colorado Boulder</td>
</tr>
<tr>
<td>Chair: Barbara Anthony, Southwestern University</td>
<td><strong>One Size Fits All: Designing for Socialization in Physical Computing</strong>&lt;br&gt;Gabriella Anton, Uri Wilensky, Northwestern University</td>
</tr>
<tr>
<td>Room: Hyatt Greenway A</td>
<td><strong>CS0: Introducing Computing with Raspberry Pis</strong>&lt;br&gt;Brian Krupp, Andrew Watkins, Baldwin Wallace University</td>
</tr>
</tbody>
</table>

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http://sigcse2019.sigcse.org
<table>
<thead>
<tr>
<th>Time</th>
<th>Professional Skills</th>
<th>Attitudinal</th>
<th>Security 2</th>
<th>Computational Thinking 2</th>
<th>Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:45 PM</td>
<td>Usage of Hints on Coding-Based Summative Assessments</td>
<td>Assessing the Attitudes Towards Computing Scale: A Survey Validation Study</td>
<td>Introducing Practical SHA-1 Collisions to the Classroom</td>
<td>Primary School Teachers’ Conceptions of Computational Thinking</td>
<td>WatDFS: A Project for Understanding Distributed Systems in the Undergraduate Curriculum</td>
</tr>
<tr>
<td>4:10 PM</td>
<td>A Collaborative Practicum Targeting Communication Skills for Computer Science Researchers</td>
<td>Are You Game?: Assessing Students’ Perception of Learning, Instructors’ Perspective, and Learning Attitude</td>
<td>Teaching Cybersecurity with Networked Robots</td>
<td>PRADA: A Practical Model for Integrating Computational Thinking in K-12 Education</td>
<td>Computer Organization and Design Course with FPGA Cloud</td>
</tr>
</tbody>
</table>

**Room Assignments:**
- Professional Skills: Hyatt Greenway J
- Attitudinal: Hyatt Greenway B/C
- Security 2: Hyatt Greenway D/E
- Computational Thinking 2: Millennium Grand North
- Systems: Millennium Grand South

**Chairs:**
- Professional Skills: Bob Edmison, Virginia Tech
- Attitudinal: Bob Edmison, Virginia Tech
- Security 2: Carlos Cabrera, Miami Dade College
- Computational Thinking 2: Meg Ray, Cornell Tech
- Systems: Gursimran S. Walia, North Dakota State University

**Participants:**
- Professional Skills:
  - Merilin Säde, Reelika Suviste, Piret Luik, Eno Tõnisson, Marina Lepp
  - University of Tartu
- Attitudinal:
  - Dana Wanzer, Tom McKlin, The Findings Group; Doug Edwards, Jason Freeman, Brian Magearko, Georgia Institute of Technology
- Security 2:
  - Ákos Lődéczi, Miklós Maróti, Hamid Zare, Bernard Yett, Nicole Hutchins, Brian Broll, Péter Völgyesi, Michael B. Smith, Timothy Darrah, Mary Metelko, Xenonon Koutsoukos, Gautam Biswas, Vanderbilt University
- Computational Thinking 2:
  - Megean Garvin, University of Maryland; Heather Killen, Jandelyn Plane, David Weintrop, University of Maryland, College Park
- Systems:
  - Michael Abebe, Brad Glasbergen, Khuzaima Daudjee, University of Waterloo
  - Ke Zhang, Yisong Chang, Mingyu Chen, Yungang Bao, Zhiwei Xu, State Key Laboratory of Computer Architecture, ICT, CAS; University of Chinese Academy of Sciences

**Additional Topics:**
- Usage of Hints on Coding-Based Summative Assessments
- Assessing the Attitudes Towards Computing Scale: A Survey Validation Study
- Introducing Practical SHA-1 Collisions to the Classroom
- Primary School Teachers’ Conceptions of Computational Thinking
- PRADA: A Practical Model for Integrating Computational Thinking in K-12 Education
- WatDFS: A Project for Understanding Distributed Systems in the Undergraduate Curriculum
- Computer Organization and Design Course with FPGA Cloud
- Understanding CS Undergraduate Students’ Professional Development through the Lens of Internship Experiences
- Computational Thinking in the Danish High School: Learning Coding, Modeling, and Content Knowledge with NetLogo
- Visualizing Classic Synchronization Problems: Dining Philosophers, Producers-Consumers, and Readers- Writers
## Paper Sessions • 3:45 pm - 5:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:45 PM</td>
<td><strong>CS1 2</strong>&lt;br&gt;Chair: Ria Galanos, Thomas Jefferson High School for Science &amp; Technology&lt;br&gt;Room: Millennium Grand Central&lt;br&gt;<strong>Sister Session TOCE #2</strong>&lt;br&gt;Chair: Chris Hundhausen, Washington State University&lt;br&gt;Room: Hyatt Lake Bemidji</td>
</tr>
<tr>
<td>4:10 PM</td>
<td>Students’ Experience of Participation in a Discipline – A Longitudinal Study of Computer Science and IT Engineering Students&lt;br&gt;Anne-Kathrin Peters, Uppsala University&lt;br&gt;Classroom-based Research Projects for Computing Teachers: Facilitating Professional Learning&lt;br&gt;Sue Senteance, King’s College; Jane Sinclair, University of Warwick, Coventry; Carl Simmons, Edge Hill University, Ormskirk; Andrew Csizmadia, Newman University, Birmingham&lt;br&gt;Taking a Studio Course in Distributed Software Engineering from a Large Local Cohort to a Small Global Cohort&lt;br&gt;William Billingsley, Rosemary Torbay, Peter R. Fletcher, University of New England, Armidale; Richard N. Thomas, Jim R. H. Steel, Jörn Guy Süß, The University of Queensland, St Lucia</td>
</tr>
<tr>
<td>4:35 PM</td>
<td><strong>Panel Session</strong>&lt;br&gt;Room: Hyatt Northstar B&lt;br&gt;Community College Transfer Pathways&lt;br&gt;Jeffrey Forbes, Duke University; Jumee Song, Siegel Family Endowment; Louisa Ann Lyon, Education, Training, and Research; Leslie Maxwell, California State University, Monterey Bay; Cindy S. Tucker, Bluegrass Community and Technical College&lt;br&gt;<strong>Special Session</strong>&lt;br&gt;Room: Hyatt Northstar A&lt;br&gt;Microteaching: Recursion, Coding Style, Creative Coding, Inheritance and Polymorphism, Loops, and the Internet&lt;br&gt;Colleen M. Lewis, Harvey Mudd College; Daniel D. Garcia, University of California, Berkeley, Helen H. Hu, Westminster College; Saber Khan, Packer Collegiate Institute &amp; Processing Foundation; Nigamanth Sridhar, Cleveland State University; Bryan Twarek, San Francisco Unified School District; Chinma Uche, Academy of Aerospace and Engineering&lt;br&gt;<strong>Special Session</strong>&lt;br&gt;Room: Hyatt Regency&lt;br&gt;Curious about Student Participation in Humanitarian Open Source Software?&lt;br&gt;Darci Burdge, Nassau Community College; Gregory W. Hsiopl, Drexel University; Grant Braught, Dickinson College; Josh Dehlinger, Towson University; Christian Murphy, University of Pennsylvania; Joanna Klukowska, Courant Institute, NYU; Lynn Lambert, Christopher Newport University; Patricia Ordóñez, University of Puerto Rico, Rio Piedras; Karl R. Wurst, Worcester State University</td>
</tr>
</tbody>
</table>
### Friday, March 1

#### ACM Student Research Competition • 3:45 pm - 5:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3:45 pm - 5:00 pm</td>
<td>ACM Student Research Competition - Undergraduate: Final Round</td>
<td>Hyatt Greenway F/G</td>
<td>(See page 59 for complete ACM Student Research Competition listing) Chairs: Stephen Hughes, Coe College; Jessica Schmidt, North Carolina State University</td>
</tr>
<tr>
<td>3:45 pm - 5:00 pm</td>
<td>ACM Student Research Competition - Graduate: Final Round</td>
<td>Hyatt Greenway H/I</td>
<td>(See page 59 for complete ACM Student Research Competition listing) Chairs: Stephen Hughes, Coe College; Jessica Schmidt, North Carolina State University</td>
</tr>
</tbody>
</table>

#### Friday Evening Events • 5:10 pm - 8:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Room</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>5:10 pm - 6:00 pm</td>
<td>SIGCSE Business Meeting</td>
<td>Hyatt Greenway A</td>
<td></td>
</tr>
<tr>
<td>6:00 pm - 7:00 pm</td>
<td>CCSC Business Meeting</td>
<td>Hyatt Greenway B/C</td>
<td></td>
</tr>
<tr>
<td>6:00 pm - 7:00 pm</td>
<td>NCWIT Reception</td>
<td>Northstar Ballroom</td>
<td></td>
</tr>
<tr>
<td>7:00 pm - 8:00 pm</td>
<td>Community College Reception</td>
<td>Hyatt Regency</td>
<td></td>
</tr>
</tbody>
</table>

#### Friday Workshops • 7:00 pm - 10:00 pm

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Title</th>
<th>Room</th>
<th>Presenter</th>
</tr>
</thead>
<tbody>
<tr>
<td>301</td>
<td>Adopting, Integrating, and Evaluating Computational Creativity Exercises to Improve Student Learning</td>
<td>Lakeshore B</td>
<td>Leen-Kiat Soh, Markeya S. Peteranetz, University of Nebraska - Lincoln</td>
</tr>
<tr>
<td>302</td>
<td>Using Raspberry Pi as a Platform for Teaching Cybersecurity Concepts</td>
<td>Lakeshore C</td>
<td>Andreea Cotoranu, Li-Chiou Chen, Pace University</td>
</tr>
<tr>
<td>303</td>
<td>Using Subgoal Labeling in Teaching CS1</td>
<td>Greenway A</td>
<td>Briana B. Morrison, University of Nebraska Omaha; Lauren Margulieux, Georgia State University; Adrienne Decker, University at Buffalo</td>
</tr>
<tr>
<td>304</td>
<td>Micro:bit Magic: Engaging K-12, CS1/2, and Non-majors with IoT &amp; Embedded</td>
<td>Greenway B/C</td>
<td>Bill Siever, Washington University in St. Louis; Michael P. Rogers, Northwest Missouri State University</td>
</tr>
<tr>
<td>305</td>
<td>Integrating Agent-based Modeling in STEM Classes: From Blocks to Text and Back?</td>
<td>Greenway D/E</td>
<td>Connor Bain, Gabriella Anton, Northwestern University</td>
</tr>
<tr>
<td>306</td>
<td>SciGirls Code: Creative Robotics for Tween Girls in Out of School Time</td>
<td>Greenway J</td>
<td>Joan Freese, Twin Cities PBS; Heather Benedict, Heather Benedict Consulting; Sarah Carter, Katie Hessen, Rita Karl, Twin Cities PBS; Karen Peterson, National Girls Collaborative; Cassandra Scharber, University of Minnesota</td>
</tr>
<tr>
<td>307</td>
<td>Competency-Based Education: The Future of Learning</td>
<td>Greenway F/G</td>
<td>Amardeep Kahlon, Ann Kennedy, Linda Smarzik, Austin Community College</td>
</tr>
<tr>
<td>308</td>
<td>Playing with and Creating Practice Spaces for Equitable Teaching</td>
<td>Greenway H/I</td>
<td>Joshua Littenberg-Tobias, Amanda Aparicio, Justin Reich, Massachusetts Institute of Technology</td>
</tr>
<tr>
<td>309</td>
<td>Code Crafters Curriculum: A Textile Crafts Approach to Computer Science</td>
<td>Great Lakes A1 &amp; A2</td>
<td>Ursula Wolz, Bennington College; Seoyen (Stella) Lee, Grinnell College; James Mulligan, Paulina Valdivieso, Bennington College</td>
</tr>
<tr>
<td>310</td>
<td>Make and Take an Ethics Module: Ethics Across the CS Curriculum</td>
<td>Lake Bemidji</td>
<td>Darakhshan J. Mir, Bucknell University; Iris Howley, Williams College; Janet Davis, Whitman College; Evan Peck, Bucknell University; Deborah Tatar, Virginia Tech</td>
</tr>
</tbody>
</table>

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SIGCSE Gold Sponsor | Come visit us at Booth 326!
### Saturday, March 2

#### Saturday Morning Event • 7:00 am - 8:15 am

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>7:00 am - 8:15 am</td>
<td>Community College Breakfast</td>
</tr>
<tr>
<td></td>
<td>Room: Hyatt Regency</td>
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</table>

#### KEYNOTE SESSION

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:15 am - 9:30 am</td>
<td>General Information</td>
</tr>
<tr>
<td></td>
<td>Room: Hyatt Nicollet Grand Ballroom</td>
</tr>
</tbody>
</table>

**General Information**

Elizabeth K. Hawthorne, Union County College; Manuel A. Pérez-Quiñones, University of North Carolina at Charlotte

**CLOSING KEYNOTE:** Cybersecurity is Not a Fad: Why Cyber is a Game Changer for Computer Science Education

Dr. Blair Taylor, Towson University

#### Paper Sessions • 9:45 am - 10:35 am

<table>
<thead>
<tr>
<th>Session</th>
<th>Time</th>
<th>Room</th>
<th>Speaker Details</th>
</tr>
</thead>
</table>
| **Professional Development 1** | 9:45 AM | Hyatt Greenway A | Assessing In-service Teachers’ Development of Computational Thinking Practices in Teacher Development Courses  
Siu-Cheung Kong, The Education University of Hong Kong; Andrew Chan-Chio Lao, University of Macau
| | 10:10 AM | Hyatt Greenway A | Teaching Accessibility: A Design Exploration of Faculty Professional Development at Scale  
Saba Kawas, Laura Vonessen, University of Washington-Seattle; Andrew J. Ko, University of Washington
| **REU** | 9:45 AM | Hyatt Greenway J | Utilizing the Affinity Research Group Model in a Summer Research Experience for Undergraduates Program  
Ben Jelen, Indiana University; Julia Dunbar, University of Washington; Susan Monsey Indiana University; Olivia K. Richards, Pennsylvania State University; Katie A. Siek, Indiana University
| | 10:10 AM | Hyatt Greenway J | Hello Research! Developing an Intensive Research Experience for Undergraduate Women  
Suzanne Menzel, Katie A. Siek, David Crandall, Indiana University
| **Expectations** | 9:45 AM | Hyatt Greenway B/C | Collaboration Versus Cheating: Reducing Code Plagiarism in an Online MS Computer Science Program  
Tony Mason, Ada Gavrilovska, David A. Joyner, Georgia Institute of Technology
| | 10:10 AM | Hyatt Greenway B/C | What Do CS1 Syllabi Reveal About Our Expectations of Introductory Programming Students?  
Brett A. Becker, Thomas Fitzpatrick, University College Dublin
| **Outreach** | 9:45 AM | Hyatt Greenway D/E | Computational Thinking Bins: Outreach and More  
Briana B. Morrison, Brian Dorn, Michelle Friend, University of Nebraska Omaha
| | 10:10 AM | Hyatt Greenway D/E | Applying Self-Determination Theory towards Motivating Young Women in Computer Science  
Allison Mishkin, University of Oxford
Paper Sessions • 9:45 am - 10:35 am

<table>
<thead>
<tr>
<th>Theory &amp; Math</th>
<th>9:45 AM</th>
<th>10:10 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Shannon Reckinger, University of Illinois Chicago</td>
<td>A Survey-based Exploration of Computer Science Student Perspectives on Mathematics Nikki Sigurdson, Andrew Petersen, University of Toronto Mississauga</td>
<td>Impact of Steps, Instruction, and Motivation on Learning Symbolic Reasoning Using an Online Tool Megan Fowler, Michelle Cook, Kevin Pils, Tim Schwab, Yu-Shan Sun, Murali Sitaraman, Clemson University; Jason O. Hallstrom, Florida Atlantic University; Joseph E. Hollingsworth, Rose-Hulman Institute of Technology</td>
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</table>

<table>
<thead>
<tr>
<th>Pair Programming</th>
<th>9:45 AM</th>
<th>10:10 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Juan Chen, National University of Defense Technology</td>
<td>Hybrid Pair Programming - A Promising Alternative to Standard Pair Programming Hans Yuan, Yingjun Cao, University of California, San Diego</td>
<td>In Their Own Words: Gender Differences in Student Perceptions of Pair Programming Kimberly Michelle Ying, Lydia G. Pezzullo, Mohona Ahmed, Kassandra Crompton, Jeremiah Blanchard, Kristy Elizabeth Boyer, University of Florida</td>
</tr>
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<thead>
<tr>
<th>CSP</th>
<th>9:45 AM</th>
<th>10:10 AM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chair: Joshua Elder, CSforALL</td>
<td>AP Computer Science Principles’ Impact on the Landscape of High School Computer Science using Maryland as a Model Heather Killen, University of Maryland, College Park; David Weintrop, University of Maryland; Megean Garvin, University of Maryland, Baltimore County</td>
<td>An Examination of the Correlation of Exploring Computer Science Course Performance and the Development of Programming Expertise Steven McGee, The Learning Partnership; Ronald I. Greenberg, Loyola University; Randi McGee-Tekula, Jennifer Duck, The Learning Partnership; Andrew M. Rasmussen, Lucia Dettori, Chicago Public Schools; Dale F. Reed, University of Illinois at Chicago</td>
</tr>
</tbody>
</table>

SIGCSE@50 & Supporter Sessions • 9:45 am - 10:35 am

<table>
<thead>
<tr>
<th>SIGCSE@50: Historical Perspectives</th>
<th>9:45 am - 10:10 am</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Gradescope by Turnitin Supporter Session</th>
<th>10:10 am - 10:35 am</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room: Hyatt Lakeshore A</td>
<td>Discussion Author(s) of the Top SIGCSE Technical Symposium Paper of All Time</td>
</tr>
</tbody>
</table>

One Platform for Paper, Online, and Programming Assignments (See page 48 for abstract) Ibrahim Awwal, Gradescope
### Demos & Lightning Talks • 9:45 am - 10:35 am

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chairs/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:45 am - 10:35 am</td>
<td>Demo Session #5: NetsBlox and Wireless Robots Make Cybersecurity Fun, Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Blocks4All: Making Blocks-Based Programming Languages Accessible for Children with Visual Impairments, Chairs: Lauren R. Milne, Macalester College; Richard E. Ladner, University of Washington</td>
<td></td>
</tr>
<tr>
<td></td>
<td>CodeBuddy (Collaborative Software Development Environment): In-and Out-Class Practice for Remote Pair-Programming with Monitoring Coding Students’ Progress, Chairs: Teerapong Leelanupab, Tiwipab Meephruek, King Mongkut’s Institute of Technology Ladkrabang</td>
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<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chairs/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:45 am - 10:35 am</td>
<td>Lightning Talks #2 (See page 60 for complete listing of Lightning Talks), Chairs: Lina Battestilli, North Carolina State University; Peter-Michael Osera, Grinnell College</td>
<td></td>
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</tbody>
</table>

### Break, Exhibits & NSF Showcase • 10:35 am - 11:15 am

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chairs/Institutions</th>
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<tbody>
<tr>
<td>10:35 am - 11:15 am</td>
<td>Break &amp; Exhibits</td>
<td></td>
</tr>
<tr>
<td></td>
<td>NSF Showcase #5 (See page 58 for complete listing of NSF Showcases)</td>
<td></td>
</tr>
</tbody>
</table>

### Poster Session • 10:35 am - 12:30 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chairs/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:35 am - 12:30 pm</td>
<td>Poster Session #3 (See pages 53-56 for complete listing of Posters), Chairs: Laurence D. Merkle, Air Force Institute of Technology; S. Monisha Pulimood, The College of New Jersey</td>
<td></td>
</tr>
</tbody>
</table>

### Paper Sessions • 11:15 am - 12:30 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Chairs/Institutions</th>
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<tbody>
<tr>
<td>11:15 AM</td>
<td>&quot;I Impressed Myself With How Confident I Felt&quot;: Reflections on a Computer Science Assessment for K-8 Teachers, Chairs: Hannah E. Chipman, Rhodes College; Fernando J. Rodriguez, Kristy Elizabeth Boyer, University of Florida</td>
<td></td>
</tr>
<tr>
<td>11:40 AM</td>
<td>Reflective Diary for Professional Development of Novice Teachers, Chairs: Martin Ukrop, Valdemar Švábenský, Jan Nehyba, Masaryk University</td>
<td></td>
</tr>
<tr>
<td>12:05 PM</td>
<td>Helping K-12 Teachers Get Unstuck with Scratch: The Design of an Online Professional Learning Experience, Chairs: Paulina Haduong, Karen Brennan, Harvard Graduate School of Education</td>
<td></td>
</tr>
<tr>
<td>12:05 PM</td>
<td>A Structured Mentorship Model for Computer Science University Students in Kenya, Chairs: Chao Mbogo, Kenya Methodist University</td>
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<tr>
<th>Time</th>
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<tr>
<td>11:40 AM</td>
<td>2nd BEST PAPER Curricula Initiatives A Flexible Curriculum for Promoting Inclusion Through Peer Mentorship, Chairs: Heather Pon-Barry, Audrey St. John, Becky Wai-Ling Packard, Barbara Rotundo, Mount Holyoke College</td>
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<tr>
<th>Time</th>
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<th>Chairs/Institutions</th>
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<tbody>
<tr>
<td>11:15 AM</td>
<td>Professional Development 2, Chair: Valerie Summet, Rollins College</td>
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<tr>
<td>11:40 AM</td>
<td>Mentorship, Chair: Janet Davis, Whitman College</td>
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</tbody>
</table>
## Paper Sessions • 11:15 am - 12:30 pm

<table>
<thead>
<tr>
<th>Engagement</th>
<th>11:15 AM</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td><strong>Engagement</strong></td>
<td>Student Engagement is Key to Broadening Participation in CS</td>
<td>Evaluating the Impact of Combination of Engagement Strategies in SEP-CyLE to Improve Student Learning of Programming Concepts</td>
<td>Non-Programming Activities for Engagement with Foundational Concepts in Introductory Programming</td>
</tr>
<tr>
<td>Chair: Gloria Washington, Howard University</td>
<td>Beryl Hoffman, Elms College; Ralph Morelli, Trinity College; Jennifer Rosato, College of St. Scholastica</td>
<td>Mourya Reddy Narasareddy, Gursimran S. Walia, North Dakota State University; Debra M. Duke, Virginia Commonwealth University; Vijayalakshmi Ramasamy, James Kper, Miami University; Debra Lee Davis, Florida International University; Andrew A. Allen, Georgia Southern University; Hakam W. Alomari, Miami University</td>
<td>Shuchi Grover, Looking Glass Ventures, LLC.; Patrik Lundh, Nicholas Jackiw, SRI International</td>
</tr>
<tr>
<td>Room: Hyatt Greenway B/C</td>
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<table>
<thead>
<tr>
<th>Access</th>
<th>11:15 AM</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td><strong>Access</strong></td>
<td>A Teacher Workshop for Introducing Computational Thinking in Rural and Vulnerable Environments</td>
<td>An Analysis through an Equity Lens of the Implementation of Computer Science in K-8 Classrooms in a Large, Urban School District</td>
<td>Increasing Capacity for Computer Science Education in Rural Areas through a Large-Scale Collective Impact Model</td>
</tr>
<tr>
<td>Chair: Jennifer Parham-Mocello, Oregon State University</td>
<td>Jocelyn Simmonds, Francisco J. Gutierrez, Cecilia Casanova, Cecilia Sotomayor, Nancy Hitschfeld, University of Chile</td>
<td>Jean Salac, Max White, Ashley Wang, Diana Franklin, The University of Chicago</td>
<td>Jayce R. Warner, Carol L. Fletcher, Ryan Torbey, Lisa S. Garbrecht, University of Texas at Austin</td>
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<td>Room: Hyatt Greenway D/E</td>
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<thead>
<tr>
<th>Culture &amp; Language</th>
<th>11:15 AM</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td><strong>Culture &amp; Language</strong></td>
<td>The Role of Translanguaging in Computational Literacies: Documenting Middle School Bilinguals’ Practices in Computer Science Integrated Units</td>
<td>A Cultural Computing Curriculum</td>
<td>Stitching the Loop with Electronic Textiles</td>
</tr>
<tr>
<td>Chair: Andrew J. Ko, University of Washington</td>
<td>Sara Vogel, The Graduate Center, City University of New York; Christopher Hoadley, New York University; Laura Ascenzi-Moreno, Brooklyn College, City University of New York; Kate Menken, Queens College &amp; The Graduate Center, CUNY</td>
<td>James Davis, Rensselaer Polytechnic Institute; Michael Lachney, Michigan State University; Zoe Zatz, William Babbit, Rensselaer Polytechnic Institute; Ron Eglash, University of Michigan</td>
<td>Yasmin B. Kafai, University of Pennsylvania; Deborah A. Fields, Utah State University; Debora A. Lui, Justice T. Walker, Mia S. Shaw, Gayathri Jayathirtha, University of Pennsylvania; Tomoko M. Nakajima, University of California, Los Angeles; Joanna Goode, University of Oregon; Michael T. Giang, California State Polytechnic University, Pomona</td>
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<tr>
<td>Room: Millennium: Grand North</td>
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<table>
<thead>
<tr>
<th>Inclusion</th>
<th>11:15 AM</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td><strong>Inclusion</strong></td>
<td>How Faculty Negotiate “Inclusive Educational Practice” in Computer Science</td>
<td>Infusing Cooperative Learning into AP Computer Science Principles Courses to Promote Engagement and Diversity</td>
<td>Computer Science Educators Stack Exchange: Perceptions of Equity and Gender Diversity in Computer Science</td>
</tr>
<tr>
<td>Chair: Durga Suresh-Menon, Wentworth Institute of Technology</td>
<td>Heather Thiry, Golden Evaluation; Sarah Hug, Colorado Evaluation &amp; Research Consulting</td>
<td>Jeff Gray, University of Alabama; Kathy Haynie, Haynie Research and Evaluation; Fran Trees, Rutgers University; Owen Astrachan, Duke University; Chinma Uche, Academy of Aerospace and Engineering; Richard Kick, Newbury Park High School; Siobhan Cooney, Cooney Collaborative</td>
<td>Sukanya Kannan Moudgalya, Kathryn M. Rich, Arman Yadav, Matthew J. Koehler, Michigan State University</td>
</tr>
<tr>
<td>Room: Millennium Grand South</td>
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## Paper Sessions • 11:15 am - 12:30 pm

<table>
<thead>
<tr>
<th>Blocks</th>
<th>11:15 AM</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td>Chair: Denise Case, Northwest Missouri State University</td>
<td>Defining Tinkering Behavior in Open-ended Block-based Programming Assignments&lt;br&gt;Yihuan Dong, Samiha Marwan, Veronica Catete, Thomas W. Price, Tiffany Barnes, North Carolina State University</td>
<td>Using Rubrics Integrating Design and Coding to Assess Middle School Students’ Open-ended Block-based Programming Projects&lt;br&gt;Satabdi Basu, SRI International</td>
<td>Block-based Comprehension: Exploring and Explaining Student Outcomes from a Read-only Block-based Exam&lt;br&gt;David Weintrop, University of Maryland; Heather Killen, University of Maryland, College Park; Talal Munzar, University of Maryland; Baker Franke, Code.org</td>
</tr>
<tr>
<td>Room: Millennium Grand Central</td>
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<thead>
<tr>
<th>Sister Session SIGCAS: Values in Internet Security: Design and Governance</th>
<th>11:40 AM</th>
<th>12:05 PM</th>
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</thead>
<tbody>
<tr>
<td>Chair: Alyssa Moore, Canadian Internet Registration Authority; Bradley Fidler, Stevens Institute of Technology</td>
<td>Rethinking Values in the Design of Security Technologies&lt;br&gt;Farzaneh Badiei, Georgia Institute of Technology</td>
<td>Computer and Network Security: Understanding Communities of Ethical Research Practice&lt;br&gt;Quinn DuPont, Megan Finn, University of Washington</td>
</tr>
<tr>
<td>Room: Hyatt Lake Bemidji</td>
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</table>

## Nifty Assignments • 11:15 am - 12:30 pm

<table>
<thead>
<tr>
<th>Room: Hyatt Northstar A</th>
<th>11:15 am - 12:30 pm</th>
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</thead>
<tbody>
<tr>
<td>Nifty Assignments</td>
<td>Chairs: Nick Parlante, Julie Zelenski, Stanford University</td>
</tr>
<tr>
<td>11:15 am - 11:27 am</td>
<td>Nifty #1: Post-It Pandemonium&lt;br&gt;Jeffrey L. Popyack, Drexel University</td>
</tr>
<tr>
<td>11:27 am - 11:39 am</td>
<td>Nifty #2: Hawaiian Word Phonetic Generator&lt;br&gt;Kendall Bingham, University of Missouri-Kansas City</td>
</tr>
<tr>
<td>11:39 am - 11:51 am</td>
<td>Nifty #3: Motion Parallax&lt;br&gt;Benjamin Dicken, University of Arizona</td>
</tr>
<tr>
<td>11:51 am - 12:03 pm</td>
<td>Nifty #4: CS1/2 Assignment: Computing Gerrymandering&lt;br&gt;Allison Obourn, University of Arizona</td>
</tr>
<tr>
<td>12:03 pm - 12:15 pm</td>
<td>Nifty #5: Code Crusher&lt;br&gt;Ben Stephenson, University of Calgary</td>
</tr>
<tr>
<td>12:15 pm - 12:27 pm</td>
<td>Nifty #6: Blocky&lt;br&gt;Diane Horton, David Liu, University of Toronto</td>
</tr>
</tbody>
</table>

## Panel and Special Sessions • 11:15 am - 12:30 pm

<table>
<thead>
<tr>
<th>Panel Session</th>
<th>11:15 am - 12:30 pm</th>
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</thead>
<tbody>
<tr>
<td>Room: Hyatt Regency</td>
<td>Making K-12 CS Education Accessibility a Norm, not an Exception&lt;br&gt;Maya Israel, University of Florida; Shireen Hafeez, Deaf Kids Code; Emmanuel Schanzer, Bootstrap/Brown University; Rebecca Dovi, CodeVA; Emma Koslow, Programming Pals; Todd Lash, University of Illinois at Urbana-Champaign</td>
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<table>
<thead>
<tr>
<th>Special Session</th>
<th>11:15 am - 12:30 pm</th>
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<tbody>
<tr>
<td>Room: Hyatt Greenway F/G</td>
<td>Women and Girls of Color in Computing: Exploring Current Trends, Emerging Opportunities, and Strategies for Meaningful Impact&lt;br&gt;Frieda McAlear, Allison Scott, Kapor Center; Kimberly Scott, Arizona State University; Jamika D. Burge, black computer; Sonia Koshy, Kapor Center</td>
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<tr>
<th>Special Session</th>
<th>11:15 am - 12:30 pm</th>
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<tbody>
<tr>
<td>Room: Hyatt Greenway H/I</td>
<td>Demystifying Language about Students’ Varied Identities&lt;br&gt;Jason T. Black, Florida A&amp;M University; Karnau Bobb, Georgia Tech; April Browne, Butte College; Phillip T. Conrad, University of California, Santa Barbara; Colleen M. Lewis, Harvey Mudd College; Cheryl A. Swaniher, Caltech University; Sheila Tejada, University of Southern California</td>
</tr>
</tbody>
</table>
### Saturday, March 2

#### Lunch & Closing Ceremonies • 12:30 pm - 2:00 pm

<table>
<thead>
<tr>
<th>Time</th>
<th>Event Description</th>
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</thead>
<tbody>
<tr>
<td>12:30 pm - 2:00 pm</td>
<td>Lunch &amp; Closing Ceremonies</td>
</tr>
<tr>
<td>Room:</td>
<td>Hyatt Nicollet Grand Ballroom</td>
</tr>
<tr>
<td></td>
<td>Elizabeth K. Hawthorne, Union County College; Manuel A. Pérez-Quiñones, University of North Carolina at Charlotte; Jian Zhang, Texas Woman’s University; Mark Sherriff, University of Virginia; Sarah Heckman, North Carolina State University; Alvaro Monge, California State University, Long Beach; Pamela Cutter, Kalamazoo College</td>
</tr>
</tbody>
</table>

#### Saturday Workshops • 3:00 pm - 6:00 pm

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Title</th>
<th>Speakers/Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>401</td>
<td>Using and Customizing Open-Source Runestone Ebooks for Computer Science Classes</td>
<td>Barbara Ericson, Jaclyn Cohen, University of Michigan; Brad Miller, Runestone Interactive, LLC</td>
</tr>
<tr>
<td>402</td>
<td>To Dissemination... And Beyond!: Building Better Propagation Plans for Computer Science Education Innovations</td>
<td>Christopher Lynny Hovey, University of Colorado Boulder; Cynthia Taylor, Oberlin College; Heather Bort, Marquette University; David P. Bunde, Knox College; Zack Butler, Rochester Institute of Technology</td>
</tr>
<tr>
<td>403</td>
<td>Architecting Serverless Microservices on the Cloud with AWS</td>
<td>Ariel Ortiz, Tecnologico de Monterrey, Campus Estado de Mexico</td>
</tr>
<tr>
<td>404</td>
<td>NSF Interactive Discussion: Computer Science Undergraduate Education in 2026 and Beyond</td>
<td>Stephanie E. August, National Science Foundation &amp; Loyola Marymount University; Alexandra Medina-Borja, Mark Pauley, Michael M. Rook, National Science Foundation</td>
</tr>
<tr>
<td>405</td>
<td>CyberPaths: Cyber Security Labs for Liberal Arts Institutions Using the NSF Global Environment for Network Innovations (GENI)</td>
<td>Xenia Mountroudiou, College of Charleston; Vicraj Thomas, Architecture Technology Corporation</td>
</tr>
<tr>
<td>406</td>
<td>Modernizing Early CS Courses with Parallel and Distributed Computing</td>
<td>Sushil Prasad, Georgia State University; Sheikh Ghafoor, Tennessee Technical University; Charles Weems, University of Massachusetts Amherst; Alan Sussman, University of Maryland</td>
</tr>
<tr>
<td>407</td>
<td>An Afternoon with an AP Computer Science A Exam Reader</td>
<td>Ria Galanos, Thomas Jefferson High School for Science &amp; Technology; Timothy Gallagher, Winter Springs High School; Briana B. Morrison, University of Nebraska Omaha</td>
</tr>
<tr>
<td>408</td>
<td>Interactive Programming Environments for Teachers and Students</td>
<td>David J. Malan, Doug Lloyd, Kareem Zidane, Harvard University</td>
</tr>
<tr>
<td>409</td>
<td>Big Data Analytics with Spark</td>
<td>Mark C. Lewis, Trinity University</td>
</tr>
<tr>
<td>410</td>
<td>Booting Into AI: Startup Instructions for Teaching Artificial Intelligence</td>
<td>Brian K. Hare, University of Missouri-Kansas City; David Heise, Lincoln University of Missouri</td>
</tr>
</tbody>
</table>

An ON-LINE, AUTO-CHECKED Homework Program:
- Command-line interface specs automatically generated
- Easy to understand feedback diagnostics for students
- Gradebook and LMS (Canvas, Moodle) integration
- Plagiarism checking
- Support for instructor comments, including scoring and communication with students

Assemble your ingredients:
- provide instructions for students
  Write a program that ...
- supply at least one solution
  import java.io.*; ...
- specify the input for at least one test case
  4 87.5 69.0 98.5 78.0

1. Assemble your ingredients:
2. Pour Into CodeLab: copy-paste into a web form
3. That's it! There's no step 3 – CodeLab does the rest.

For More Details:
- Come to our supporter session, Thursday 1:45pm, Room: Lakeshore A
- Drop by our booth (329)
- Email: arnow@turingscraft.com

Turing's Craft, the company behind CodeLab and MyProgrammingLab – offers hundreds of online, instant feedback coding exercises in each of Java, C++, C, C#, VB, Javascript, Python. To date, over 140 million student code submissions have been checked. With plagiarism checking, LMS integrations, easier-than-ever customization tools, and an attractive introductory adoption discount, there's never been a better time for trying us out (www.turingscraft.com).
Integrating Cloud Computing into the Computer Science Curriculum: Beginner Level

8:30 am - 5:00 pm
Room: Hyatt Lakeshore A

Cloud computing makes a wide variety of computing resources available to every student. In this workshop, faculty will have the opportunity to get hands-on experience with a variety of cloud technologies, from Infrastructure as a Service launching a Virtual Machine in the cloud to Software as a Service, using pre-trained Machine Learning Models. Participants will have the opportunity to discuss how these can be used in classes. No previous cloud experience is assumed. This workshop will be coordinated with the Intro-level workshop so participants can move to it if those sessions are more appropriate for their needs. Examples will be drawn from a variety of courses.

Integrating Cloud Computing into the Computer Science Curriculum: Advanced Topics

8:30 am - 5:00 pm
Room: Hyatt Lakeshore B

Cloud computing makes a wide variety of computing resources available to every student. In this workshop, faculty will have the opportunity to get hands-on experience with a variety of cloud technologies, from Infrastructure as a Service launching a Virtual Machine in the cloud to Software as a Service, using pre-trained Machine Learning Models. Participants will have the opportunity to discuss how these can be used in classes. This workshop will be coordinated with the Intro-level workshop so participants can move to it if those sessions are more appropriate for their needs. Examples will be drawn from a variety of courses.

Create Classroom Labs in the Cloud

10:45 am - 12:00 pm
Room: Hyatt Lakeshore A

Presenter: Ji Eun Kwon, Microsoft Corporation

Hands-on learning is often the best teacher, especially for computer science students who need exposure to various systems and software. Come join this interactive session to learn how easy it is to create classroom labs in Azure. Azure Lab Services is a service that enables educators to easily create labs of virtual machines in Azure, without having to master the complexities of setting up cloud infrastructure.

As educators, you can specify the exact machine setup you want to roll out to your students. You can spin up/tear down classroom labs on demand. Minimize costs by monitoring and controlling the usage of the machines. Students go to a single place to access all the virtual machines they are given across multiple labs, and connect from there to do day-to-day work, short-term projects, or classroom exercises.

We will provide live demos and open the room for discussions.

Customized Auto-Grading and Homework Project Management with CodeLab

1:45 pm - 3:00 pm
Room: Hyatt Lakeshore A

Presenter: David Arnow, Brooklyn College

CodeLab is an online, automated, interactive learning tool for students in programming courses. The CodeLab service provides hundreds of very short, focused coding exercises that help students gain mastery over the syntax, semantics and common usage patterns of language constructs and programming ideas. Code submissions for each exercise are automatically checked for correctness and students are given relevant hints in case of incorrect code.

Building on this platform, Turing’s Craft has introduced a highly flexible, comprehensive, easy-to-use system that allows faculty to create their own auto-graded homework programming projects, with support for individualized grading and student-instructor communication. It’s easier than ever for instructors to build, assign, establish due dates for, and optionally review any programming assignment. Projects may vary from fragments of code to full programs that involve both interactive and file i/o.

This session completely illustrates the process of creating, deploying, and grading homework projects.
# Get to Near-total Automation with GitHub: Teacher Stories

**1:45 pm - 3:00 pm**
**Room: Hyatt Lakeshore B**

Presenters: Dan Wallach, Rice University; Paul Salvador, Inventado; California State University Fullerton; Vanessa Gennarelli, GitHub Education

Dan Wallach was looking for a scalable, reliable solution for his course: In 2015 the peak loads from his students’ work crashed their campus Subversion server, forcing them to extend their deadlines and ultimately run a private server, requiring significant assistance from Rice’s IT group. So he tried GitHub Classroom in 2017, and now uses for his 200-level course at Rice University.

Paul Salvador Inventado has 60 - 120 students per semester at California State University, Fullerton, and that’s a lot of checking. Inventado combines the use of a unit-testing framework with GitHub Classroom to automate the automatables: problem assignment, feedback, and checking. His research focuses on problem set generation, unit-testing, and machine learning. He is also a certified GitHub Campus Advisor.

## Is Your CS Course Too Complex? How Are You Handling Growth?

**3:45 pm - 5:00 pm**
**Room: Hyatt Lakeshore A**

Presenters: Smita Bakshi, zyBooks; Frank Vahid, zybooks/U of California, Riverside; Roman Lysecky, zyBooks/U of Arizona; Alex Edgcomb, zyBooks/University of California Riverside.

“Programming is hard, but all the logins are harder” -- Said by a UCR student

Instructors often don’t realize how complex CS courses have become ("feature creep"). zyBooks provide an outstanding interactive textbook, auto-grading homework system, and program auto-grader, all seamlessly integrated into ONE platform (with only one login -- or none via LMS integration). That’s a key reason nearly all faculty come back, and why students ask to access our zyBooks even if their professor is using a different book. We’ll show how our comprehensive solution leads to smooth courses that students love -- even if hard.

“I enjoy grading programs” -- Said by nobody

CS is experiencing explosive growth, which pushes our grading resources to the limit. Auto-grading saves huge amounts of time. Students get more practice and immediate feedback, so they can improve quickly. We’ve learned how to do auto-grading even better, like with automated hints in homework problems, or using many small programs in CS1. We’ll show how easy it is to create auto-graded programming assignments, and tell you about our large set of zyBooks-maintained labs -- so you can focus on the parts of teaching you really enjoy.
Shortcuts for Keeping Your CS Curriculum Current

Wednesday, February 28

Presented courtesy of **IBM**

**How FLCC Uses Mimir Classroom and OER to Improve Course Outcomes**

- **5:30 pm - 6:20 pm**
- **Room: Hyatt Lakeshore B**

Presenters: Prahasith Veluvolu, Mimir; Dave Ghidiu, Finger Lakes Community College

Assistant Professor of Computing Sciences, Dave Ghidiu of Finger Lakes Community College (FLCC), has been using Mimir Classroom to automate grading, reduce plagiarism, and efficiently teach computer science. Ghidiu also pairs open educational resources (OER) with Mimir Classroom to improve course outcomes. Since 2014, thousands of students, like Ghidiu, have been using the platform at more than 75 universities and have seen an 11% boost on average in final exam scores.

To open this session, CEO Prahasith Veluvolu will explain how Mimir is helping instructors, like Ghidiu, meet class size demand while offering free, pre-loaded curriculum through Mimir Classroom. Ghidiu will elaborate on his user experience, the 3-minute average response time he receives from support, and how he utilizes 40 languages, frameworks, and databases to teach his students. Veluvolu will highlight features in Mimir Classroom that have helped universities like Northern Kentucky University, Quinnipiac University, and Michigan State University optimize their courses.

Learn more about Mimir Classroom before the conference by visiting www.mimirhq.com/sigcse2019.

Presented courtesy of **IBM**

**Shortcuts for Keeping Your CS Curriculum Current**

- **6:30 pm - 7:20 pm**
- **Room: Hyatt Lakeshore A**

Presenters: Misty Decker, Valinda Kennedy, IBM

CS Technology changes so fast, it’s impossible to keep your curriculum current with technologies such as: - Artificial Intelligence - Data Science - Blockchain - Cloud - Cybersecurity - Open Source technologies

Did you know that companies like IBM need to educate our clients on these new technologies and you can use many of the same resources in your classroom free of charge? Join us for a tour of the wide variety of resources available including Course Materials, Open Badges, Case Studies and Cloud Resources.

Bonus: You’ll find many of our courses are also useful for educators looking to upgrade their own skills and earn official credentials. Bring your phone or your laptop so you can easily save links to your favorite materials.

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**Jump Start Parallel Programming Education in Data Science, Artificial Intelligence and More**

Friday, March 1

Presented courtesy of **INTEL**

**How FLCC Uses Mimir Classroom and OER to Improve Course Outcomes**

- **10:45 am - 12:00 pm**
- **Room: Hyatt Lakeshore A**

Presenter: Henry Gabb, INTEL

Henry Gabb is a senior principal engineer at Intel Corporation. Among other things, he is the editor of The Parallel Universe, Intel's quarterly magazine for software innovation. Henry first joined Intel in 2000 to help drive parallel computing inside and outside the company. Prior to joining Intel, Henry was Director of Scientific Computing at the U.S. Army Engineer Research and Development Center MSRC, a Department of Defense high-performance computing facility. Henry holds a BS in biochemistry from Louisiana State University, an MS in medical informatics from the Northwestern Feinberg School of Medicine, and a PhD in molecular genetics from the University of Alabama at Birmingham School of Medicine. He has published extensively in computational life science and high-performance computing. Henry recently rejoined Intel after spending four years working on a second PhD in information science at the University of Illinois at Urbana-Champaign.

Solving the biggest challenges in science, industry and society requires dramatic increases in computing efficiency. Today’s applications must be parallelized to unlock the benefits of current and future hardware with the use of key software enablement tools. In this session, we will share resources that address educating the next generation of programmers, researchers, scientist, etc. through providing attendees with information focused on the different Intel architectures, programming models, algorithms, etc. Including, the sharing of resources for accessing various hardware, free software licenses offered to educators and students, educational content for teaching Parallel Programming, Data Science and Artificial Intelligence (machine and deep learning). By the end of this session, attendees will receive training materials for K-12 STEM initiatives, academic curriculum (undergraduate and graduate levels), and scientific research using real case study examples for hands-on experiments.

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http://sigcse2019.sigcse.org
Friday, March 1

Delivering Cutting Edge Compute Resources to the Classroom - Jupyter, Clusters, Container Networks, & More

10:45 am - 12:00 pm
Room: Hyatt Lakeshore B
Presenter: Sanjay Srivastava, Vocareum

In this session, we will discuss (1) the growing variety of compute resources needed to support courses in programming, machine learning, data science, engineering and IT; (2) how top universities are using Vocareum to configure and deploy interactive computing (Jupyter, RStudio), cluster computing, distributed databases, container networks, and cloud infrastructure; and (3) how Vocareum cloud learning labs tightly integrate compute, storage, LMS and cost management to provide students with an optimized learning experience.

Microsoft MakeCode Arcade

1:45 pm - 3:00 pm
Room: Hyatt Lakeshore A
Presenter: Jacqueline Russell, Microsoft Corporation

Come join us to learn about the new Microsoft MakeCode Arcade platform - a 2D game development environment entirely online and free. In this workshop, attendees can expect to get hands-on creating simple sprite-based games using Microsoft MakeCode, download their games to hardware, and get access to open-source curriculum and resources they can use in the classroom. No prior experience required.

Codio: A Powerful, Flexible Platform for Instructors to Deliver and Assess Student Learning Experiences

1:45 pm - 3:00 pm
Room: Hyatt Lakeshore B
Presenter: Elise Deitrick, Codio

Codio introduces their newest pedagogical tools built-in to the platform, including quality content, an auto-graded assessment library mapped to learning objectives, and the ability to customize student learning experiences. All of these features are on top of a platform designed to scale: (1) LMS integration including support for courses run on MOOC platforms such as edX or Coursera, (2) cloud-based IDEs/boxes the instructor configures, (3) integrated content-delivery to allow a variety of pedagogical approaches from blended/flipped to self-paced learning, (4) multi-modal content and assessment delivery, and (5) free support, including access to trained computer science professionals.

Saturday, March 2

One Platform for Paper, Online, and Programming Assignments

9:45 am - 10:35 am
Room: Hyatt Lakeshore A
Presenter: Ibrahim Awwal, Gradescope

Gradescope is a single place for grading paper-based exams, programming projects, and online assignments. You will learn how to use our rubric-based grading interface to grade your exams and homework, faster, without compromising on quality. Additionally, you will see how to build your own autograders to automatically grade programming projects, in any language, at scale. We will also show our new feature this year, where we automatically run an updated version of MOSS on your students’ code.

Microsoft MakeCode Arcade

1:45 pm - 3:00 pm
Room: Hyatt Lakeshore A
Presenter: Jacqueline Russell, Microsoft Corporation

Come join us to learn about the new Microsoft MakeCode Arcade platform - a 2D game development environment entirely online and free. In this workshop, attendees can expect to get hands-on creating simple sprite-based games using Microsoft MakeCode, download their games to hardware, and get access to open-source curriculum and resources they can use in the classroom. No prior experience required.
Introduction to Deep Learning
Eugene Charniak
A project-based guide to the basics of deep learning.
$35.00 | £27.00 | cloth

Model Checking
Second Edition
Edmund M Clarke, Jr., Orna Grumberg, Daniel Kroening, Doron Peled, and Helmut Veith
An expanded and updated edition of a comprehensive presentation of the theory and practice of model checking, a technology that automates the analysis of complex systems.
$75.00 | £58.00 | cloth

Decision Making Under Uncertainty
Theory and Application
Mykel J. Kochenderfer
An introduction to decision making under uncertainty from a computational perspective, covering both theory and applications ranging from speech recognition to airborne collision avoidance.
$78.00 | £60.00 | cloth

Reinforcement Learning
An Introduction
Second Edition
Richard S. Sutton and Andrew G. Barto
The significantly expanded and updated new edition of a widely used text on reinforcement learning, one of the most active research areas in artificial intelligence.
$80.00 | £62.00 | cloth

Foundations of Machine Learning
Mehryar Mohri, Afshin Rostamizadeh, and Ameet Talwalkar
Fundamental topics in machine learning are presented along with theoretical and conceptual tools for the discussion and proof of algorithms.
$85.00 | £66.00 | cloth

Mathematics of Big Data
Spreadsheets, Databases, Matrices, and Graphs
Jeremy Kepner and Hayden Jananthan
Foreword by Charles E. Leiserson
The first book to present the common mathematical foundations of big data analysis across a range of applications and technologies.
$80.00 | £62.00 | cloth

The Little Typer
Daniel P. Friedman and David Thrane Christiansen
Foreword by Robert Harper
Illustrations by Duane Bibby
An introduction to dependent types, demonstrating the most beautiful aspects, one step at a time.
$38.00 | £30.00 | paper

Robotics Through Science Fiction
Artificial Intelligence Explained Through Six Classic Robot Short Stories
edited by Robin R. Murphy
Six classic science fiction stories and commentary that illustrate and explain key algorithms or principles of artificial intelligence.
$25.00 | £20.00 | paper

Urban Computing
Yu Zheng
An authoritative treatment of urban computing, offering an overview of the field, fundamental techniques, advanced models, and novel applications.
$85.00 | £66.00 | cloth

Essential Logic for Computer Science
Rex Page and Ruben Gamboa
An introduction to applying predicate logic to testing and verification of software and digital circuits that focuses on applications rather than theory.
$50.00 | £40.00 | cloth

Visit our booth to receive 30% off
**Flock A: Thursday, February 28**

5:30 pm - 6:20 pm

Chairs:
Mary Anne Egan, Siena College
Mark Sherriff, University of Virginia

Towards a More Inclusive Tech Culture: Promoting Professionalism in CS Classrooms and Labs
**Room: Hyatt Greenway A**

Ursula Wolz, Bennington College; Stephanie R. Taylor, Colby College

AI for K-12: Making Room for AI in K-12 CS Curricula
**Room: Hyatt Greenway J**

Christina Gardner-McCune, University of Florida; David Toretzky, Carnegie Mellon University; Fred Martin, University of Massachusetts Lowell; Deborah Seehorn, CSTA

Toward an Anti-Racist Theory of Computational Curricula
**Room: Hyatt Greenway B/C**

Matthew Jadud, Bates College; Jamika D. Burge, black computHER; Jeffrey Forbes, Duke University; Celine Latulipe, University of North Carolina at Charlotte; Yolanda A. Rankin, Florida State University; Kristin Searle, Utah State University; Ben Shapiro, University of Colorado Boulder

What to Make of Makerspaces
**Room: Hyatt Greenway D/E**

Michael P. Rogers, Northwest Missouri State University; Bill Siever, Washington University in St. Louis

Can Game Elements Make Computer Science Courses More Attractive?
**Room: Hyatt Greenway F/G**

Darin Dicheva, Christo Dichev, Keith Irvin, Elva J. Jones, Winston-Salem State University; Lillian (Boots) Cassel, Villanova University; Peter J. Clarke, Florida International University

Discussion of Integrating Hands-on Cybersecurity Exercises into the Curriculum in 2019
**Room: Hyatt Greenway H/I**

Richard Weiss, Evergreen State College; Jens Mache, Lewis and Clark College; Blair Taylor, Siddharth Kaza, Towson University; Ankur Chattopadhyay, University of Wisconsin at Green Bay

Teaching Track Faculty in CS
**Room: Hyatt Northstar A**

Chris Gregg, Stanford University; Shawn Lupoli, Texas A&M University; Laney Strange, Northeastern University

Computing Competencies and the CC2020 Project
**Room: Hyatt Northstar B**

Alison Clear, Eastern Institute of Technology; John Impagliazzo, Hofstra University; Ming Zhang, Peking University

A Town Meeting: SIGCSE Committee on Expanding the Women-in-Computing Community
**Room: Hyatt Regency**

Paula Gabbert, Furman University; Wendy Powley, Queen’s University; Gloria Childress Townsend, DePauw University

The Problem of Packaging Curricular Materials
**Room: Hyatt Great Lakes A1 & A2**

Austin Cory Bart, University of Delaware; Michael Hilton, Carnegie Mellon University; Bob Edmison, Virginia Tech; Phillip T. Conrad, University of California, Santa Barbara

Modernizing the Mathematics Taught in Computer Science
**Room: Hyatt Lake Bemidji**

Barbara Anthony, Southwestern University; Mia Minnes, University of California, San Diego; David Liben-Nowell, Carleton College; Peter-Michael Osera, Grinnell College

Teaching Human-Centered Design in CSE Programs
**Room: Hyatt Lake Minnetonka**

Tamara Peyton, Harrisburg University; Aarathi Prasad, Skidmore College; Sa Liu, Harrisburg University; Joslenne Peria, Pennsylvania State University

Incorporating Computing for Social Good in Computing Education
**Room: Millennium Grand North**

Gregory W. Hislop, Drexel University; Darci Burdge, Nassau Community College; Michael Goldweber, Xavier University; Samuel A. Rebeksky, Grinnell College; Stewart N. Weiss, Hunter College of the City University of New York

How Can We Make Office Hours Better?
**Room: Millennium Grand Central**

Kristin Stephens-Martinez, Duke University; Brian Railling, Carnegie Mellon University

Supporting Students Living With Mental Illness
**Room: Millennium Grand South**

Christian Murphy, University of Pennsylvania; Linda Duhadway, Weber State University; Matthew Hanson, University of Minnesota
**Flock B: Thursday, February 28**

6:30 pm - 7:20 pm

**Chairs:**
Mary Anne Egan, Siena College
Mark Sherriff, University of Virginia

**Academic Cybersecurity Disciplinary Foundations and Accreditation**

Room Hyatt Greenway A

Allen S. Parrish, Mississippi State University; Rajendra K. Raj, Rochester Institute of Technology; Lawrence Jones, ABET

**Sponsoring Girls Who Code Clubs**

Room Hyatt Greenway J

Pamela Cutter, Kalamazoo College

**Developing a Contemporary and Innovative Operating Systems Course**

Room Hyatt Greenway B/C

Saverio Perugini, David J. Wright, University of Dayton

**Co-Curricular Activities in Computer Science Departments**

Room Hyatt Greenway D/E

Kathleen Freeman Hennessy, University of Oregon; Jennifer Parham-Mocello, Oregon State University; Henry M. Walker, Grinnell College

**Access to Computing Education for Students with Disabilities**

Room Hyatt Greenway F/G

Richard E. Ladner, University of Washington; Andreas Stefik, University of Nevada, Las Vegas; Andrew J. Ko, Brianna Blaser, University of Washington

**Building Bridges for Data Science Education**

Room Hyatt Greenway H/I

Mine Cetinkaya-Rundel, Duke University + RStudio; Andrea Danyluk, Williams College; Jeffrey Forbes, Duke University; Michael Posner, Villanova University

**Birds of a Feather Who'd Like to Share Software Together: Teaching Tools that Improve Efficiency and Outcomes**

Room Hyatt Northstar A

Doug Lloyd, Erin Carvalho, David J. Malan, Harvard University

**Bringing Reflection into Computer Science Education**

Room Hyatt Northstar B

Paul E. Dickson, John Barr, Ithaca College

**Undergraduate TA and Mentor Programs in Computer Science**

Room Hyatt Regency

Diba Mirza, Phillip T. Conrad, University of California, Santa Barbara; Colleen M. Lewis, Harvey Mudd College; Cynthia B. Lee, Stanford University

**Auto-Graded Programming Labs: Dos and Don'ts for Less-Stressed Higher-Performing Students, Reduced Grading Time, and Happier Teachers**

Room Hyatt Great Lakes A1 & A2

Frank Vahid, University of California, Riverside & zyBooks; Roman Lysecky, University of Arizona

**POGIL in Computer Science for Beginners and Experts**

Room Hyatt Lake Bemidji

Debra M. Duke, Virginia Commonwealth University; Margarethe Posch; Salt Lake Community College

**Broadening Participation in Computing: A Call to Action for Universities and Community Colleges**

Room Hyatt Lake Minnetonka

Amardeep Kahlon, Austin Community College; Deborah Boisvert, University of Massachusetts Boston; Cheryl Calhoun, Santa Fe College; Louise Ann Lyon, Jill Denner, Education, Training, Research; Wendy M. DuBow, University of Colorado Boulder; Melanie Williamson, Bluegrass Community and Technical College

**Enriching Courses on Computers and Society and Computer Ethics**

Room Millennium Grand North

Ronald M. Baecker, University of Toronto; Elliot B. Koffman, Temple University

**Exploring Programming Instruction in Multidisciplinary Contexts**

Room Millennium Grand Central

Leo C. Ureel II, Michelle Janvie-Eggart, Melanie Kueber Watkins, Russell Louks, Briana Bettin, Michigan Technological University

**How Can We Engage in Inclusive, Culturally Responsive Computer Science?**

Room Millennium Grand South

Eileen T. Kraemer, Murali Sitaraman, S. Megan Che, Clemson University
Cloud Learning Labs

How would you use it?

Automate grading tasks

“The scalability and automated grading lets us simultaneously deliver exercises to thousands of MOOC students around the world.”
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Adam Pah, Northwestern / Kellogg

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Ken Eisner, Global Lead, AWS Educate

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Come by and see us at the IBM Booth #413.
And join our session on
Shortcuts for Keeping your CS Curriculum Current
Thursday, February 28th from 6:30 pm - 7:20 pm

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**Poster Sessions**

**Chairs:**
Laurence D. Merkle, *Air Force Institute of Technology*
S. Monisha Pulimood, *The College of New Jersey*

**Poster Session #1**

Friday, March 1
10:00 am - 12:00 pm

**Hyatt Exhibit Hall**

**Coding Pedagogy for the Liberal Arts: An Online Publication**

Jeremy H. Sarachan, Sean O’Leary, *St. John Fisher College*

**Online or In Person? Student Motivations in the Choice of a CS1 Experience**

Melinda McDaniel, David A Joyner, *Georgia Institute of Technology*

**viCyber: An Intelligent Curriculum Design Tool for Cybersecurity Education**

Shamim Khan, Shuangbao Wang, Rania Hodhod, *Columbus State University*

**Establishing Computational Thinking as Just Another Tool in the Problem Solving Tool Box**

Hillary Fleenor, *Columbus State University*

**Questioning the Board in Computer Science Education Board Games**

Caroline Hardin, Alexander Brooks, Joshua Gabai, Anthony Pellicone, Isaac Sung, *University of Wisconsin-Madison*

**Creating a Tech-in-Residence Corps of Industry Adjuncts: An Academic/Government/Industry Partnership**

Susan P. Imberman, *City University of New York*; Robert J. Domanski, *University of Florida*; Kristy Elizabeth Boyer, *University of Florida*

**Encouraging Reflection in Support of Learning Data Structures**

Cheryl Resch, Christina Gardner-McCune, *University of Florida*

**The Development and Validation of Survey Items on Upper Elementary Students’ Perspectives and Attitudes on CS**


**Fostering State-level Change In CS Education: The Expanding Computing Education Pathways Alliance**


**Teaching and Assessing Debugging, Testing, and Coding Style with Recursive Pedagogy using Spinoza**

Fatima A. Abu Deeb, *King Saud bin Abdulaziz University for Health Science*; Timothy J. Hickey, *Brandeis University*

**Towards Learning Analytics in Cybersecurity Capture the Flag Games**

Valdemar Švábenský, Jan Vykopal, Pavel Čeleda, *Masaryk University*

**Boxes, Bumps & Breakfast: Object Lessons for Teaching Undergraduates the Importance of Human-Centered Research & Analysis**

Tamara Peyton, *Harrisburg University*

**Situated Learning in Systems-Level Coursework**

Jeremiah Blanchard, *University of Florida*

**Messy Learning: When Problem-based Learning Just Isn’t Enough**

Paul E. Dickson, John Barr, *Ithaca College*

**Evaluating the Effect of Follow-up Questions in an Online Exercise**

Yefei Dong, Michelle Craig, Jennifer Campbell, *University of Toronto*

**What Can the Reid List of First Programming Languages Teach Us About Teaching CS1?**

Robert M. Siegfried, *Adelphi University*; Diane Liporace, Katherine G. Herbert-Berger, *Montclair State University*

**Game Engines Construction to Motivate Computing Concepts: Build from Scratch or Leverage Existing Systems**

Christopher A. Egert, *Rochester Institute of Technology*

**An Analysis of Upper Elementary and Middle Grade Teachers’ Perceptions, Concerns and Goals for Integrating CS into Classrooms**

Mehmet Celepkolu, Erin O’Halloran, Jamieka Wilkinson, Kristy Elizabeth Boyer, *University of Florida*

**Integrating Computational Thinking in Informal and Formal Science and Math Activities for Preschool Learners**


**Undergraduate Computer Science Student Perceptions of Their Own Field**

Katelyn Manzo, *University of Maine*; Stacy A. Doore, Sarah Harmon, *Bowdoin College*

**Overcoming Doubt: Workshop Aimed at Giving Students Strategies to Build Their Authentic Self-Esteem Within Their Computing Major**

Rachelle Kristof Hippler, *Baldwin Wallace University*

**Debriefing Lab Content Using Active Learning**

Michael J. McCarthy, Joseph Mertz, Martin L. Barrett, Michael Melville, *Carnegie Mellon University*

**Graduate Curriculum Initiative -- COSMIC: Change Opportunity - Start Masters in Computing: COSMIC**

Gary Krenz, Thomas Kaczmarek, *Marquette University*

**An Investigation of Learning Outcomes Between Two Teaching Modalities to Improve Student Learning in Online Courses**

Audrey Rorrer, Julio César Bahamón, *University of North Carolina at Charlotte*

**University-Industry Collaboration in Curriculum Design: A Case Study of Curriculum Design for Early Undergraduate Computer Science Coursework with an Eye on Equity**

Lauren Provost, *Simmons College*; Christopher Harrington
Poster Sessions

A Peer Based Tutoring and Mentoring Model for First Year Computer Science Courses Based on Strategies Used by Songbirds for Learning
Ashwin Satyanarayana, New York City College of Technology; Lior Baron, City University of New York

Changing Teaching Assistant's Behavior Based on Learning Support Strategies for Programming Exercise
Yuuki Yokoyama, Hironori Egi, The University of Electro-Communications

Using Bloom’s Taxonomy to Write Effective Programming Questions for Autograding Tools
Lina Battestill, Sarah Korkes, North Carolina State University; Olivia Smith, University of Minnesota; Tiffany Barnes, North Carolina State University

Utilizing Participatory Design to Develop a Culturally Relevant Computer Science Curriculum
Menijke Coenraad, University of Maryland, College Park; Jen Palmer, Diana Franklin, The University of Chicago; David Weintrop, University of Maryland

Why are Linked List Operations Daunting to some College Students?: Exploring the Mental Models of Undergraduate Programmers
Harrison Chotzen, Claremont McKenna College; Alasdair J. Johnson, Parth M. Desai, Pitzer College

Benefits of Physical Interaction with Array Elements and Code Consolidation on Student Comprehension of Sorting Algorithms
Anisha Kaul, Julia Ann Pinedo, Scripps College; Anya Wallace, Harvey Mudd College

An Investigation of Conflicts Between Upper-Elementary Pair Programmers
Jennifer Tsin, Jessica Vandenberk, Xiaoting Fu, North Carolina State University; Jamieka Wilkinson, University of Florida; Danielle Bouden, North Carolina State University; Kristy Elizabeth Boyer, University of Florida; Collin F. Lynch, Eric Wiebe, North Carolina State University

Job Placement Experience of Alumni from a 3-year CS Program
Miguel Lara, California State University, Monterey Bay; Kathryn Cunningham, University of Michigan; Bude Su, California State University, Monterey Bay

Creating Co-curricular Programs to Improve CS Student Identity and Sense of Belonging
Cynthia Y. Lester, Georgia State University; Pamela Leggett-Robinson, PLR Consulting

Engaging Alumni Mentors in Software Engineering Project Courses
C.F. Larry Heimann, Sara Moussawi, Jeria Quesenberry, Raja Somiamurthi, Carnegie Mellon University

Lessons Learned in 10 years of Distributed Systems Capstones
Carsten Kleiner, Arne Koschel, University of Applied Sciences & Arts

Improving Programming Skills Through Classroom Presentation of Assignments
Abhimanyu Ghosh, Keith Wojciechowski, Daniel Sinkovits, University of Wisconsin-Stout

Mobile App Development: Android or iOS? An Experience Report from Teaching Both Platforms
Gina Sprint, Gonzaga University

Building Trust in Computer Science Research-Practice Partnerships: A Theme Study
Todd Lash, University of Illinois at Urbana-Champaign; Stephanie Wortel-London, Leigh Ann DeLysar, Lauren Wright, CSforALL

Understand the Emerging Demands of Computing Education for Non-CS Major Students
Meng Han, Zhigang Li, Jing Selena He, Xin Shirley Tian, Kennesaw State University

Infusing CS Graduate Transition Curriculum with Professional, Technical and Data Science Competencies
Katherine G. Herbert-Berger, Nina Goodey, Stephen Ruczszyk, Scott Kight, Montclair State University; Thomas J. Marlowe, Seton Hall University

Towards Encapsulated Cyber Security Labs: A Container Based Approach
Selvarajah Mohanarajah, University of North Carolina at Pembroke; Gregory Ross, SPAWAR, Shan Suthaharan, University of North Carolina at Greensboro

Poster Session #2

Friday, March 1
3:00 pm - 5:00 pm
Hyatt Exhibit Hall

Enhancing Essential Data Skills for College-wide Students
Qiong Cheng, University of North Carolina at Charlotte

Data Protection with SMSD Labware
Hossain Shahriar, Kai Qian, Md Arabin Islam Talukder, Reza Parizi, Kennesaw State University

Applying Project-Based Learning for An Online Object-Oriented Systems Course
Kalpathi Subramanian, Kiran Budhrani, University of North Carolina at Charlotte

Use Bots to Improve GitHub Pull-Request Feedback
Zhewei Hu, Edward Gehringer, North Carolina State University

Student Debugging Practices and Their Relationships to Project Outcomes
Ayaan M. Kazerooni, Rifat Sabibor Mansur, Stephen H. Edwards, Clifford A. Shaffer, Virginia Tech

Using Interactive Visualization and Programmed Instruction to Teach Formal Languages
Mostafa Mohmed, Clifford A. Shaffer, Virginia Tech; Susan H. Rodger, Duke University

Mobile App Development: Android or iOS? An Experience Report from Teaching Both Platforms
Gina Sprint, Gonzaga University

Building Trust in Computer Science Research-Practice Partnerships: A Theme Study
Todd Lash, University of Illinois at Urbana-Champaign; Stephanie Wortel-London, Leigh Ann DeLysar, Lauren Wright, CSforALL

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Towards Encapsulated Cyber Security Labs: A Container Based Approach
Selvarajah Mohanarajah, University of North Carolina at Pembroke; Gregory Ross, SPAWAR, Shan Suthaharan, University of North Carolina at Greensboro
Poster Sessions

The Institute of Coding: A University-Industry Collaboration to Address the UK Digital Skills Crisis
James H. Davenport, Rachid Hourizi, University of Bath

Computer Science Problem Solving Course: Practical and Technical Thinking Skills for CS Majors
Margaret Ellis, Virginia Tech

Design of a Gateway for Open Source Software Development in a Traditional CS Curriculum
Stewart N. Weiss, Hunter College of the City University of New York

Inclusive Experiences Using HFOSS in a Senior Computer Science Elective
Becka Morgan, Western Oregon University

A Neural Network Model for a Tutoring Companion Supporting Students in a Programming with Java Course
Melissa Day, Javier Gonzalez-Sanchez, Arizona State University

Assessing Middle School Students’ Computational Thinking Through Programming Trajectory Analysis
Bita Akram, Wookhee Min, Eric Wieber, Bradford W. Mott, North Carolina State University; Kristy Elizabeth Boyer, University of Florida; James C. Lester, North Carolina State University

Evaluating Student Engagement Towards Integrating Parallel and Distributed Computing (PDC) Topics in Undergraduate Level Computer Science Curriculum
Mary Smith, Hawaii Pacific University; Srishti Srivastava, University of Southern Indiana

Dynamic Recitation: A Student-Focused, Goal-Oriented Recitation Management Platform
Joseph A Boyle, Georgiana Haldeman, Andrew Tjang, Monica Babes-Woman, Ana Paula Centeno, Thu D. Nguyen, Rutgers University

Sentiment Analysis across the Courses of a MOOC Specialization
Kenny Wong, University of Alberta

Using an Art Museum Field Trip to Spark Classroom Discussions about Mobile App Design
Aarathi Prasad, Skidmore College

Lichen: Customizable, Open Source Plagiarism Detection in Submitty
Matthew Peveler, Rensselaer Polytechnic Institute; Tushar Gurjar, IIT Kanpur; Evan Maicus, Andrew Aikens, Alexander Christoforides, Barbara Cutler, Rensselaer Polytechnic Institute

Facilitating Discussion-Based Grading and Private Channels via an Integrated Forum
Andrew Aikens, Rensselaer Polytechnic Institute; Gagan Kumar, Indian Institute of Technology Patna; Shal Patel, Evan Maicus, Matthew Peveler, Barbara Cutler, Rensselaer Polytechnic Institute

Poster Session #3

Saturday, March 2
10:35 am - 12:30 pm
Hyatt Exhibit Hall

Introducing Theoretical Computer Concepts in Secondary Education
Rafael del Vado Virseda, Universidad Complutense de Madrid

Girls in Engineering Draw a Computer Scientist
Sabrina Tsui, University of California, Santa Cruz

What Does It Take to Teach K12 Computer Science? Exploring Teachers’ Attitudes Towards Teaching CS K12 in Georgia
Alfredo Perez, Hillary Fleenor, Columbus State University

Implementing CS0 with Computer Science Principles Curriculum
D. Cerik Erdil, Darcy Ronan, Sacred Heart University

Linear Data Structures: A Comparison of Novice and Expert Teacher Pedagogical Content Knowledge
Aleata Hubbard, WestEd

SciGirls Code: Computational Participation for Middle School Girls
Cassandra Scharber, Yu-Hui Chang, Sarah Barksdale, Lana Peterson, Angelina Constantine, Ramya Sivaraj, Jennifer Englund, University of Minnesota

Every Little Bit Counts: Experiences and Lessons Learned Building a Community Outreach Program from the Ground Up
Brian Krupp, Paul Peters, Tyler Hardy, Sydney Leither, Zach Egler Baldwin Wallace University

Machine Learning: An Introductory Unit of Study for Secondary Education
Ramsey Young, Jonathan Ringenberg, Millard West High School; University of Nebraska Omaha

Comparing the Effects of Using a Tangible Object or a Simulation in Learning Elementary CS Concepts: A Case Study with Block-Based Programming
Grégoire Fessard, Ilaria Renna, Institut Supérieur d’Électronique de Paris; Patrick Wang, Institut Supérieur d’Électronique

Collaborative Coding and Composing of JazzHands: Integrating the Learning of Advanced Computational Concepts with Electronic Textiles to Make Music Wearables
Gaythri Jayathirtha, Yasmin B. Kafai, Debora A. Lui, Mia S. Shaw, University of Pennsylvania; Ji Yong Cho, Cornell University

Collaboration: Developing and Piloting a Cybersecurity Curriculum for Middle School
Hillary Fleenor, Yesem Peker, Columbus State University; Ebone Cutts Muscogee County School District

Building Computer Science K-12 PLCs in Rural Communities
Allison Sauppé, Samantha S. Foley, Thomas Gendreau, Joshua T. Hertel, Mao Zheng, University of Wisconsin-La Crosse
Computational Thinking in the Making: Lessons for Second Graders in a STEM Computer Science Immersion School
Lindsey Scheppegrell, Elyse Hiatt, Charlotte Mecklenburg Schools; Johanna Okerlund, David Wilson, University of North Carolina at Charlotte

CodeNC: Integrating Computational Thinking into K-12 Instructional Activities using Animated Videos
N. Rich Nguyen, University of Virginia; Iulia Poliakova, Sahithi Meduri, Joshua Hutcheson, Ryan Ke, University of North Carolina at Charlotte

An Interactive Teaching Tool for Introducing Novices to Machine Translation
Huda Khayrallah, Rebecca Knowles, Kevin Duh, Matt Post, Johns Hopkins University

Teacher Beliefs in Student Capabilities as a Mediating Factor in a Novel Understanding of Enactment of CT Curriculum
Page Prescott, University of New Mexico; Irene A. Lee, Massachusetts Institute of Technology; Kersti Tyson, University of New Mexico

Exploring the Definition of Computational Thinking in Research and the Classroom
Tony Lowe, Sean Brophy, Monica Cardella, Purdue University

Curated Pathways to Innovation: Personalized CS Education to Promote Diversity
Natalie Linnell, Santa Clara University; Phil Gosalves, YWCA Silicon Valley; Mayank Kakodkar, Purdue University; Vanessa Martinez, YWCA Silicon Valley; Tim Urdan, Santa Clara University; Bruno Ribiero, Purdue University; Janice Zdankus, Hewlett Packard Enterprise

Using Music to Foster Engagement in Introductory Computing Courses
Fatemeh Jamshidi, Daniela Marghitu, Auburn University

Sorting Out Algorithms: What Makes One Better than Another?
Connor Bain, Uri Wilensky, Northwestern University

Four Scope-Related Misconceptions Held by Computer Science Students
Wynne Becker, Kayley James, Scripps College; Maya Minier, Harvey Mudd College

Snap! A Look at 5 Years, 250,000 Users and 2 Million Projects
Michael Ball, University of California, Berkeley; Jens Mönig; Bernat Romagosa; Brian Harvey, University of California, Berkeley

ECS4Alabama: A State-Wide Effort to Provide Access to Authentic Computer Science Education in Predominantly Rural and High Minority Schools
Mohammed A. Qazi, Tuskegee University; Jeff Gray, Melody Russell, David M. Shannon, Auburn University

Don’t Forget About Us: Understanding Rural and Small Town Principals’ Values Toward Computer Science
Chris Shively, Sarbani Banerjee, Neal Mazur, Joseph Zawicki, SUNY College at Buffalo State

Integrated STEM+C Learning for K-2 Aged Children: CT Competencies as a Precursor to K-2 Computer Science Education
Tikyna M. Dandridge, Hoda Ehsan, Elizabeth Gajdzik, Tony Lowe, Carson Ohland, Ibrahim Yeter, Sean Brophy, Monica Cardella, Purdue University

Using an Intelligent Tutoring System to Teach Red Black Trees
Chun Wai Liew, Lafayette College; Huy Nguyen, Carnegie Mellon University

Code For Her: Exploring Female and Gender-Diverse Computing Workshops for Faculty; Staff; and Students
Josienne Pena, Carmen Cole, Mary Beth Rosson, Pennsylvania State University

Rubric to Evaluate Programming Learning of Elementary School Students
Daisuke Saito, Hironori Washizaki, Yoshiaki Fukazawa, Waseda University; Mariko Tamura, Yuki Sakuragi, D2C inc

Giving Students Canned Code using Typing Exercises
Adam M. Gaweda, Collin F. Lynch, North Carolina State University

Using an Art Show in CS1 to Spark Interest in Computer Science
David L. Largent, Ball State University

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Turing's Craft and the Paradigm

In 2001, interactive on-line programming exercises were not only NOT part of the CS teaching paradigm— they simply didn’t exist. Turing's Craft changed that.

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The Great CS1 Enrollment Trough

Era of the Brave Early Adopters

2002

"Can online exercises really be an important part of a programming course?"

Faculty-authored unit exercises.

2006

"Hmmm. Can I write some too?"

Interactive test case tables.

2008

The Exercise Explosion— many hundreds per course and new languages.

2007

Automated markup of code errors.

2008

Interactive test case tables.

2009

CS1 enrollments explode, publishers show interest, the Paradigm Shift Starts

2010

Faculty-authored snippet exercises and support for full program projects.

2012

Faculty-authored unit exercises.

2006

2009

The Paradigm Has Shifted, The Imitators Come and Go, The Leader Remains.

The CS1 enrollment recovery begins.

2007

2008

2010

2012

2017-2018

2019

2008

2004

2002

2007

2008

2009

2010

2012

2017-2018

2019

2008

2004
NSF Project Showcase Sessions feature recipients of education-related National Science Foundation grants
NSF Showcase will take place in The Hyatt Exhibit Hall.

**NSF Showcase #1**
Thursday, February 28
10:00 am - 10:45 am

Collaborative Learning in Cloud-based Virtual Computer Labs
Xiaolin Hu, Hai Le, Yuan Long, Anu G. Bourgeois, Yi Pan, Georgia State University

Online Interactive Learning Platforms in STEM Education: A Study of Motivation and Engagement
Darina Dicheva, Keith Irwin, Christo Dichev, Breonte Guy, Winston-Salem State University; Lillian (Boots) Cassel, Villanova University

PRIME: Engaging STEM Undergraduate Students in Computer Science with Intelligent Tutoring Systems
James C. Lester, Bradford W. Mott, EricWiebe, North Carolina State University; Kristy Elizabeth Boyer, University of Florida

Promoting a Growth Mindset Using Automated Feedback
Matthew Jadud, Bates College; Stephen H. Edwards, Virginia Tech; Manuel A. Pérez-Quíñones, University of North Carolina at Charlotte

**NSF Showcase #2**
Thursday, February 28
3:00 pm - 3:45 pm

Understanding the Implications of Gamification on Women Computer Science Students’ Engagement and Women-CS Fit
Monique Ross, Leila Zahedi, Jasmine Batten, Florida International University

Collaborative Research: Transforming Computer Science Education Research Through Use of Appropriate Empirical Research Methods: Mentoring and Tutorials
Jeffrey C. Carver, University of Alabama; Mark Sher riff, University of Virginia; Sarah Heckman, North Carolina State University

Scaling Project-Based STEM Learning Through Novel Interactive Systems for In-Class Peer Feedback
Amy Cook, Jessica Hammer, Carnegie Mellon University; Steven Dow, University of California San Diego

**NSF Showcase #3**
Friday, March 1
10:00 am - 10:45 am

Living-Learning Community for Women in Computer Science at Rutgers
Rebecca N. Wright, Sally J. Nadler, Thu D. Nguyen, Cynthia N. Sanchez Gomez, Rutgers University; Heather M. Wright, Computing Research Association

Pencil Puzzles as an Inclusive Domain for Learning Computer Science Concepts
Zack Butler, Rochester Institute of Technology

BRAID: A Mixed-Methods Longitudinal Study of 15 Universities Engaged in Efforts to Diversify Undergraduate Computing
Linda J. Sax, Kathleen J. Lehman, University of California; Los Angeles

**NSF Showcase #4**
Friday, March 1
3:00 pm - 3:45 pm

Secure Mobile Software Development
Fan Wu, Cassandra Thomas, Tuskegee University; Kai Qian, Hossain Shahriar, Kennesaw State University; Emmanuel Agu, Worcester Polytechnic Institute

Using csedresearch.org to Improve Research and Evaluation for Pre-college Computing Education
Adrienne Decker, University at Buffalo; Monica M. McGill, Knox College

On Writing Competitive NSF CS Education Research Proposals
Stephanie E. August, National Science Foundation & Loyola Marymount University; Mark Pauley, National Science Foundation; S. Megan Che, Eileen T. Kraemer, Murali Sitaraman, Clemson University

Retaining and Engaging CS Majors Using BRIDGES
Kalpathi Subramanian, University of North Carolina at Charlotte; Jamie Payton, Temple University; Erik Saule, University of North Carolina at Charlotte

**NSF Showcase #5**
Saturday, March 2
10:35 am - 11:15 am

Computational Creativity to Improve Computer Science Education for CS and non-CS Undergraduates
Leen-Kiat Soh, University of Nebraska-Lincoln

LEGO for Software Engineering
Stan Kurkovsky, Central Connecticut State University; Stephanie Ludi, University of North Texas

Broadening the Path to the STEM Profession Through Cybersecurity Learning
Kaiqi Xiong, Mohamed Rahouti, University of South Florida
The ACM Student Research Competition (SRC) at SIGCSE awards prizes to the top three graduate and undergraduate students determined by faculty judges. Initially, students use the interactive nature of visual presentation to highlight different aspects of their research to individual evaluators. These presentations are evaluated on their quality, the significance of the works, and the clarity of the informal discussion. The semi-finalists present their contributions using the standard forum of conference presentation during two conference sessions. The venue provides selected audience attendees with another platform for evaluation, the student with the experience in formal presentations, and conference participants with the opportunity to learn of ongoing, current research in computer science.

The winners will be announced and receive their awards during Saturday’s Closing Lunch session.

UNDERGRADUATE
Posters:
Thursday, February 28 • 1:45 pm - 5:00 pm
Hyatt Exhibit Hall

Subgoals, Problem Solving Phases, and Sources of Knowledge: A Complex Mangle
Kevin Lin, David DeLiema, University of California, Berkeley

Young Aspirants Developer Contest
Petterson Nguyen Pham, Jordan Fite, Jacob McInite, Vinitha Subburaj, West Texas A&M University

Problem Decomposition in Introductory Computer Science and Spatial Reasoning
Ka Ki Fung, Claremont McKenna College; Thitaree Tanprasert, Harvey Mudd College

Accessible American Sign Language Recognition with the Leap Motion Controller
Sarah Garanganao Almeda, The College of New Jersey

Visualizing Classic Synchronization Problems: Dining Philosophers, Producers-Consumers, and Readers-Writers
Elizabeth Koning, Joel C. Adams, Calvin College; Christiaan D. Hazlett, University of Illinois, Urbana-Champaign

Understanding the Usage and Familiarity of Home Network Terminology Using Open Card Sorting Analysis
Jackie Chan, Kirby Mitchell, Carleton College

A Qualitative Analysis of Students’ Understanding of Conditional Control Structures
Shannon Collier, Mara Downing, Harvey Mudd College

The Adventures of ScriptKitty: Teaching Middle School Students Cyber Awareness with Commons on the Raspberry Pi
Ovidiu-Gabriel Baciu-Ureche, Carlie Steelman, Karlee Scott, William Moody, Suzanne J Matthews, United States Military Academy

A Qualitative Study of Wisconsin Computer Science in K-12
Darren Jefferson, Tina Boyle Whyte, Marquette University

Semifinalists:
Friday, March 1 • 3:45 pm - 5:00 pm
Hyatt Greenway F

GRADUATE
Posters:
Thursday, February 28 • 1:45 pm - 5:00 pm
Hyatt Exhibit Hall

Improving Student Self-efficacy in CS 1 Using Examples of Erroneous Code
Adam Koehler, University of California, Riverside

A Corpus-assisted Discourse Analysis of Chiptune-related Practices Discussed within Chipmusic.org.
Jared O’Leary, Arizona State University

Analyzing User Interactions with Cybersecurity Games
Valdemar Švábenský, Masaryk University

Applying Alignment to Improve the Effectiveness of CS Education
Noha Elsherbiny, Virginia Tech

Reinforcement Learning: Improve Feedback Mechanism with Indicator based Reward, VirtualTA towards Growth Mindset
Zhiyi Li, Virginia Tech

Engaging African American Elementary School Children in Code Understanding
Olivia Mambo Nche, Clemson University

Empirical Assessment of Software Documentation Strategies: A Randomized Controlled Trial
Scott Kolodziej, Texas A&M University

Online Mob Programming: Effective Collaborative Project-Based Learning
Sreecharan Sankaranarayanan, Carnegie Mellon University

Deconstructing Successful and Unsuccessful CS Undergraduate Interns
Amanpreet Kapoor, University of Florida

Using Touch and Sound to Program Scratch
Zirui Wang, Birmingham-Southern College

Semifinalists:
Friday, March 1 • 3:45 pm - 5:00 pm
Hyatt Greenway H
Supporter Sessions

Lightning Talks #1
Thursday, February 28
3:45 pm - 5:00 pm
Room: Hyatt Lake Bemidji

Building a Community of Undergraduate Women: Ambassadors for Computing Outreach
Kathryn Laurel Atchison, Jandelyn Plane, University of Maryland

Introduction to Ipsative Assessment
Jared O'Leary, Arizona State University

Every Marathon Starts with the First Mile: Early Successes in Broadening Participation in K-12 CS
Carol L. Fletcher, University of Texas at Austin

Thinking about Computational Thinking: Lessons from Education Research
Shuchi Grover, Looking Glass Ventures, LLC.

Sports Analytics as a Context for Computational Thinking in K-12 Education
Steven Paul Floyd, Western University; Luigi Sorbara, Boston Celtics, Fanshawe College

Adapting Mob Programming for Collaborative Project-Based Learning in the Classroom
Michael Hilton, Sreecharan Sankaranarayanan, Carnegie Mellon University

Programming Politics: Using p5.js to Create Interactive Art Connected to Current Events
Jeremy H. Sarachan, St. John Fisher College

Assessing the Impact of Sustainability-Themed Programming Assignments
Jeffrey A. Stone, Pennsylvania State University

More than a Bootcamp, Less than a Degree: A One-Year Program to Retrain Industry Employees as Developers
Gail Carmichael, Shopify

Experiences using Discord as Platform for Online Tutoring and Building a CS Community
Kenrick Mock, University of Alaska Anchorage

A Research-Oriented EPIC Course - Applying Mobile Technologies to Biomedical Research Questions
Chen-Hsiang Yu, Wentworth Institute of Technology

Lightning Talks #2
Saturday, March 2
9:45 am - 10:35 am
Room: Hyatt Lake Bemidji

Micro-Volunteering and Virtual-Volunteering as Pedagogical Tools in Computer Science Instruction
Valerie Summet, Rollins College

5 Lessons on Supporting CSforAll in K12 School Districts
Rafi Santo, CSforALL

Promoting Mastery Learning in an Introductory Programming Course
Paul Salvador Inventedo, California State University, Fullerton

Teaching RSA: What Happens When One of Your Primes Isn’t?
Barry Fagin, United States Air Force Academy

Recognizing and Questioning the CT Education Paradigm
Vance Kite, Soonhye Park, Eric Wiebe, North Carolina State University

Consistency when Teaching Multiple Sections: Live Lecture Recordings Reviewed and Discussed with Students
Olivera Grujic, University of Southern California

Improving Access to Internships with an On-Campus Software Development Center
Zachary J. Oster, University of Wisconsin-Whitewater

Increase K-12 Cyber Competency to Prevent Cyberbullying
Rachel Stange, Sherando High School & Lord Fairfax Community College

Historical High School Computer Science Curriculum and Current K-12 Initiatives
Steven Paul Floyd, Western University

Improving Retention through Team-Based Learning Finch Labs and Peer-Educators in Intro to Programming
Sotirios Kentros, Manish Wadhwa, Lakshmidevi Sreeramareddy, Komalpreet Kaur, Salem State University
Network with colleagues - Get Curriculum Guidance!
Special Session - Cybersecurity Guidelines
Thursday, February 28, 1:45 PM @ Hyatt, Northstar B
Community College Reception
Friday, March 01, 7:00 PM @ Hyatt, Regency Room
Community College Breakfast
Saturday, March 02, 7:00 AM @ Hyatt, Regency Room
Visit us in the Exhibit Hall
@ ACM Booth # 525

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DAN GARCIA    UC Berkeley

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Find out more at Booth 329.
ACM CCECC
Booth 525
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New York, NY 10121
www.women.acm.org
The ACM Committee for Computing Education in Community Colleges (CCECC) serves and supports community and technical college educators in all aspects of computing education. The Committee engages in curriculum and assessment development, community building, and advocacy in service to this sector of higher education.

ACM-W
Booth 525
2 Penn Plaza, Suite 701
New York, NY 10121
http://women.acm.org
ACM-W supports, celebrates, and advocates internationally for the full engagement of women in computing. With a wide range of programs and services to ACM members, ACM-W works in the larger community to advance the contributions of women in technology.

AccessComputing
Booth 421
University of Washington
Box 354842
Seattle, WA 98195-4842
www.uw.edu/accesscomputing/
AccessComputing, with over 30 partner organizations and institutions, uses evidence-based practices to increase the participation and success of people with disabilities in computing. It supports communities of practice, migrates to fund activities that promote computing careers for students with disabilities, a searchable knowledge base with case studies and effective practices, and mentoring and internships for students with disabilities.

AccessCSforAll
Booth 421
University of Washington
Box 354842
Seattle, WA 98195-4842
www.uw.edu/accesscomputing/accesscsforall
AccessCSforAll works to increase the participation of students with disabilities in K-12 computing education through accessible tools and curricular units. Through a research practitioner partnership with schools that serve students with disabilities, we are testing the effectiveness of an accessible version of AP Computer Science Principles.

Advancing the Successful IT Student through Enhanced Computational Thinking (ASSECT)
Booth 421
BATEC Center for IT
University of Massachusetts Boston
100 Morrissey Boulevard
Boston, MA 02125
www.batec.org
Advancing the Successful IT Student through Enhanced Computational Thinking (ASSECT) is a project of Broadening Advanced Technological Education Connections (BATEC), an NSF ATE National Center of Excellence for Computing and Information Technologies. ASSECT has developed a rubric for computational thinking in Information Technology and industry-relevant scenarios bundled into an entry level course to help students envision what it is like to be an IT Professional.

AdaCore
Booth 614
150 W. 30th Street
16th Floor
New York, NY 10001
www.adacore.com
AdaCore is the leading provider of commercial software solutions designed to help developers build safe, secure and reliable software. Products include a compilation solution for native and cross systems, a code generator, as well as tools for testing, code coverage, debugging, static analysis and formal proof. AdaCore is committed to encouraging safe and secure programming in academia and offers a free GNAT Academic Program (GAP) to educators and graduate students wanting to use Ada and SPARK. Visit Booth #614 to learn more about AdaCore and GAP, or to register for membership.

AnitaB.org
Booth 523
1501 Page Mill Road
MS 1105
Palo Alto, CA 94304
www.AnitaB.org
At AnitaB.org, we envision a future where the people who imagine and build technology mirror the people and societies for whom they build it. We connect, inspire, and guide women in computing, and organizations that view technology innovation as a strategic imperative. Our social enterprise supports women in technical fields, the organizations that employ them, and the academic institutions training our next generation. We offer programs to support women technologists as they grow, learn, and develop to their highest potential.
Auburn University- jGRASP
Booth 111
Computer Science and Software Engineering
3101 Shelby Center
Auburn, AL 36849
www.jgrasp.org

jGRASP is a freely available integrated development environment with visualizations for improving the comprehensibility of software. Features include: Control Structure Diagrams (CSDs) for Java, C/C++, Objective-C, Python, Ada, and VHDL; UML class diagrams for Java; and dynamic viewers and canvas integrated with a visual debugger, workbench, and interactions for Java. A new jGRASP plugin for Eclipse includes the dynamic viewers and canvas integrated with the Eclipse debugger for Java.

CCSC
Booth 622
Huntington University
2303 College Avenue
Huntington, IN 46750
www.ccsc.org

The Consortium for Computing Sciences in Colleges (CCSC) sponsors ten regional conferences offering a high-quality, affordable venue for faculty to share research including pedagogical approaches, meet colleagues, and publish their work. Papers are double-blind, peer-refereed and published in the Journal of Computing Sciences in Colleges included in the ACM Digital Library. Conferences include keynote and banquet speakers, papers, tutorials, panels, vendors, nifty assignments, and workshops.

Cengage
Booth 616
303 Second Street
Suite 500 South
San Francisco, CA 94107
www.cengage.com

Cengage is the education and technology company built for learners. As the largest US-based provider of teaching and learning materials for higher ed, we offer valuable options at affordable price points. Our industry-leading initiatives include Cengage Unlimited, the first-of-its-kind all-access digital subscription service. We embrace innovation to create learning experiences that build confidence and momentum toward the future students want. Visit us at www.cengage.com

CodeHS
Booth 318
1328 Mission Street, Suite 8
San Francisco, CA 94110
https://codehs.com

CodeHS is a comprehensive teaching platform for helping schools teach computer science. We provide web-based curriculum, teacher tools and resources, and professional development. There are over 800,000 students using the platform and 10,000 classrooms on CodeHS every month. Come visit our booth to learn more about our newest courses and professional development opportunities including Cybersecurity and Interdisciplinary Coding Projects.

CODIO
Booth 216
177 Huntington Avenue
Suite 1703 #45670
Boston, MA 02115
www.codio.com

Codio is the leading web-based learning platform for CS education. We raise the performance of CS programs, giving faculty & instructors the tools to teach more effectively & creating a more engaging learning experience for students. Used globally by universities and MOOCs, Codio saves faculty time, reduces IT costs, boosts student engagement & unlocks new previously inaccessible learning insights. Learn more about Codio at www.codio.com and visit the team at booth #216.

CSTA
Booth 525
332 S. Michigan Avenue, 9th Floor
Chicago, IL 60604
www.csteachers.org

The Computer Science Teachers Association (CSTA) is a membership organization that supports and promotes the teaching of computer science. CSTA provides opportunities for K-12 teachers and their students to better understand computer science and to more successfully prepare themselves to teach and learn.
DataCabinet
Booth 612
404 Bryant Street
San Francisco, CA 94107
https://datacabinet.info/index.html
DataCabinet provides a social browser-based programming environment for computer classrooms. Using DataCabinet, computer classrooms can develop and share complex programming environments as assignments. Students get access to programming environment through industry standard notebooks. Instructors can manage grading and reporting and can also detect plagiarism. For more information about DataCabinet, please visit booth number 612.

Franklin, Beedle & Associates Inc.
Booth 322
2154 NE Broadway, Suite 100
Portland, OR 97232
www.fbeedle.com
Established in 1985, Franklin, Beedle is an independent publisher of computer science textbooks and course materials.

CS Unplugged Accessibility Laboratory for Education and Assistive Technology (LEAT)
Booth 421
Auburn University
338 Shelby Technology Center
345 W. Magnolia Street
Auburn, AL 36830
CS Unplugged aims to make CS easier to access by avoiding using computers. However, students with disabilities (e.g., mobility, learning, cognitive or intellectual) face additional challenges with these kinesthetic activities, so the Auburn University Laboratory for Education and Assistive Technology has been improving the accessibility and inclusiveness of the activities.

GitHub Education
Booth 208
88 Colin P. Kelly Jr St
San Francisco, CA 94107
http://education.github.com
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Google
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1600 Amphitheatre Parkway
Mountain View, CA 94043
edu.google.com/computer-science/advanced
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Gradescope by Turnitin
Booth 217
2101 Webster Street #1800
Oakland, CA 94612
www.gradescope.com
Gradescope is the leading assessment and feedback platform in higher education. By leveraging AI, we help reduce grading times by up to 80%, increase grading consistency and quality of feedback, and dramatically improve workflow versus traditional pen and paper grading.
Gradescope was founded by former UC Berkeley TAs who were trying to reduce the pain that instructors experience with grading while also increasing the quality and timeliness of feedback for students.

IBM
Booth 413
2455 South Road
Poughkeepsie, NY 12601
www.research.ibm.com/university/
IBM University Programs include the Academic Initiative, Skills Academy and University Awards. The Academic Initiative focuses on making it easier for you to teach the latest technologies, providing access to open source and IBM software, hardware, course materials, and other resources. The Skills Academy is an integrated program providing faculty training, cloud infrastructure for labs, testing, and badge credentials. The Awards Program provides funding and resources for approved research.

ICCP
Booth 215
224 South Randall Road, #116
Elgin, IL 60123
Stop by our booth 215 and learn how ICCP's outcome assessment program for Computer Science and Information Systems, based on ACM Model curriculum, can help your school with a national benchmarking performance evaluation. Sample reports will be available to look at. ICCP is a non-profit organization based out of Chicago, IL.
Institute for African American Mentoring in Computing Sciences (iAAMCS)

Booth 421
University of Florida
Department of Computer and Information Science and Engineering
301 CISE Building
Gainesville, FL 32611
www.cise.ufl.edu/~juan/iAAMCS/index.html

iAAMCS pronounced “i am cs” the Institute for African-American Mentoring in Computing Sciences aims to significantly increase the number of Black/African-Americans pursuing and completing the PhD in computing fields through a national mentoring model. iAAMCS is synergized by previous NSF BPC Alliances (ARTSI, A4RC and EL) interventions and activities.

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Hillsboro, OR 97124
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Intel® Corporation (booth #315) is redefining what it means to be an innovator, by ensuring the next generation of innovators are empowered, diverse and inclusive in harnessing the full power of technology to enable the best future possible for everyone. Intel® will share training materials for K-12 STEM initiatives, academic curriculum (undergraduate and graduate levels), and scientific research using real case study examples for hands-on experiments.

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Jones & Bartlett Learning is a world-leading provider of instructional, assessment, and learning-performance management solutions for the secondary education, post-secondary education, and professional markets. Our educational programs and services improve learning outcomes, enhance student achievement, and increase career readiness.

LIGHTHOUSE

Booth 421
Program in Science, Technology & Society
Department of Engineering & Society
University of Virginia
Charlottesville, VA 22904
www.LH4CS.org

Lighthouse is focused on developing effective educators who promote diversity in computing. Tapestry uses face-to-face learning workshops with high school teachers to increase the number and diversity of enrollments in HS computing. Lighthouse CC provides online and face-to-face diversity-focused professional development for community college computing instructors. Lighthouse EC promotes diverse engagement in undergraduate computing courses using enhanced collaborative learning strategies.

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Redmond, WA 98052
www.microsoft.com

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SILVER SUPPORTER

Mimir

Booth 314
10 W. Market Street, Suite 820
Indianapolis, IN 46204
www.mimirhq.com

Mimir is a software company that grows the software engineering workforce. The company’s core product, Mimir Classroom, helps computer science instructors scale and automate curriculum without compromising quality for students. For more information about Mimir or Mimir Classroom, visit booth 314.

SILVER SUPPORTER

MIT Press

Booth 213
One Rogers Street
Cambridge, MA 02142
www.mitpress.mit.edu

The MIT Press is a leading publisher of books and journals at the intersection of science, technology, and the arts. MIT Press books and journals are known for their intellectual daring, scholarly standards, and distinctive design. Visit booth #213 and receive 30% off all books.
Join Our SIGSCE 2019 Workshop
Jump Start Parallel Programming in Data Science, Artificial Intelligence, and More 10:45 a.m.–12:00 p.m.
Friday, March 1 in Lakeshore A

Visit Us at Intel Booth #315
Intel is redefining what it means to be a technology innovator by working to ensure the next generation is empowered, diverse, and inclusive to enable a better future for everyone. Intel will share training materials for K-12 STEM initiatives, academic curricula, and scientific research using real case study examples for hands-on experiments.

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**National Center for Women & Information Technology (NCWIT)**

Booth 421

University of Colorado  
Campus Box 320  
Boulder, CO 80309-0320  
www.ncwit.org

The National Center for Women & Information Technology (NCWIT) is a non-profit community of more than 1,100 universities, companies, non-profits, and government organizations nationwide working to increase girls’ and women’s meaningful participation in computing. NCWIT equips change leaders with resources for taking action in recruiting, retaining, and advancing women from K–12 and higher education through industry and entrepreneurial careers.

**NCWIT EngageCSEdu**

Booths 427

National Center for Women & Information Technology (NCWIT)  
University of Colorado  
Campus Box 417 UCB  
Boulder, CO 80309  
wwwengage-csedu.org

Foster diversity in your introductory computer science courses with quality content and engaging pedagogy. EngageCSEdu is a platform for CS faculty teaching introductory level courses to find and share engaging materials for their courses. All materials in the collection make use of at least one “Engagement Practice”: Research-based techniques for engaging ALL students. Because it is peer-reviewed, being published in EngageCSEdu offers another way for faculty to demonstrate teaching excellence.

**NSF Showcase**

Booth 414

85 Engineer’s Way  
Box 400740  
Charlottesville, VA 22904  
www.nsfshowcase.org

Every year, twenty projects that are currently being sponsored by NSF are asked to present their work in an interactive, personal format during the break sessions and open slots at SIGCSE. The goal of the showcase is to share information about programs and research opportunities that attendees might not otherwise hear about.

**Oracle Academy**

Booth 326

Oracle Corporation Headquarters  
500 Oracle Parkway  
Redwood City, CA 94065  
academy.oracle.com

As Oracle’s flagship philanthropic educational program, Oracle Academy advances computing education globally to drive knowledge, innovation, skills development, and diversity in technology fields. Through Oracle Academy, students receive hands-on experience with the latest technologies, helping make them college and career ready in the era of big data, artificial intelligence, machine learning, cloud computing, Internet of Things, and beyond.

**Piazza Technologies**

Booth 109

101 University Ave. Suite 300  
Palo Alto, CA 94301  
www.piazza.com

Piazza is the premier social learning platform used by 2.5 million students helping them learn beyond the classroom in more than 2000 universities in 90 countries. Students from all areas of STEM can work together collaboratively despite differences in gender, ethnicity, or socioeconomic status.

**SciGirls Code**

Booth 421

Twin Cities PBS  
scigirlsconnect.org

SciGirls Code uses principles of connected learning with partners nationwide to provide middle school girls and their educators with computational thinking and coding skills. The program features: a nine-month curriculum; role-model training; professional development for STEM educators; and research that investigates girls’ computational thinking and attitudes toward computer science.

**Sense Education**

Booth 422

1 W 85th Street  
New York, NY 10024  
sense.education

The future of education lies in preserving the learning dynamics of a small class, while accommodating massively more students. Sense lets educators virtually review and analyze every student’s open-ended work, regardless of how many students there are. - Students receive the personal feedback they need to flourish - Faculty delivers assessments that are precise, unbiased, and fast - Educators continuously gain insights into what students understand. Courses improve. Outcomes improve. Everyone wins.

**Pearson**

Booth 410

400 Center Ridge Drive, Suite F  
Austin, TX 78753  
www.pearson.com/us

Pearson, the world’s leading learning company, partners with K-20 institutions and educators to provide educational solutions and services that help to improve learning outcomes. Pearson serves learners of all ages around the globe, employing 41,000 people in more than 70 countries. For more information, visit www.pearson.com/us.
SIGCSE 50th Celebration
Booth 124
2 Penn Plaza, Suite 701
New York, NY 10121
www.sigcse.org

Come celebrate the 50th SIGCSE with your fellow attendees. Reminisce about conferences past and discuss what the future of the conference should become. View the historical information gathered while preparing for this year’s celebration.

SIGCSE 2020
Booth 225
2 Penn Plaza, Suite 701
New York, NY 10121
www.sigcse.org

The 51st Technical Symposium will be held March 10 -14, 2020 on Portland, Oregon.

Springer
Booth 107
233 Spring Street
New York, NY 10013
www.springernature.com

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STARS Computing Corps
Booth 421
Director, STARS Computing Corps
Associate Professor and Chair
Department of Computer and Information Sciences
Temple University
1925 N. 12th Street
Philadelphia, PA 19122
www.starscomputingcorps.org

The STARS Computing Corps is a national alliance of over 50 academic institutions that develops college students and faculty as leaders who take action to broaden participation of underrepresented groups in computing. STARS members work with regional K-12 schools, industry, and community partners to inform, engage, and prepare future students for entry and success in college computing programs. Since 2006, STARS students have reached over 140,000 K-12 students in workshops, camps, and after school programs that introduce computer science concepts.

Temple University, Department of Computer & Information Sciences
Booths 620
Temple University, Department of Computer & Information Science (SERC 304)
1925 N. 12th St.
Philadelphia, PA 19122
http://www.cis.temple.edu

The Department of Computer and Information Sciences at Temple University is committed to excellence in computer science research and education. CIS has made significant strides in recent years, tripling annual research expenditures and ranking among the top 50 computer science departments in the US in terms of research productivity (ARWU Shanghai) and degree programs (ComputerScience.org). We are hiring to expand our strengths in research and education and to support future visions of computing.

Sustainable Diversity in the Computing Research Pipeline (CRA-W/CDC) Alliance
Computing Research Association
Booth 421
1828 L Street NW
Suite 800
Washington, DC 20036
www.cra-w.org

The Sustainable Diversity in the Computing Research Pipeline (CRA-W/CDC) Alliance offers programs at the undergraduate through mid-career levels aimed at increasing and retaining the number of women, underrepresented minorities and people with disabilities participating in computing research and education.

Turing’s Craft
Booth 329
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Brooklyn, NY 11230
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www.vt.edu
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