

The 45th Technical Symposium
on
Computer Science Education

*Leveraging Computing
to Change Education*

SIGCSE
ATLANTA

2014

March 5-8, 2014

Atlanta, Georgia, USA

<http://sigcse2014.sigcse.org/>



Thursday at a Glance

Time	Event	Location
8:30-10:00	Plenary Session and Robert M. Panoff Keynote: <i>Computational Thinking for All</i>	Centennial III-IV
10:00-10:45	Break & Exhibits	Grand Hall
10:00-11:30	NSF Showcase #1	Grand Hall
10:45-12:00	Automated Assessment	Hanover C
	Gamification	Regency VI
	Software Engineering: Projects	Hanover FG
	Mathematical Perspectives	Hanover DE
	Bringing CS2013 Recommendations for Parallel and Distributed Computing	Centennial I
	Toward Curricular Guidelines for Cybersecurity	Regency V
	Understanding NSF Funding	Centennial II
	Google: The Engagement and Retention of Students in Undergraduate CS Programs; CS First	Regency VII
	Microsoft: Building Touch Apps from Millimeters to Yards	Learning Center
12:00-1:45	First Timers' Luncheon & Andrea Lawrence Keynote: <i>SIGCSE Plus You Equals Leverage</i>	Centennial III-IV
12:00-1:45	Lunch Break	<i>On your own</i>
1:45-5:00	Student Research Competition Posters Session	Grand Hall
1:45-3:00	Engaging Students Through Artistic Expression	Regency VI
	Concept Inventories & Neo-Piagetian Theory	Hanover AB
	Active Learning	Hanover DE
	Big Data	Hanover FG
	Games	Hanover C
	ACM/IEEE-CS Computer Science Curricula 2013	Centennial I
	Diverse Learners, Courses and Projects	Centennial II
	Engaging Mathematical Reasoning Exercises	Regency V
	ABET: The Benefits of ABET Accreditation to a Quality Computing Program	Learning Center
3:00-3:45	Break & Exhibits	Grand Hall
3:00-4:30	NSF Showcase #2	Grand Hall
3:45-5:00	K-12: Profession and Professional Development	Regency VI
	Design: Courses and Curricula	Hanover AB
	Collecting and Analyzing Student Data I	Hanover DE
	Tactile Computing	Hanover FG
	Projects and Capstone Courses	Hanover C
	Panel of Computing Students with Disabilities	Centennial I
	Rediscovering the Passion, Beauty, Joy, and Awe	Centennial II
	Alternatives to Lecture	Regency V
5:10-7:00	Birds of a Feather: Sessions I & II	<i>See page 42</i>
7:00-8:00	SIGCSE Symposium Reception	Centennial Lobby

Friday at a Glance

Time	Event	Location
8:30-10:00	Plenary Session and Hadi Partovi Keynote: <i>Transforming US Education with Computer Science</i>	Centennial III-IV
10:00-10:45	Break & Exhibits	Grand Hall
10:00-12:00	Poster Session I	Grand Hall
10:00-11:30	NSF Showcase #3	Grand Hall
10:45-12:00	CS2	Regency VI
	Assessment and Evaluation	Hanover AB
	Classroom Management	Hanover DE
	K-12: Middle School	Hanover FG
	Soft Skills: Industry Perspectives	Hanover C
	Experiences Mapping/Revising Curricula with CS2013	Centennial I
	CS Professional Development MOOCs	Centennial II
	Looking Outside: What Can Be Learnt From Computing Education Around The World?	Regency V
12:00-1:45	Lunch Break	<i>On your own</i>
1:45-3:00	Peer Instruction	Regency VI
	Software Engineering: Courses	Hanover AB
	Web-based Instruction	Hanover DE
	Recruitment and Retention of Underrepresented Groups	Hanover FG
	Interdisciplinary Courses and Curricula	Hanover C
	Teaching Tips We Wish They'd Told Us, HS Edition	Centennial I
	Using real problems and data in CS1	Centennial II
	Guided Inquiry Learning: Perspectives on POGIL in CS	Regency V
3:00-3:45	Break & Exhibits	Grand Hall
3:00-4:30	NSF Showcase #4	Grand Hall
3:00-5:00	Poster Session II	Grand Hall
3:45-5:00	Predictors, Creative Thinking, Co-linking Courses	Regency VI
	K-12: Informal Education, Curriculum, and Robots	Hanover DE
	K-12: Before Middle School	Hanover FG
	Security Among the Cloud	Hanover C
	Recruit and Retain Women in Undergraduate Computing	Centennial I
	CS Principles Professional Development	Centennial II
5:10-5:55	Blocks-based Programming Languages	Learning Ctr
5:10-5:55	SIGCSE Business Meeting	Regency VI
6:00-7:00	CCSC Business Meeting	Regency VI
6:00-7:00	NCWIT Reception	Regency V
7:00-10:00	Friday Evening Workshops (12 – 23)	<i>See page 59</i>

Saturday at a Glance

Time	Event	Location
9:00-10:15	Operating Systems and Programming Languages	Hanover AB
	Soft Skills: Academic Perspectives	Hanover DE
	What We Say, What They Do	Hanover FG
	Extending Frameworks	Hanover C
	Teaching Parallel Design Patterns to Undergraduates in Computer Science	Regency V
	Nifty Assignments	Centennial I
	Public/Private Partnership for Expanding CS	Regency VI
	Interdisciplinary Computing in Many Forms	Centennial II
	Oracle: The Integration of Computer Science into English, and History and Science... Oh My!	Learning Center
9:00-12:00	Graduate Student Research Presentations	Green Brier
	Undergraduate Student Research Presentations	Fairlie
10:15-10:45	Break & Exhibits (Exhibits open at 9:30)	Grand Hall
10:15-10:45	NSF Showcase #5	Grand Hall
10:45-12:00	Team Projects with Alice 3	Regency VI
	Tools	Hanover AB
	K-12: Outreach and Computational Thinking	Hanover DE
	MOOCs	Hanover FG
	Collecting and Analyzing Student Data II	Hanover C
	Advanced Placement: CS A and CS Principles	Centennial I
	Data Science as an Undergraduate Degree	Regency V
	"Hands-On" Tutorial: Teaching Software Correctness with RESOLVE	Centennial II
12:00-2:00	GitHub: Version Control with GitHub	Learning Center
	Luncheon & AJ Brush Keynote: <i>Lab of Things: a Devices Research and Teaching Platform for Home and Beyond</i>	Centennial III-IV
3:00-6:00	Saturday Afternoon Workshops 24 - 35	See page 64

General Schedule Notes

NSF Project Showcase Sessions feature recipients of education-related National Science Foundation grants and will take place in the Grand Hall Exhibit area.

Sessions 1 and 2: Thursday: 10:00am – 11:30am, 3:00pm – 4:30pm

Sessions 3 and 4: Friday: 10:00am – 11:30am, 3:00pm – 4:30pm

Session 5: Saturday: 10:15am – 11:45am

See also <http://www.cs.virginia.edu/~sherriff/nsfshowcase/>

The Student Research Competition features the work of graduate and undergraduate researchers and takes place in two phases (see page 52):

Poster presentations: Thursday 10:00am – 11:30am Grand Hall

Research presentations: Saturday 9:00am – 12:00pm
Graduate in GreenBrier; Undergraduate in Fairlie

Message from the Chairs

Welcome to the 45th ACM Technical Symposium on Computer Science Education (*i.e.*, SIGCSE 2014). We invite you to explore this collection of papers, posters, workshops and other materials that capture the latest ideas, tools and pedagogy in computer science education. We also encourage you to connect with the people that generate, document and “implement” this body of knowledge, take this experience with you and share.

The theme is “Leveraging Computing to Change Education,” and features a number of talks and sessions focused on how the ideas and applications of computing can benefit not only those learning computer science, but also learning overall. SIGCSE 2014 is co-located with a new ACM conference on *Learning at Scale*; it will be interesting to see what ideas and connections emerge between the two conferences, and we urge you to consider attending both.

We are happy to announce the winners of the two annual SIGCSE Awards. Robert M. Panoff, Founder and Executive Director of the Shodor Education Foundation, Inc., will receive the SIGCSE Award for Outstanding Contribution to Computer Science Education, and will provide Thursday morning’s keynote address. Andrea W. Lawrence of Spelman College will accept the SIGCSE Award for Lifetime Service to the Computer Science Education Community and speak at our First Timer’s Lunch on Thursday. (SIGCSE First Timers will receive the lunch for free; more seasoned SIGCSE attendees can purchase a ticket and (a) enjoy a delicious meal and (b) mentor a First Timer).

The remaining keynote presentations include Hadi Partovi, Founder and CEO of Code.org, and A.J. Brush of Microsoft Research, who will each present on Friday morning and Saturday lunch, respectively.

Symposium statistics are presented in the table. We thank the authors, reviewers, and Program Committee members involved in the production of this program. The schedule

year has the usual varied selection of events, including the Evening Reception on Thursday and the ACM SIGCSE Student Research Competition on Thursday afternoon. There are also some atypical offerings, such as Experience-IT, and of course the co-located Learning at Scale conference. The latest in hardware, software tools, textbooks, educational programs and research are found in the exhibit hall.

<i>Proposal type</i>	<i>Accepted</i>	<i>Received</i>	<i>Acceptance Rate</i>
Paper	108	274	39.4%
Panel	14	23	60.9%
Special Session	12	16	75.0%
Workshop	35	75	49.3%
Poster	56	122	45.9%
Birds of a Feather	37	52	71.7%

SIGCSE 2014 Pre-symposium Events will occur on Wednesday and cover the following topics: Process Oriented Guided Inquiry Learning (POGIL); Integrating Professional/Ethical Issues into the CS Curriculum; New Educators Workshop; SIGCAS nowadays: What it is? What should it be?; and Git & GitHub Foundations for Educators

Our sincere thanks go out to the people who made this Symposium happen. First, our Symposium Committee: Carl Alphonse, Paul Carter, Stephen Cooper, Tom Cortina, Annemieke Craig, Pam Cutter, Lynn Degler, John Dooley, Mary Anne Egan, Susan Haller, Michael T. Helmick, Cary Laxer, James Maher, Scott McElfresh, Sara Melnick, Larry Merkle, Deepa Muralidhar, Susan Rodger, Marc Rubin, Jaime Spacco, Cheryl Seals, Ann Sobel, Kimberly Voll, Henry Walker and Steven Wolfman. Additional thanks go to our Associate Program Chairs who provided meta-reviews for papers: Eric Aaron, Ruth E. Anderson, Don Blaheta, Stephen Edwards, Mary Anne Egan, Allison Elliott Tew, Dave Levine, Sam Rebelsky, Ellen Walker, and Steven Wolfman. We also recognize and thank our International Liaison Committee (Reyyan Ayfer, Karen Bradshaw, Alison Clear, Judith Gal-Ezer, Michail Giannakos, Simon Humphreys, Sridhar Iyer, Carsten Kleiner, Claudia Bauzer Madeiros, Yasuto Shirai, Gary K.W. Wong and Ming Zhang) for helping ensure SIGCSE 2014 is welcoming to attendees from around the world. Our appreciation goes out to our student volunteers, there to help us with all of the important details that make the conference run so well. Finally, we want to offer special thanks to John Dooley for his ongoing work “in the background” transitioning to a new system for online conference management.

We wish to thank all our supporters, vendors, exhibitors and in-kind donors whose participation does more than make the Symposium possible; your participation enhances the collaboration and learning experiences all week. A special thank you to the following supporters: Google (Platinum Plus), Microsoft (Platinum); ABET (Gold), GitHub (Silver), Oracle Academy (Silver), Intel (Bronze) and Turingscraft (Bronze). Special thanks to Dorothea Heck and her team at D. Lawrence Planners for coordinating an outstanding exhibition and their creative efforts with conference planning and logistics.

We thank SIGCSE President Susan Rodger and the entire Board for their continuing support and guidance, and acknowledge the SIGCSE Symposium Site Coordinators Bob Beck and Scott Grissom, as well as April Moskus, Ashley Cozzi and Ann Lane of ACM. Lisa Tolles of Sheridan Printing Company brought all materials together. Also, we thank Jenna Bornschein of the Atlanta Convention and Visitors Bureau, as well as Todd Tamer and his team at the Hyatt Regency Atlanta.

Special thanks to our home institutions for providing needed resources: Georgia Gwinnett College, Haverford College, the Rochester Institute of Technology and the University of British Columbia. We hope you enjoy the Symposium and leverage the SIGCSE 2014 Proceedings in your future activities.

Symposium Chairs

John Dougherty
Haverford College

Kris Nagel
Georgia Gwinnett College

Program Chairs

Adrienne Decker
Rochester Institute of Technology

Kurt Eiselt
University of British Columbia

SIGCSE 2014 Symposium Committee

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Kris Nagel, *Georgia Gwinnett College*

Program Chairs

Adrienne Decker, *Rochester Inst. of Tech.*
Kurt Eiselt, *U. of British Columbia*

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Stephen Cooper, *Stanford University*

Workshops

Susan Haller, *SUNY Potsdam*
Paul Carter, *U. of British Columbia*

Publications

J.D. Dougherty, *Haverford College*

Database Administrators

John Dooley, *Knox College*
Henry Walker, *Grinnell College*

Registration

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Cary Laxer, *Rose-Hulman Inst. of Tech.*
Larry Merkle, *Comp. Opt. Services*

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Michael T. Helmick, *U. of Cincinnati*

Birds of a Feather

Marc Rubin, *Colorado School of Mines*

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Steven Wolfman, *U. of British Columbia*

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Pre-Conference Events Liaison

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Accessibility

Raghu Ramanujan, *Davidson College*

Student Research Competition

Ann Sobel, *Miami U. (Ohio)*

International Liaison

Annemieke Craig, *Deakin University*

International Liaison Committee

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Dave Levine, *St. Bonaventure University*
Sam Rebelsky, *Grinnell College*
Ellen Walker, *Hiram College*
Steve Wolfman, *U. of British Columbia*

SIGCSE 2014 Keynotes

Computational Thinking for All

Thursday, 8:30 AM
Centennial III-IV

Robert M. Panoff, *The Shodor Education Foundation*
2014 Award for Outstanding Contribution to Computer Science Education

Students and faculty alike at all education levels are clearly spending much more of their time interacting with computing and communication tools than with each other. Is this good? Are all uses of computational technology in education helpful, and if not, how does one separate the benefits from the burdens? We will explore how this technology enables multiple representations in the sciences, arts, and humanities, giving us the opportunity to be more fully human as we seek new knowledge in service to society. Moving "beyond PowerPointless-ness," we have the opportunity to demonstrate that computing really matters in teaching and learning. Computing "matters" because quantitative reasoning, computational thinking, and multi-scale modeling are the intellectual "heart and soul" of 21st Century science and therefore are the essential skills of the 21st Century workforce. Computing "matters" because we can apply the power of dynamic, visual, and interactive computing to reach a deeper understanding of models across math and science while exploring their role in understanding our world.

SIGCSE Plus You Equals Leverage

Thursday, Noon
Centennial III-IV

Andrea Lawrence, *Spelman College*
2014 Award for Lifetime Service

SIGCSE and its members provide a multitude of possibilities for computer science professionals. This talk will address some of these possibilities and ways for those participating in the organization and in the annual conferences to explore and profit from these possibilities. The opportunities include learning about computer science history, keeping abreast of changes and developments in curriculum, and learning new pedagogical techniques. In addition there are opportunities to attend workshops, explore opportunities for students, and develop new skills.

Transforming US Education with Computer Science

Friday, 8:30 AM
Centennial III-IV

Hadi Partovi
Co-Founder and CEO, *Code.org*

Code.org first exploded on the CS education scene in Feb 2013 with its first video featuring Mark Zuckerberg and Bill Gates talking about computer science. 10 months later, it launched an Hour of Code campaign that has taken the world by storm. Reaching 10 million students in just 3 days, the Hour of Code became the fastest-spreading service in the history of technology OR education. Code.org founder Hadi Partovi will talk about how he came up with the concepts behind these grassroots campaigns, and how Code.org hopes to harness the reach of the broader CS community to grow computer science education in schools.

Lab of Things: a Devices Research and Teaching Platform for Home and Beyond

Saturday, Noon
Centennial III-IV

A. J. Brush,
Senior Researcher, *Microsoft Research*

Inspired by the availability of inexpensive connected devices, such as lights, water sensors, security cameras, power meters, and thermostats, we built the Lab of Things (LoT) platform to enable easy interaction with devices for a range of applications, including automation, security, energy management, and elder care. Our goal is to substantially lower the barrier for researchers and students to develop and experiment with new technologies for the home environment. LoT provides a common framework to write applications that use connected devices and includes a set of cloud services that enable remote command/control of devices, monitoring of system health, and data collection. We released the LoT SDK in July 2013 for non-commercial use. I will describe the research studies that motivated the development of Lab of Things, student and research projects developed using Lab of Things and its precursor HomeOS, and our long-term vision of research groups working together to create a test bed of homes around the world that are willing to participate in field studies.

45th SIGCSE Technical Symposium on Computer Science Education

Pre-Symposium Events

Wednesday 9:00 a.m. to 5:00 p.m.

Using Guided Inquiry Activities to Help Students Learn Key Concepts and Process Skills	Hanover FG
New Educators Workshop	Hanover DE
Git & GitHub Foundations for Educators	Hanover C
Humanitarian Free and Open Source Software Community Workshop	Dunwoody

Wednesday Morning 9:00 a.m. to 12:00 p.m.

SIGCAS nowadays: What it is? What should it be?	Hanover AB
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Wednesday Afternoon 1:00 p.m. to 5:00 p.m.

Integrating Professional Issues into the Computer Science Curriculum: Teaching Computing Students about the Challenge of Computer Ethics in an Increasingly Automated World Living with Sophisticated Machines	Hanover AB
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Wednesday Evening 7:00 p.m. to 10:00 p.m.

Workshops 1 - 11	Various Locations
<i>Full descriptions and locations of workshops may be found on page 54 of this program, and on the conference website: http://sigcse2014.sigcse.org/.</i>	

Thursday Morning – 8:30 a.m. to 10:00 a.m.

SIGCSE Opening Plenary Session

Centennial

8:30 **Welcome**

J.D. Dougherty, Symposium Co-Chair, *Haverford College*

Kristine Nagel, Symposium Co-Chair, *Georgia Gwinnett College*

Keynote:

Computational Thinking for All (description p. 8)

Robert M. Panoff, *The Shodor Education Foundation*

Thursday Morning • 10:00 a.m. to 10:45 a.m.

Break & Exhibits

Grand Hall

Thursday Morning – 10:00 a.m. to 11:30 a.m.

NSF Showcase #1

Grand Hall

- Teaching Service-Oriented Programming to CS and SE Undergraduate Students, Xumin Liu, Rajendra K. Raj, Thomas Reichlmayr, Alex Pantaleev, and Chunmei Liu
- Rethinking Software Testing in Undergraduate Education, W. Eric Wong
- Problets Anyone?, Amruth Kumar
- Mobile Computational Thinking with App Inventor, Franklyn Turbak, Fred Martin, Mark Sherman, Ralph Morelli, Shaileen Crawford Pokress, and David Wolber

Thursday Morning • 10:45 a.m. to 12:00 p.m.

Paper session: Automated Assessment

10:45am–Noon

Chair: Ashraf Saad, *Armstrong Atlantic State University*

Hanover C

10:45 ***Increasing the Effectiveness of Automated Assessment By Increasing Marking Granularity and Feedback Units***

Nickolas Falkner, Rebecca Vivian, David Piper,
Katrina Falkner, *The University of Adelaide*

11:10 ***Adaptively Identifying Non-terminating Code When Testing Student Programs***

Stephen Edwards, Zalia Shams, Craig Estep, *Virginia Tech*

11:35 ***Can Computers Compare Student Code Solutions as Well as Teachers?***

Matheus Gaudencio, *Universidade Federal de Campina Grande*
Ayla Dantas, *Universidade Federal da Paraiba*
Dalton D. S. Guerrero, *Universidade Federal de Campina Grande*

- Paper session: *Gamification*** 10:45am–Noon
 Chair: Mario A.M. Guimaraes, *Zayed University* Regency VI
- 10:45 ***An Experience Report on Using Gamification in Technical Higher Education***
 Alexandru Iosup, Dick Epema, *Delft University of Technology*
- 11:10 ***How (not) to Introduce Badges to Online Exercises***
 Lassi Haaranen, Petri Ihantola, Lasse Hakulinen, Ari Korhonen, *Aalto University*
- 11:35 ***Khan Academy Gamifies Computer Science***
 Briana Morrison, Betsy DiSalvo, *Georgia Institute of Technology*

*** Best Paper Session ***

- Paper Session: Software Engineering: Projects** 10:45am–Noon
 Chair: Jodi Tims, *Baldwin Wallace College* Hanover FG
- 10:45 ***Course-Embedded Research In Software Development Courses***
 Sonal Dekhane, Richard Price, *Georgia Gwinnett College*
- 11:10 ***Using a Real World Project in a Software Testing Course***
 Dan Krutz, Samuel Malachowsky, Thomas Reichlymayr, *RIT*
- 11:35 ***Student Projects Are Not Throwaways: Teaching Practical Software Maintenance in a Software Engineering Course***
 Claudia Szabo, *The University of Adelaide*

- Paper session: Mathematical Perspectives** 10:45am–Noon
 Chair: David Stucki, *Otterbein University* Hanover DE
- 10:45 ***Syrus: Providing Practice Problems in Discrete Mathematics With Instant Feedback***
 Diego Zaccai, Aditi Tagore, Dustin Hoffman, Jason Kirschenbaum, Zakariya Bainazarov, Harvey Friedman, Dennis Pearl, Bruce Weide, *The Ohio State University*
- 11:10 ***Teaching Theoretical Computer Science using a Cognitive Apprenticeship Approach***
 Maria Knobelsdorf, *New York University*
 Christoph Kreitz, Sebastian Boehne, *University of Potsdam*
- 11:35 ***Learning Relational Algebra by Snapping Blocks***
 Jason Gorman, Sebastian Gsell, Chris Mayfield, *James Madison University*

Panel session: Bringing CS2013 Recommendations for Parallel and Distributed Computing 10:45am–Noon
Centennial I
Moderator: Richard Brown, *St. Olaf College*
Panelists: Elizabeth Shoop, *Macalester College*
Joel Adams, *Calvin College*

Panel session: Towards Curricular Guidelines for Cybersecurity 10:45am–Noon
Regency V
Moderator: Andrew McGettrick, *ACM Education Board*
Panelists: Lillian Cassel, *Villanova University*
Melissa Dark, *Purdue University*
Elizabeth Hawthorne, *Union County College*
John Impagliazzo, *Hofstra University*

Special session: Understanding NSF Funding 10:45am–Noon
Regency V
Participants: Jane Prey, Valerie Barr, Jan Cuny, Jeff Forbes, Harriet Taylor,
Paul Tymann, NSF

Supporter Session: Google 10:45am–Noon
The Engagement and Retention of Students in Undergraduate Computer Science Programs
Leslie Yeh Johnson, *Google*
Lecia Barker, *University of Texas at Austin*
CS First
Kate Berrio, Matthew Dawson, Jamie Sue Goodman, *Google*

Supporter Session: Microsoft 10:45am–Noon
Building touch apps from millimeters to yards
Martin Schray, *Microsoft*

Detailed descriptions for Supporter Sessions are on page 37 of this program.

Thursday Lunch 12:00 p.m. to 1:45 p.m.

First Timers' Lunch Centennial III-IV
Address: *SIGCSE Plus You Equals Leverage*
Andrea W. Lawrence, *Spelman College*, (description p. 8)
SIGCSE 2014 Lifetime Service Award Winner

Lunch Break *On your own.*

Thursday Afternoon – 1:45 p.m. to 5:00 p.m.

Student Research Poster Session

Grand Hall

Thursday Afternoon – 1:45 p.m. to 3:00 p.m.

Paper session: Engaging Students Through Artistic Expression 1:45pm – 3:00pm
Regency VI

Chair: Netiva Caftori, *SIGCAS*

1:45 ***Engaging Underrepresented Groups in High School Introductory Computing through Computational Remixing with EarSketch***

Jason Freeman, *Georgia Tech*
Brian Magerko, *Georgia Tech*
Tom McKlin, *The Findings Group, LLC*
Mike Reilly, *Lanier High School*
Justin Permar, *Georgia Tech*
Cameron Summers, *Georgia Tech*
Eric Fruchter, *Georgia Tech*

2:10 ***Dancing Alice: Exploring Embodied Pedagogical Strategies for Learning Computational Thinking***

Shaundra Bryant Daily, Alison Leonard, Sabarish Babu, Sophie Jörg, Kara Gundersen, *Clemson University*

2:35 ***Underrepresented Middle School Girls: On the Path to Computer Science through Paper Prototyping***

Ashley Robinson, Manuel A. Pérez-Quiñones, *Virginia Tech*

Paper session: Research: Concept Inventories & Neo-Piagetian Theory 1:45pm – 3:00pm
Hanover AB

Chair: Samuel Rebelsky, *Grinnell College*

1:45 ***Developing a Pre- and Post-Course Concept Inventory to Gauge Operating Systems Learning***

Kevin Webb, *Swarthmore College*
Cynthia Taylor, *Oberlin College*

2:10 ***Misconceptions and Concept Inventory Questions for Hash Tables and Binary Search Trees***

Kuba Karpierz, Steven Wolfman, *University of British Columbia*

2:35 ***Neo-Piagetian Theory as a Guide to Curriculum Analysis***

Claudia Szabo, Katrina Falkner, *The University of Adelaide*

Paper session: Active Learning 1:45pm – 3:00pm
Hanover DE

Chair: Susan Reeder, *Seattle University*

1:45 ***Active Learning During Lecture Using Tablets***

Barry L. Kurtz, Rahman Tashakkori, James B. Fenwick, *Appalachian State University*

Ahmad Esmaili, *Stony Brook University*

Stephen R. Tate, *University of North Carolina at Greensboro*

2:10 ***Teaching CS 1 with POGIL Activities and Roles***

Helen H. Hu, Tricia D. Shepherd, *Westminster College*

2:35 ***Effectiveness of a Computational Thinking (CS0) Course on Student Analytical Skills***

Michele Van Dyne, Jeffrey Braun, *Montana Tech of the University of Montana*

Paper session: Big Data

1:45pm – 3:00pm

Chair: Krish Narayanan, *Eastern Michigan University*

Hanover FG

1:45 ***Integrating Big Data into the Computing Curricula***

Yasin Silva, Suzanne Dietrich, Jason Reed, Lisa Tsosie, *Arizona State University*

2:10 ***An Undergraduate Degree in Data Science: Curriculum and a Decade of Implementation Experience***

Paul Anderson, James Bowring, Renée McCauley, George Pothering, Christopher Starr, *College of Charleston*

2:35 ***CS Principles Goes to Middle School: Learning How to Teach "Big Data"***

Philip Buffum, *North Carolina State University*
 Allison Martinez-Arocho, *Meredith College*
 Megan Frankosky, Fernando Rodriguez, Eric Wiebe, Kristy Boyer, *North Carolina State University*

Paper session: Games

1:45pm – 3:00pm

Chair: Monica McGill, *Bradley University*

Hanover C

1:45 ***Lessons Learned and Recommended Strategies for Game Development Components in a Computer Literacy Course***

Robert Collier, Jalal Kawash, *University of Calgary*

2:10 ***Use and Development of Entertainment Technologies in After School STEM Program***

Veronica Catete, Kathleen Wassell, Tiffany Barnes, *NC State University*

2:35 ***Making Games a "Snap" with Stencyl – A Summer Computing Workshop for K-12 Teachers***

Jiangjiang Liu, Cheng-Hsien Lin, Joshua Wilson, David Hemmenway, Ethan Hasson, Zebulun Barnett, Yingbo Xu, *Lamar University*

Special Session: ACM/IEEE-CS Computer Science 1:45pm – 3:00pm
Curricula 2013: Implementing the Final Report Centennial I
 Participants: Mehran Sahami, *Stanford University*
 Steve Roach, *Exelis, Inc.*
 Ernesto Cuadros-Vargas, *San Pablo Catholic University*
 Elizabeth Hawthorne, *Union County College*,
 Amruth Kumar, *Ramapo College of New Jersey*
 Richard LeBlanc, *Seattle University*
 David Reed, *Creighton University*
 Remzi Seker, *Embry-Riddle Aeronautical University*

Special Session: Diverse Learners, Diverse Courses, 1:45pm – 3:00pm
Diverse Projects: Learning from Challenges Centennial II
in New Directions
 Organizer: Owen Astrachan, *Duke University*
 Participants: R. Brook Osborne, *Code.org*
 Jeff Gray, *University of Alabama*
 Irene Lee, *Santa Fe Institute*
 Bradley Beth, *University of Texas, Austin*

Special Session: Engaging Mathematical Reasoning 1:45pm – 3:00pm
Exercises Regency V
 Participants: Joseph Hollingsworth, *Indiana University Southeast*
 Murali Sitaraman, *Clemson University*

Supporter Session: ABET 1:45pm–3:00pm
The Benefits of ABET Accreditation to a Quality Learning Center
Computing Program
 Presenter: David Cordes, *ABET*

Detailed descriptions for Supporter Sessions are on page 39 of this program.

Thursday Afternoon – 3:00 p.m. to 3:45 p.m.
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Break & Exhibits Grand Hall

Thursday Afternoon 3:00 p.m. to 4:30 p.m.**NSF Showcase #2**

Grand Hall

- Hands-on Cybersecurity Exercises in the EDURange Framework, Richard Weiss, Jens Mache, and Michael Locasto
- CS4Alabama: A Model for Statewide Deployment of CS Principles Courses, Jeff Gray, Mary Boehm, Carol Crawford, Kathy Haynie, and Sheryl Packman
- MyCS: Computer Science for the Middle School Classroom, Michael Erlinger
- REU Site in Computer Systems, Michael Erlinger and Zach Dodds

Thursday Afternoon – 3:45 p.m. to 5:00 p.m.

Paper session: Focus on K-12: Growing the Profession and Professional Development 3:45pm – 5:00pm
Regency VI

Chair: Shaileen Pokress, *MIT Media Lab*

3:45 ***STEM Teaching as an Additional Profession for Scientists and Engineers: The Case of Computer Science Education***

Orit Hazzan, *Technion – Israel Institute of Technology*

Noa Ragonis, *Beit Berl College & Technion – Israel Institute of Technology*

4:10 ***Spreading the Word: Introducing Pre-Service Teachers to Programming in the K-12 Classroom***

Richard (Scott) Bell, *Kansas State University*

Tim Frey, *Doane College*

Eugene Vasserman, *Kansas State University*

4:35 ***Research Experience for Teachers: Data Analysis & Mining, Visualization, and Image Processing***

Rahman Tashakkori, Mitchell Parry, *Appalachian State University*

Rebecca Cooper, *West Wilkesboro High School*

Nicholas Westveer, Jessica Jenkins, *Watauga High School*

Adam Benoit, *Lincolnton High School*

- Paper session: Design: Courses and Curricula** 3:45pm – 5:00pm
 Chair: Carl Alphonse, *University at Buffalo* Hanover AB
- 3:45 ***The Design of Sweden's First 5-year Computer Science and Software Engineering Program***
 Fredrik Heintz, Inger Erlander Klein, *Linköping University*
- 4:10 ***Bringing Business Intelligence to Healthcare Informatics Curriculum: A Preliminary Investigation***
 Guangzhi Zheng, Chi Zhang, Lei Li, *Southern Polytechnic State University*
- 4:35 ***An ACM 2013 Exemplar Course Integrating Fundamentals, Languages, and Software Engineering***
 Jason Hallstrom, Cathy Hochrine, Jacob Sorber, Murali Sitaraman, *Clemson University*
-

- Paper session: Collecting and Analyzing Student Data I** 3:45pm – 5:00pm
 Chair: Don Blaheta, *Longwood University* Hanover DE
- 3:45 ***Measuring Demographics and Performance in Computer Science Education at a Nationwide Scale Using AP CS Data***
 Barbara Ericson, Mark Guzdial, *Georgia Tech*
- 4:10 ***Blackbox: A Large Scale Repository Of Novice Programmers' Activity***
 Neil Brown, Michael Kölling, Davin McCall, Ian Utting, *University of Kent*
- 4:35 ***Using CodeBrowser to Seek Differences Between Novice Programmers***
 Kenny Heinonen, Kasper Hirvikoski, Matti Luukkainen, Arto Vihavainen, *University of Helsinki*
-

- Paper session: Tactile Computing** 3:45pm – 5:00pm
 Chair: Robert Lutz, *Georgia Gwinnett College* Hanover FG
- 3:45 ***Hands-on Introduction to Computer Science at the Freshman Level***
 Raghuraman Balasubramanian, Zachary York, Matthew Dorran, Aritra Biswas, Timur Girgin, Karthikeyan Sankaralingam, *UW-Madison*

- 4:10 ***Ethnocomputing with Electronic Textiles: Culturally Responsive Open Design to Broaden Participation in Computing in American Indian Youth and Communities***
 Yasmin Kafai, Kristin Searle, University of Pennsylvania
 Cristóbal Martínez, Bryan Brayboy, Arizona State University
- 4:35 ***Tracking @stemxcomet: Teaching Programming to Blind Students via 3D Printing, Crisis Management, and Twitter***
 Shaun Kane, University of Maryland Baltimore County
 Jeffrey Bigham, Carnegie Mellon University

Paper session: Projects and Capstone Courses 3:45pm – 5:00pm
 Chair: Rajeev Agrawal, *North Carolina A & T State Univ.* Hanover C

- 3:45 ***An Assessment Model for Large Project Courses***
 Maria Vasilevskaya, *Linköping University*
 David Broman, *UC Berkeley and Linköping University*
 Kristian Sandahl, *Linköping University*
- 4:10 ***Adding Unit Test Experience to a Usability Centered Project Course***
 Christopher Brown, Robert Pastel, Marika Seigel, Charles Wallace,
 Linda Ott, *Michigan Technological University*
- 4:35 ***A Service Learning Practicum Capstone***
 Aaron Bloomfield, Mark Sherriff, *University of Virginia*
 Kara Williams, *Center for Nonprofit Excellence*

Panel session: Panel of Computing Students with Disabilities 3:45pm–5:00pm
 Centennial I

- Moderator: Richard Ladner, *University of Washington*
 Panelists: Jillian Hall, *Auburn University*
 Samir Jain, *Georgia Tech*
 CeAhna Lathon, *Georgia College and State University*
 Vincent Martin, *Georgia Tech*

Special session: Rediscovering the Passion, Beauty, Joy, and Awe: Making Computing Fun Again, part 7 3:45pm – 5:00pm
 Centennial II

- Organizer: Daniel D. Garcia, *UC Berkeley*
 Participants: Jennifer Campbell, *University of Toronto*
 Rebecca Dovi, *Patrick Henry High School*
 Cay Horstmann, *San José State University*

Special session: Alternatives to Lecture: Experience 3:45pm – 5:00pm
Peer Instruction and Pedagogical Code Reviews Regency V
Participants: Scott Grissom, *Grand Valley State University*
Chris Hundhausen, *Washington State University*
Phillip Conrad, *University of California Santa Barbara*

Thursday Evening • 5:10 p.m. to 7:00 p.m.

Birds of a Feather sessions:

BOF descriptions available at <http://sigcse2014.sigcse.org/>
or scan below for online program



- **Flock I (5:10-6:00):** *Please see page 42 for sessions and locations.*
- **Flock II (6:10-7:00):** *Please see page 44 for sessions and locations.*

Thursday Evening 7:00 p.m. to 8:00 p.m.

SIGCSE Reception – Hot Hors d’oeuvres and Beverages 7:00pm – 8:00pm
Centennial Lobby

Friday Morning – 8:30 a.m. to 10:00 a.m.

SIGCSE Plenary Session

Centennial

8:30

Welcome

Adrienne Decker, Program Co-Chair, *Rochester Institute of Technology*
 Kurt Eiselt, Program Co-Chair, *University of British Columbia*

Keynote Address:

Transforming US Education with Computer Science

Hadi Partovi, *Code.org*

(description, p. 9)

Friday Morning • 10:00 a.m. to 10:45 a.m.

Break & Exhibits

Grand Hall

Friday Morning • 10:00 a.m. to 12:00 p.m.

Poster Session I

Grand Hall

Detailed information about posters may be found on page 46.

Friday Morning 10:00 a.m. to 11:30 p.m.

NSF Showcase #3

Grand Hall

- Easily-programmable, highly-capable robots for use across the curriculum, Zack Butler and Rajendra Raj
- Capacity Building through Curriculum and Faculty Development on Mobile Security, Li Yang, Kai Qian, Minzhe Guo, Prabir Bhattacharya, Fan Wu, and Joseph Kizza
- CE21 Special Project: Principled Assessment of Computational Thinking, Eric Snow and Marie Bienkowski
- Undergraduate researchers roles in cybersecurity for critical infrastructure and software engineering, Joseph Urban

Friday Morning – 10:45 a.m. to 12:00 p.m.

- Paper session: CS2** 10:45am–Noon
 Chair: David Levine, *St. Bonaventure University* Regency VI
- 10:45 ***Injecting Parallel Computing into CS2***
 Joel Adams, *Calvin College*
- 11:10 ***On the Efficacy of Board Game Strategy Development as a First-Year CS Project***
 Ivona Bezakova, James Heliotis, Sean Strout, *Rochester Institute of Technology*
- 11:35 ***Transforming Introductory Computer Science Projects via Real-Time Web Data***
 Austin Bart, Eli Tilevich, Simin Hall, Tony Allevato, Clifford A. Shaffer, *Virginia Tech*

-
- Paper session: Assessment and Evaluation** 10:45am–Noon
 Chair: Ria Galanos, Thomas Jefferson High School Hanover AB
 for Science and Technology
- 10:45 ***Importance of Early Performance in CS1: Two Conflicting Assessment Stories***
 Leo Porter, *Skidmore College*
 Daniel Zingaro, *University of Toronto*
- 11:10 ***Reinventing homework as cooperative, formative assessment***
 Don Blaheta, *Longwood University*
- 11:35 ***Evaluating an Inverted CS1***
 Jennifer Campbell, Diane Horton, Michelle Craig, Paul Gries, *University of Toronto*

-
- Paper session: Classroom Management** 10:45am–Noon
 Chair: Peter DePasquale, *The College of New Jersey* Hanover DE
- 10:45 ***Supporting CS Education via Virtualization and Packages: Tools for Successfully Accommodating “Bring-Your-Own-Device” at Scale***
 Andy Sayler, Dirk Grunwald, John Black, Elizabeth White, Matthew Monaco, *University of Colorado, Boulder*
- 11:10 ***Framing Classroom Climate for Student Learning and Retention in Computer Science***
 Lecia J. Barker, *University of Texas*
 Melissa O'Neill, *Harvey Mudd College*
 Nida Kazim, *University of Texas*

- 11:35 ***Multiple Case Study of Nerd Identity in a CS1 Class***
 Don Davis, Timothy Yuen, *University of Texas at San Antonio*
 Matthew Berland, *University of Wisconsin at Madison*

Paper session: Focus on K-12: Middle School 10:45am–Noon
 Chair: Jill Pala, *Girls Preparatory School* Hanover FG

- 10:45 ***Camp CyberGirls: Using a Virtual World to Introduce Computing Concepts to Middle School Girls***
 Caitlin Hulsey, Toni Pence, Larry Hodges, *Clemson University*
- 11:10 ***MyCS: CS For Middle-Years Students And Their Teachers***
 Elizabeth Schofield, Michael Erlinger, Zachary Dodds, *Harvey Mudd College*
- 11:35 ***Remedying Misperceptions of Computer Science Among Middle School Students***
 Shuchi Grover, Roy Pea, Stephen Cooper, *Stanford University*

Paper session: Soft Skills: Industry Perspectives 10:45am–Noon
 Chair: Sarah Heckman, *North Carolina State University* Hanover C

- 10:45 ***Workplace Scenarios to Integrate Communication Skills and Content: A Case Study***
 Mark Hoffman, *Quinnipiac University*
 Paul Anderson, *Elon University*
 Magnus Gustafsson, *Chalmers University of Technology*
- 11:10 ***Comparing Educational Experiences and On-the-Job Needs of Educational Software Designers***
 Marisa Exter, *Purdue University*
- 11:35 ***Evaluating Industry-Inspired Pair Programming Communication Guidelines with Undergraduate Students***
 Mark Zarb, Janet Hughes, *University of Dundee*
 John Richards, *IBM T.J. Watson Research Center*

Panel session: Experiences Mapping and Revising Curricula with CS2013 10:45am–Noon
 Centennial I

- Participants: David Reed, *Creighton University*
 Andrea Danyluk, *Williams College*
 Elizabeth K. Hawthorne, *Union County College*
 Mehran Sahami, *Stanford University*
 Henry M. Walker, *Grinnell College*

Special session: CS Professional Development MOOCs 10:45am–Noon
Centennial II

Participants: Erin Mindell, *Google*
Karen Brennan, *Harvard University*
Gwendolyn Britton, *Colorado State University-Global Campus*
Jennifer S. Kay, *Rowan University*
Jennifer Rosato, *College of St. Scholastica*

Special session: Looking Outside: What Can Be Learnt From Computing Education Around The World 10:45am–Noon
Regency V

Participants: Annemieke Craig, *Deakin University*
Carsten Kleiner, *University of Applied Sciences & Arts Hanover*
Catherine Lang, *La Trobe University*
Judith Gal-Ezer, *The Open University of Israel*
Michail N. Giannakos, *Norwegian Univ. of Science & Technology*

Supporter Session: Microsoft TouchDevelop – Migrating from Block to Text Programming 10:45am–Noon
Learning Ctr.
Presenter: Peli de Halleux, *Microsoft Research*

Detailed descriptions for Supporter Sessions may be found on page 39.

Friday Lunch – 12:00 p.m. to 1:45 p.m.

Lunch Break *On your own.*

Friday Afternoon – 1:45 p.m. to 3:00 p.m.

Paper session: Peer Instruction 1:45pm–3:00pm
Chair: Jian Zhang, *Texas Womans' University* Regency VI
1:45 *Peer Instruction Contributes to Self-Efficacy in CS1*
Daniel Zingaro, *OISE - University of Toronto*

- 2:10 ***New CSI Pedagogies and Curriculum, the Same Success Factors?***
Christine Alvarado, *University of California, San Diego*
Cynthia Lee, *Stanford University*
Gary Gillespie, *University of California, San Diego*
- 2:35 ***Social Effects of Pair Programming Mitigate Impact of Bounded Rationality***
Zhen Li, Eileen Kraemer, *University of Georgia*

Paper session: Software Engineering: Courses 1:45pm–3:00pm

Chair: Cam Macdonell, *Grant MacEwan University* Hanover AB

- 1:45 ***Improving Software Engineering Education through an Empirical Approach: Lessons Learned from Capstone Teaching Experiences***
Andres Neyem, Jose I. Benedetto, Andres F. Chacon, *Pontificia Universidad Católica de Chile*
- 2:10 ***Selecting Open Source Software Projects to Teach Software Engineering***
Therese Smith, Swapna Gokhale, Robert McCartney, *University of Connecticut*
- 2:35 ***Evaluating GameDevTycoon for Teaching Software Engineering***
Claudia Szabo, *The University of Adelaide*

Paper session: Web-based Instruction 1:45pm–3:00pm

Chair: John Dooley, *Knox College* Hanover DE

- 1:45 ***Online Discussions: Improving Education in CS?***
Radu Mihailescu, *University of Kentucky*
Beth Rubin, *DePaul University*
Judy Goldsmith, *University of Kentucky*
- 2:10 ***CrowdGrader: A Tool For Crowdsourcing the Evaluation of Homework Assignments***
Luca de Alfaro, Michael Shavlovsky, *UCSC*
- 2:35 ***Teaching Composition Quality at Scale***
John DeNero, Stephen Martinis, *University of California, Berkeley*

Paper session: Recruitment and Retention of 1:45pm–3:00pm

Underrepresented Groups Hanover FG

Chair: Alvaro Monge, *California State University, Long Beach*

- 1:45 ***A Journey toward Obtaining Our First NSF S-STEM Grant***
An-I Wang, Gary Tyson, David Whalley, Robert van Engelen,
Zhenghao Zhang, *Florida State University*

- 2:10 ***A Comprehensive Support Program for Introductory CS Courses: Improved Student Performance and Retention of Underrepresented Groups***
Tia Newhall, Lisa Meeden, Andrew Danner, Amet Soni, Frances Ruiz, Richard Wicentowski, *Swarthmore College*
- 2:35 ***Project Rise Up 4 CS: Increasing the Number of Black Students who Pass Advanced Placement CS A***
Barbara Ericson, *Georgia Institute of Technology*
Shelly Engelman, Tom McKlin, *The Findings Group*
Ja'Quan Taylor, *Georgia Institute of Technology*

Paper session: Interdisciplinary Courses and Curricula 1:45pm–3:00pm
Chair: Eric Aaron, *Vassar College* Hanover C

- 1:45 ***Interdisciplinary Computing Classes: Worth the Effort***
Lori Carter, Point Loma Nazarene University
- 2:10 ***Computing in the Arts: A Model Curriculum***
Renée McCauley, Bill Manaris, Marian Mazzone, William Bares, *College of Charleston*
- 2:35 ***E pluribus, plurima: The synergy of interdisciplinary class groups***
Debra Goldberg, Elizabeth White, University of Colorado Boulder

Panel Session: Teaching Tips We Wish They'd Told Us Before We Started, High School Edition 1:45pm–3:00pm
Centennial I

- Panelists: Daniel D. Garcia, UC Berkeley
Baker Franke, The University of Chicago Laboratory Schools
Stephanie Hoepfner, Clermont Northeastern Schools
Josh Paley, Henry M. Gunn High School

Panel Session: Introductory Programming Meets the Real World: Using Real Problems & Data in CS1 1:45pm–3:00pm
Centennial II

- Panelists: Ruth Anderson, *University of Washington*
Michael Ernst, *University of Washington*
Robert Ordonez, *Southern Adventist University*
Paul Pham, *Evergreen College*
Steven Wolfman, *University of British Columbia*
-

Special session: Guided Inquiry Learning in Context: Perspectives on POGIL in CS 1:45pm–3:00pm
Regency V

Participants: Helen H. Hu, *Westminster College*
Clifton Kussmaul, *Muhlenberg College*
Matthew Lang, *Moravian College*
Chris Mayfield, *James Madison University*
Tammy Pirmann, *Springfield Township School District*

Supporter Session: Google Disruptive Innovation in CS Education 1:45pm–3:00pm
Learning Center

Presenters: Maggie Johnson, *Google*
Jane Margolis, *UCLA*
Hadi Partovi, *Code.org*

Detailed descriptions for Supporter Sessions may be found on page 40.

Friday Afternoon 3:00 p.m. to 3:45 p.m.

Break & Exhibits Grand Hall

Friday Afternoon – 3:00 p.m. to 4:30 p.m.

NSF Showcase #4 Grand Hall

- Framing a Rigorous Approach to Beauty and Joy for Outreach to Underrepresented Students in Computing at Scale (FRABJOUS), Dan Garcia
- Research Experience for Teachers: Data Analysis & Mining, Visualization, and Image Processing, R. Mitchell Parry & Rahman Tashakkori
- Developing a Health Informatics Security and Privacy Program, Xiaohong Yuan, Jinsheng Xu, Hong Wang, Kossi Edoh
- Cyber Security: Cyber First Responder Program, Haydar Sahin

Friday Afternoon • 3:00 p.m. to 5:00 p.m.

Poster Session II Grand Hall

Detailed information about posters may be found on page 48.

Friday Afternoon 3:45 p.m. to 5:00 p.m.
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- Paper session: Research: Predictors, Creative Thinking, Co-linking Courses** 3:45pm–5:00pm
Regency VI
- Chair: Brian Dorn, *University of Nebraska at Omaha*
- 3:45 ***No Tests Required: Comparing Traditional and Dynamic Predictors of Programming Success***
Christopher Watson, Frederick Li, Jamie Godwin, *University of Durham*
- 4:10 ***Integrating Computational and Creative Thinking to Improve Learning and Performance in CSI***
Leen-Kiat Soh, Duane Shell, Melissa Hazley, Elizabeth Ingraham, L. D. Miller, *University of Nebraska, Lincoln*
- 4:35 ***Perspectives on Co-linking Design and Development Courses in CS***
Yolanda Jacobs Reimer, Michael Cassens, *University of Montana*

- Paper session: Focus on K-12: Informal Education, Curriculum, and Robots** 3:45pm–5:00pm
Hanover DE
- Chair: Daniela Marghitu, *Auburn University*
- 3:45 ***They Can't Find Us: The Search for Informal CS Education***
Betsy DiSalvo, Cecili Reid, Parisa Khanipour Roshan, *Georgia Institute of Technology*
- 4:10 ***Curriculum is Not Enough: The Educational Theory and Research Foundation of the Exploring Computer Science Professional Development Model***
Joanna Goode, *University of Oregon*
Jane Margolis, Gail Chapman, *UCLA*
- 4:35 ***Sneaking In Through The Back Door: Introducing K-12 Teachers to Robot Programming***
Jennifer Kay, Janet Moss, *Rowan University*
Shelly Engelman, Tom McKlin, *The Findings Group*

- Paper session: Focus on K-12: Before Middle School** 3:45pm–5:00pm
Hanover FG
- Chair: Valerie Summet, *Emory University*
- 3:45 ***Quantitative Correlation between Ability to Compute and Student Performance in a Primary School***
Osvaldo Luiz Oliveira, *Faculty of Campo Limpo Paulista*
Maria do Carmo Nicoletti, *Faculty of Campo Limpo Paulista and UFSCar*
Luis Mariano del Val, *Faculty of Campo Limpo Paulista*

- 4:10 ***Identifying Elementary Students' Pre-Instructional Ability to Develop Algorithms and Step-by-Step Instructions***
Hilary Dwyer, Charlotte Hill, Stacey Carpenter, Danielle Harlow,
Diana Franklin, *UC Santa Barbara*
- 4:35 ***Code Club: Bringing Programming to UK Primary Schools through Scratch***
Neil Smith, *The Open University*
Clare Sutcliffe, Linda Sandvik, *Code Club*

Paper session: Security Among the Cloud 3:45pm–5:00pm
Chair: Elizabeth Hawthorne, *University of Maryland* Hanover C
University College

- 3:45 ***Teaching the Security Mindset with Reference Monitors***
Justin Cappos, *NYU-Poly*
Richard Weiss, *The Evergreen State College*
- 4:10 ***Harnessing the Cloud for Teaching Cybersecurity***
Khaled Salah, *Khalifa University of Science, Technology and Research*
- 4:35 ***Taking a Walk on the Wild Side: Teaching Cloud Computing on Distributed Research Testbeds***
Yanyan Zhuang, *University of British Columbia*
Chris Matthews, Stephen Tredger, Steven Ness, Jesse Short-Gershman,
Li Ji, Niko Rebenich, Andrew French, Josh Erickson, Kyliah Clarkson,
Yvonne Coady, *University of Victoria*
Rick McGeer, *Hewlett-Packard Laboratories*

Panel session: Recruit and Retain Women in Undergraduate Computing: Success Stories using Research-Based Practices 3:45pm–5:00pm
Centennial I

Panelists: Leisa D. Thompson, *NCWIT / University of Virginia*
Crystal Eney, *University of Washington*
Ruth Davis, *Santa Clara University*
Tiffany Grady, *University of Texas - Austin*

Special session: CS Principles Professional Development: Only 9,500 to go! Lessons Learned from our CS10K Summer 2013 PD 3:45pm–5:00pm
Centennial II

Participants: Jan Cuny, *NSF*
Diane A. Baxter, *UC San Diego*
Daniel D. Garcia, *UC Berkeley*
Jeff Gray, *University of Alabama*
Ralph Morelli, *Trinity College*

Special session: Blocks-based Programming Languages: 3:45pm–5:00pm
Simplifying Programming for Different Audiences with Different Goals Learning Center

Participants: Paul Medlock-Walton, *Massachusetts Institute of Technology*
Kyle Harms, *Washington University in St. Louis*
Eileen Kraemer, *University of Georgia*
Karen Brennan, *Harvard University*
Daniel Wendel, *Massachusetts Institute of Technology*

Friday Evening • 5:10 p.m. to 5:55 p.m.

SIGCSE Business Meeting

Regency VI

Friday Evening 6:00 p.m. to 7:00 p.m.

CCSC Business Meeting

Regency VI

**NCWIT Reception for Faculty & Staff
of Educational Institutions**

Regency V

Friday Evening 7:00 p.m. to 10:00 p.m.

Workshops 12 - 23

Various Locations

Full descriptions and locations of workshops may be found on page 59, as well as the conference website: <http://sigcse2014.sigcse.org/>.

Saturday Morning 9:00 a.m. to 10:15 a.m.

Paper session: Operating Systems and Programming Languages 9:00am–10:15am
Hanover AB

Chair: Ariel Ortiz, *Tecnologico de Monterrey, Campus Estado de Mexico*

- 9:00 ***Teaching Operating Systems Using Code Review***
Christoffer Dall, Jason Nieh, *Columbia University*
- 9:25 ***A Virtual Graphics Card for Teaching Device Driver Design***
Christopher Corsi, Robert Geist, Dennis Lingerfelt, *School of Computing, Clemson University*
- 9:50 ***PLCC: A Programming Languages compiler-compiler***
Timothy Fossum, *SUNY College at Potsdam*

Paper session: Soft Skills: Academic Perspectives 9:00am–10:15am

Chair: Briana Morrison, *Southern Polytechnic State University* Hanover DE

- 9:00 ***Teaching and Learning Computer Science Soft Skills Using Soft Skills: The Students' Perspective***
Orit Hazzan, Gadi Har-Shai, *Technion – Israel Institute of Technology*
- 9:25 ***Promoting Ecoliteracy in an Introductory Database Systems Course: Activities for the First Week***
Daniela Incezan, Luis Pradanos, *Miami University*
- 9:50 ***Developing CS/SE Students' Communication Abilities through a Program-Wide Framework***
Janet Burge, *Miami University*
Mladen Vouk, *NC State University*
Paul Anderson, *Elon University*
David Wright, *NC State University*
Gerald Gannod, *Miami University*
Mike Carter, Alanna Howard, Brian Schultz, *NC State University*

- Paper session: What We Say, What They Do** 9:00am–10:15am
 Chair: Raghuram Ramanujan, *Davidson College* Hanover FG
- 9:00 ***Metaphors We Teach By***
 Joseph P. Sanford, Aaron Tietz, Saad Farooq, Samuel Guyer, R. Benjamin Shapiro, *Tufts University*
- 9:25 ***'Explain in Plain English' Questions Revisited: Data Structures Problems***
 Malcolm Corney, *Queensland University of Technology*
 Sue Fitzgerald, *Metropolitan State University*
 Brian Hanks, *BFH Educational Consulting*
 Raymond Lister, *University of Technology, Sydney*
 Renee McCauley, *College of Charleston*
 Laurie Murphy, *Pacific Lutheran University*
- 9:50 ***A Formative Study of Influences on Student Testing Behaviors***
 Kevin Buffardi, Stephen H. Edwards, *Virginia Tech*
-

- Paper session: Extending Frameworks** 9:00am–10:15am
 Chair: Ellen Walker, *Hiram College* Hanover C
- 9:00 ***Using a Software Framework to Enhance Online Teaching of Shader-Based OpenGL***
 James Miller, *University of Kansas*
- 9:25 ***Dynamic Program Visualizations – An Experience Report***
 James Cross, Dean Hendrix, Larry Barowski,
 David Umphress, *Auburn University*
- 9:50 ***Opportunities for Android Projects in a CSI Course***
 Ivaylo Ilinkin, *Gettysburg College*
-

- Special session: Teaching Parallel Design Patterns to Undergraduates in Computer Science** 9:00am–10:15am
 Regency V
- Participants: Richard Brown, *St. Olaf College*
 Joel Adams, *Calvin College*
 Clayton Ferner, *UNC Wilmington*
 Elizabeth Shoop, *Macalester College*
 Barry Wilkinson, *UNC Charlotte*
-

Special session: Nifty Assignments 9:00am–10:15am
<http://nifty.stanford.edu/> Centennial I

Moderators: Nick Parlante, *Stanford University*
 Julie Zelenski, *Stanford University*
 Participants: Kevin Wayne, *Princeton University*
 John Nicholson, *Austin Peay State University*
 Frank McCown, *Harding University*
 Antti Laaksonen, Arto Vihavainen, *University of Helsinki*
 John DeNero, *University of California, Berkeley*

Special session: A Public/Private Partnership for Expanding Computer Science in Schools 9:00am–10:15am
 Regency VI

Participants: Owen Astrachan, *Duke University*
 Amy Briggs, *Middlebury College*
 R. Brook Osborne, Pat Yongpradit, *Code.org*
 Gail Chapman, *UCLA/Exploring Computer Science*
 Joanna Goode, *University of Oregon*

Special session: Interdisciplinary Computing in Many Forms 9:00am–10:15am
 Centennial II

Participants: Ursula Wolz, *Riversound Solutions, LLC*
 Lillian (Boots) Cassel, *Villanova University*
 Bonnie MacKellar, *St. John's University*
 Joan Peckham, *University of Rhode Island*
 Carol Spradling, *Northwest Missouri State*
 Han Reichgelt, *Southern Polytechnic State University*
 Suzanne Westbrook, *University of Arizona*

Supporter Session: Oracle The Integration of Computer Science into English, and History and Science...Oh My! 9:00am–10:15am
 Learning Center

Presenter: Nancy Hoffman, *Oracle*

Detailed descriptions for Supporter Sessions are on page 40 of this program.

Saturday Morning 9:00 a.m. to 12:00 p.m.

Student Research Presentations	GreenBrier (graduate) Fairlie (undergraduate)
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Saturday Morning 10:15 a.m. to 11:45 p.m.**NSF Showcase #5**

Grand Hall

- CABECT: Collaborating Across Boundaries to Engage Undergraduates in Computational Thinking, S. Monisha Pulimood and Kim Pearson
- Developing Game-Like Instructional Modules to Enhance Student Learning in Lower Level Core Computer Science Courses, Jinghua Zhang
- Building a serious game to teach secure coding in introductory programming, Nicoletta Adamo-Villani

Saturday Morning 10:15 a.m. to 10:45 a.m.**Break & Exhibits**

Grand Hall

Saturday Morning 10:45 a.m. to 12:00 p.m.**Paper session: Tools**

10:45am–Noon

Chair: Martha Kosa, *Tennessee Technological University* Hanover AB10:45 ***Interactive Conflictive Animations for Engaging Programming Education***Andrés Moreno, Erkki Sutinen, *University of Eastern Finland*
Mike Joy, *University of Warwick*11:10 ***RSAvizual: A Visualization Tool for the RSA Cipher***Jun Tao, Jun Ma, Melissa Keranen, Jean Mayo, Ching-Kuang Shene,
Chaoli Wang, *Michigan Technological University*11:35 ***Pythy: Improving the Introductory Python Programming Experience***Stephen Edwards, Daniel Tilden, Anthony Allevato, *Virginia Tech***Paper session: Focus on K-12: Outreach and Computational Thinking**

10:45am–Noon

Hanover DE

Chair: Evelyn Brannock, *Georgia Gwinnett College*10:45 ***Five Years of Game Programming Outreach: Understanding Student Differences***Antti-Jussi Lakanen, Ville Isomöttönen, Vesa Lappalainen, University
Of Jyväskylä

- 11:10 ***Challenging Stereotypes and Changing Attitudes: The Effect of a Brief Programming Encounter on Adults' Attitudes toward Programming***
 Polina Charters, Michael LeeAndrew Ko, Dastyni Loksa, *University of Washington*
- 11:35 ***The Consume - Create Spectrum: Balancing Convenience and Computational Thinking in STEM Learning***
 Ashok Basawapatna, Alexander Repenning, Kyu Han Koh, *University of Colorado Boulder*
 Mark Savignano, *University of Northern Colorado Greeley*

- Paper session: MOOCs** 10:45am–Noon
 Chair: Michelle Craig, *University of Toronto* Hanover FG
- 10:45 ***Facilitating Human Interaction in an Online Programming Course***
 Joe Warren, Scott Rixner, John Greiner, Stephen Wong, *Rice University*
- 11:10 ***An Environment for Learning Interactive Programming***
 Terry Tang, Scott Rixner, Joe Warren, *Rice University*
- 11:35 ***Teaching Creative Problem Solving in a MOOC***
 Pascal Van Hentenryck, *NICTA and The University of Melbourne*
 Carleton Coffrin, *NICTA*

- Paper session: Collecting and Analyzing Student Data II** 10:45am–Noon
 Chair: Ruth Anderson, *University of Washington* Hanover C
- 10:45 ***Introducing Undergraduate Database Students to K-12 Education Research***
 Chris Mayfield, *James Madison University*
 Carole Ottenheimer, *Center for Innovative Technology*
 Bethann Canada, *Virginia Department of Education*
 Brooke Bell, *Center for Innovative Technology*
- 11:10 ***Remediation and Student Success in CIS Programs***
 Douglas Kranch, *North Central State College*
- 11:35 ***Identifying Challenging CSI Concepts in a Large Problem Dataset***
 Yuliya Cherenkova, Daniel Zingaro, Andrew Petersen, *University of Toronto Mississauga*

- Special session: Advanced Placement Computer Science: AP Computer Science A and AP Computer Science Principles** 10:45am–Noon
 Centennial I
- Participants: Paul Tymann, *Rochester Institute of Technology*
 Robert Martin, *School for the Talented and Gifted*
 Frances Trees, *Rutgers, the State University of New Jersey*

Richard Kick, *Conejo Valley Unified School District*
 Lien Diaz, *College Board, AP Program*

Tutorial: Team Projects with Alice 3 10:45am–Noon
 Regency VI
 Participants: Wanda Dann, Dennis Cosgrove, Don Slater, Dave Culyba,
Carnegie Mellon University

Special session: Data Science as an Undergraduate Degree 10:45am–Noon
 Regency V
 Participants: Paul Anderson, *College of Charleston*
 James McGuffee, *Northern Kentucky University*
 David Uminsky, *University of San Francisco*

Special session: “Hands-On” Tutorial: Teaching Software Correctness with RESOLVE 10:45am–Noon
 Centennial II
 Participants: Murali Sitaraman, *Clemson University*
 Bruce Weide, *Ohio State University*

Supporter Session: GitHub Version Control with GitHub: A foundation of collaboration 10:45am–Noon
 Learning Center
 Presenter: Matthew McCullough, *GitHub*

Detailed descriptions for Supporter Sessions are on page 41 of this program.

Saturday Lunch 12:00 p.m. to 2:00 p.m.

SIGCSE Luncheon and Concluding Address Centennial III-IV
Lab of Things: a Devices Research and Teaching Platform for Home and Beyond (description, p. 9)
 A.J. Bernheim Brush, Senior Researcher, *Microsoft Research*

Saturday Afternoon 3:00 p.m. to 6:00 p.m.

Workshops 24-35 Various Locations
Full descriptions and locations of workshops may be found on page 64, as well as the conference website: <http://sigcse2014.sigcse.org/>.

SIGCSE 2014 Corporate Supporter Sessions

Through the SIGCSE 2014 Symposium, corporate supporters have the opportunity to schedule sessions on topics of their choice. The following sessions have been coordinated with the SIGCSE 2014 Committee. The SIGCSE 2014 Committee and SIGCSE appreciate the interest of these companies in computer science education and their willingness to work with the SIGCSE 2014 committee to coordinate these events.

Thursday, March 6, 2014 10:45am - 12:00PM

Google: The Engagement and Retention of Students in Undergraduate Computer Science Programs Regency VII
10:45 am – 11:20 am

Leslie Yeh Johnson, *Google*
 Lecia Barker, *University of Texas at Austin*

The 2013 Taulbee report shows the fifth straight year of increased CS enrollment rates, this year at 26.9%. New initiatives are driving further growth and broader interest from women and underrepresented minorities. Retaining these students is important for the economy, national security, and equity. Research on retention in CS shows that meaningful and relevant examples used in class, assignments, and curriculum are the strongest predictor of retention. Research also shows that students with limited programming experience, a group to which a majority of women recruits belong, are at greatest risk of leaving CS after the first year. Additionally, the incoming CS students will have a broad set of interests due to the importance of computation in a rapidly expanding number of fields. Providing learning materials that are especially engaging to inexperienced students will be important for retention, and effective scaling strategies will ensure that all interested students can participate in CS programs. Come join an introduction to Google's new program, Engage CSed.

Engage CSed aims to

- Retain Computer Science undergraduates.
- Prepare for influx of undergraduate Computer Science students.

Participants will learn how we plan to achieve these aims by providing open content for introductory sequence courses that is effective in engaging and retaining all students, including women. We also plan to support scaling strategies designed to meet the educational needs of a growing Computer Science student population. We look forward to hearing from educators working on these issues.

Google: CS First
11:25 am – 12:00 pm

Regency VII

Kate Berrio, Matthew Dawson, Jamie Sue Goodman, *Google*

CS First provides teachers and volunteers with the curriculum and supporting materials to lead a CS program focused on building student courage and confidence while also instilling curiosity. Students jump into new computing experiences, develop perseverance and learn the debugging mindset while exposed to basic coding concepts using tools including Scratch and App Inventor. The curriculum is designed for 4th-12th grade students with no programming experience. Session participants will learn how Google is working with both teachers and non-teacher volunteers within South Carolina schools to scale this pilot program. Participants will also gain access to teacher developed resources that they can bring back to their classroom or share with others.

Microsoft: Building touch apps from millimeters to yards

Martin Schray, Sr. Technical Evangelist, *Microsoft*

Learning Center

Did you know that Windows 8 and Windows Phone 8 share the same OS Kernel? Or that Windows 8 can run on both Intel and ARM based systems? Or apps written in a single language run on both Intel and ARM processors and that you can write HTML 5/ JavaScript apps for Windows 8?

The same kernel runs on Windows Phone, 8.1 inch Windows Tablets to 82 inch Perceptive Pixel touch screens (and everything in between). How did Microsoft do this?

In this session learn how Microsoft architected the OS Kernel, programming languages and tools to enable apps to run on such a variety of devices. We'll explore the technology, approaches and tools allowing developers to pick C++, C# or JavaScript/HTML to build their apps. Finally, we'll explore how to develop portable code that will work on Windows Phone 8 to 82 inch Perceptive Pixel touch screen devices.

Thursday, March 6, 2014 1:45pm - 3:00pm
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ABET: The Benefits of ABET Accreditation to a Quality Computing Program Learning Center

David Cordes, Professor and Department Head, Department of Computer Science, *University of Alabama*

Participants at SIGCSE all believe in providing a quality educational experience to their students. ABET identifies itself as Assuring Quality and Stimulating Innovation. The panel, with both academic and industrial members, will discuss questions such as does ABET accreditation matter to your students and potential employers of your students and how much overhead is associated with accreditation efforts, and what is the perceived return-on-investment for these efforts.

Friday, March 7, 2014 10:45am - 12:00pm
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Microsoft: TouchDevelop – Migrating from block to text programming Learning Center

Peli de Halleux, *Microsoft Research*

The way in which we interact with computing devices is changing: instead of keyboards, advanced touchscreens become more common; mobile devices are often equipped with more sensors, such as location information and acceleration, and devices are connected to the cloud and constantly sharing data. TouchDevelop is a programming environment and language built around this new reality.

You will also learn how to transition from a block programming environment, such as Scratch, into TouchDevelop, a text programming environment. With its typed, structured programming, TouchDevelop allows students to create text-based code without having the syntax in their way. Yet, TouchDevelop is a general purpose programming environment that allows students to create exciting cross-platform apps! You also will learn how 130,000 participants earned more than 800,000 trophies with TouchDevelop during the 2013 Hour Of Code (<http://touchdevelop.com/hoc>). TouchDevelop provides an adaptive tutorial engine to guide the participants through their first experience of coding with high success rate.

Friday, March 7, 2014 1:45pm - 3:00pm
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Google: Disruptive Innovation in CS Education

Regency VII

Maggie Johnson, *Google*Jane Margolis, *UCLA*Hadi Partovi, *Code.org*

High school and college students have been studying computing for 50 years (http://www.iit.edu/cs/cs/about/pdf/high_school_students_use_computers1964.pdf), but this year marks what looks to be a huge and important inflection point in computer science education. In this panel session, people who have each played a significant role as disruptive innovators for computer science education discuss how their ideas and work have been combined with those of the entire community to position us for momentous and important change.

We will hear from each of them about their goals, visions, and aspirations for computer science education; what each is working on as part of realizing these; and how they see their contributions meshing with the community working toward a bright, near-term future.

Saturday, March 8, 2014 9:00am - 10:15am

Oracle: The Integration of Computer Science into English, and History and Science...Oh My!

Learning Center

Nancy Hoffman, *Oracle*

This presentation engages participants with little or no programming experience to understand how basic *Java* programming concepts can be integrated with a research project in any subject. The presenter will use Carnegie Mellon's *Alice* platform to do something fun – create an animated game to present research findings. By dragging and dropping graphic tiles that contain standard *Java* programming statements, the presenter will demonstrate a game that animates 3D objects in an engaging way to present a final research project.

The presenter will demonstrate an *Alice* game that overviews a subject on North America Wildlife. The game will be a presentation on North America Wildlife facts with questions that increase or decrease the game score. Game players will move to a game level, receive information and then are asked questions on that information. Based on the answers the participants provide, participants accumulate points - score at the end determines game ending. The

presentation talks about how to build the project, how to have students complete the research, how to program the animation, and then how to have peer review of the subject.

Intended Audience: K-12 Teachers with little or no Computer Science experience, Administrators, Technology Integration Specialists

Saturday, March 8, 2014 10:45am - 12:00pm

GitHub: Version Control with GitHub: A Foundation of Collaboration Learning Center

Matthew McCullough, *GitHub*

In the domain of computer science education, there is a challenge of what can be fit into a given degree program. The inclusion is often ranked by the potential value of a topic as an underpinning of future CS research, computing skills, required employment knowledge, and helpfulness during a student's university years. Version control is a domain that has benefits in all those aforementioned categories, and is evolving from a mere tracking of changes to the fundamental platform on which software collaboration happens at both small and large scale.

In these 70 minutes of exposition and live demos, come see what Git, a modern version control system, brings to a daily software development workflow. Matthew will show how, with the adoption of best practices like solid tests and continuous integration, a third layer of software quality can be obtained by having a polished history of commits, atomically grouping related work, and in an order that makes later review of the code base much easier under production-system duress.

Matthew will tie everything together with a look at how these features are a platform for collaborative light weight code review, starting from a unique "README-driven-development" approach, and flowing all the way through to pushing to in-house or cloud-based production systems.

SIGCSE 2014 Birds of a Feather Sessions (BoFs)

*BoF sessions are informal gatherings for attendees who share a common interest. Details can be found in the **symposium program**, <http://sigcse2014.sigcse.org/attendees/>.*

Flock I: Thursday Evening, 5:10 p.m. to 6:00 p.m.

Promoting Professional Responsibility and Ethics: The Pledge of the Computing Professional

John Estell, *Ohio Northern University*
Ken Christensen, *University of South Florida*

An exploration of mentor-protégé relationships and how to train mentors at many academic levels.

Elissa Redmiles, Jandelyn Plane, *University of Maryland, College Park - Maryland Center for Women in Computing*

Privacy between Technological Capabilities and Society's Expectations

Ernst Leiss, *University of Houston*
Lila Ghemri, *Texas Southern University*

CSTA Chapters: Building a CS Community

Frances P. Trees, *Rutgers University*
Lissa Clayborn, *CSTA*

What Analogies/Metaphors/Similes Do You Use When Teaching CS Concepts?

William (Bill) Pulling, *Fanshawe College*

Teaching Track Faculty in CS

Mark Sherriff, *University of Virginia*
Daniel Garcia, *University of California at Berkeley*
Jody Paul, *Metropolitan State College at Denver*

Fighting Impostor Syndrome

Aidan Feldman, Matthew McCullough, *GitHub*

No news in database education by all accounts – seriously?

Carsten Kleiner, *University of Applied Sciences&Arts Hannover, Germany*

A Town Meeting: SIGCSE Committee on Expanding the Women-in-Computing Community

Gloria Townsend, *DePauw University*

Using the Cloud to Replace Traditional Physical Networking Laboratories

John Russo, Magdy Ellabidy, *Wentworth Institute of Technology*

Toolmaker or Scientist?

Brian Patterson, *Oglethorpe University*
William Doane, *Science and Technology Policy Institute*

Inspiring a Love of Computer Science through the Education of our Youth
Paige Meeker, *Presbyterian College*

Debugging Teacher Certification
Jian Zhang, *Texas Woman's University*
Philip Sweany, *University of North Texas*

Introduction to Programming for Scientists and Engineers (IPSE)
Peter Froehlich, Joanne Selinski, *Johns Hopkins Univeristy*

China's Perspective from the viewpoint of Computational Thinking on CS1 for Non-majors
Ming Zhang, *Peking University*
Bo Li, *Xian Jiaotong University*
Ginnie Lo, *University of Oregon*

IT Curricular Guidance for Associate-Degree Granting Institutions
Elizabeth Hawthorne, *Union County College*
Robert Campbell, *CUNY Graduate Center*
Jim Nichols, *Estrella Mountain Community College*
Cara Tang, *Portland Community College*
Cindy Tucker, *Bluegrass Community and Technical College*

Preparing Computer Science Students for a Sustainable Future
Daniela Inclezan, *Miami University*

CATs – not just a furry friend. Using Active Learning in your classrooms
Nina Onesti, Saul Blanco, Mitja Hmeljak, Dan Richert, J Duncan, *IU School of Informatics and Computing*

Flock II: Thursday Evening, 6:10 p.m. to 7:00 p.m.

State-Level Advocacy for Computing Education Reform

W. Richards Adrion, *University of Massachusetts Amherst*

How to Decode Student Bottlenecks to Learning in Computer Science

Adrian German, Suzanne Menzel, Joan Middendorf, John F. Duncan, *Indiana University Bloomington*

Engaging College Students in Service Learning to Grow the K-12 Computing Pipeline and Prepare the 21st Century Workforce

Jamie Payton, *University of North Carolina at Charlotte*

Tiffany Barnes, *North Carolina State University*

Jason Black, *Florida A&M University*

Cheryl Seals, *Auburn University*

Data Fluency: Curricular Issues for All Majors

Suzanne Dietrich, *Arizona State University*

Don Goelman, *Villanova University*

Teaching Open Source (Software)

Karl Wurst, *Worcester State University*

Lori Postner, *Nassau Community College*

Stoney Jackson, *Western New England University*

Including HCI and User Experience (UX) Methodologies in Computing Curricula

Debra Davis, *Florida International University*

Janet Davis, *Grinnell College*

Dave Berque, *DePauw University*

Matt Jadud, *Berea College*

Paul Resnick, *University of Michigan*

Ensemble: The Sharing Community

Lillian Cassel, *Villanova University*

Survey Courses and AP CS Principles

Chris Mayfield, *James Madison University*

Dennis Brylow, *Marquette University*

Incorporating Mobile Computing into the CS Curriculum

Josh Dehlinger, Siddharth Kaza, Shiva Azadegan, *Towson University*

NSF/IEEE-TCPP Curriculum Initiative on Parallel and Distributed Computing – Core Topics for Undergraduates

Sushil Prasad, *Georgia State University*

Almadena Chtchelkanova, *National Science Foundation*

Anshul Gupta, *IBM T.J. Watson Research Center*

Arnold Rosenberg, *Northeastern University*

Alan Sussman, *University of Maryland*

Charles Weems, *University of Massachusetts*

Integrating Active Learning Techniques into Systems Courses

Michael Kirkpatrick, *James Madison University*

Leo Porter, *Skidmore College*

Teaching Security Using Hands-On Exercises

Richard Weiss, *The Evergreen State College*

Michael Locasto, *University of Calgary*

Jens Mache, *Lewis & Clark College*

Elizabeth Hawthorne, *Union County College*

Justin Cappos, *NYU Polytechnic University*

Community Engagement and Service Learning Opportunities in Computer Science

Douglas Harms, *DePauw University*

Technology that Educators of Computing Hail (TECH): Come, share your favorites!

Daniel D. Garcia, Dan Armendariz, *UC Berkeley*

Using Science Fiction in CS Courses

Rebecca Bates, *Minnesota State University, Mankato*

Judy Goldsmith, *University of Kentucky*

Valerie Summet, *Emory University*

Nanette Veilleux, *Simmons College*

Using and Sharing Programming Exercises to Improve Introductory Courses

David Hovemeyer, *York College*

Jaime Spacco, *Knox College*

Making Induction Meaningful, Recursively

Peter-Michael Osera, Brent Yorgey, *University of Pennsylvania*

Web Programming

Martin Stepp, *Stanford University*

Jessica Miller, *Microsoft Research*

Can 3D Virtual World Environments and Game-based Learning Effectively Teach Computer Science Concepts?

Stephanie E. August, *Loyola Marymount University*

Jungwoo Ryoo, *Pennsylvania State University - Altoona*

SIGCSE 2014 Poster Sessions

Posters present work-in-progress and other topics for which dialog and feedback are particularly appropriate. Posters are on display Friday morning and afternoon, and their presenters will be available for discussion during these sessions.

Session I: Friday, 10:00 am – 12:00 noon, Grand Hall

Application of A Blended Active Learning Model in Teaching Computer Programming to Non-majors

Chunming Gao, *Michigan Technological University*
Noriyuki Iwane, *Hiroshima City University*

An Analysis of Difficulties Encountered by Novice Alice Programmers

Kuan-Yu Lin, *Taipei Municipal Jianguo High School*
Janet Mei-Chuen Lin, *National Taiwan Normal University*
Hue-Ching Kao, *Taipei Municipal Nan Gang High School*

Exploring Cognitive Processes in Program Comprehension Based on Eye-movement Analysis

Ting-Yun Hou, Yu-Tzu Lin, *National Taiwan Normal University*
Yu-Chih Lin, *Yuanpei University, Taiwan*
Cheng-Chih Wu, *National Taiwan Normal University*

ACE: Automated Composition Evaluator

Stephanie Rogers, Steven Tang, Dan Garcia, *University of California, Berkeley*

Guidelines for Group Work in CS1

Cecily Heiner, *Southern Utah University*

Techniques for Retaining Low Performing Students: High-Need Student Mentoring Program

Shearon Brown, Xiaohong Yuan, *North Carolina A&T State University*

Intelligence and Security Informatics: Developing Curricular Modules in Context

Wingyan Chung, *Stetson University*
Albert Chan, *Fayetteville State University*
Daniel Plante, *Stetson University*
Ray Villalobos, *Seminole State College*
Joseph Woodside, *Stetson University*

Teaching Artificial Intelligence as a Lab Science: Basic and Informed Search

Stephanie E. August, Michael A. Fraser, Miguel A. Vazquez, *Loyola Marymount University*

Analysis of Interaction Logs for Online Tutorials

Daniel Breakiron, Eric Fouh, Sally Hamouda, Cliff Shaffer, *Virginia Tech*

ACM Associate-Degree IT Curricular Guidance

Elizabeth Hawthorne, *Union County College*
Cara Tang, *Portland Community College*
Jim Nichols, *Estrella Mountain Community College*
Cindy Tucker, *Bluegrass Community and Technical College*

Supporting Computational Algorithmic Thinking (SCAT): Development of a complex cognitive capability in African-American middle-school girls

Jakita Thomas, *Spelman College*

Towards Engaging Big Data for CS1/2

Nadeem Hamid, *Berry College*
Steven Benzel, *Georgia Highlands College*

Integrating Computer Science and Mathematics in Middle School with Alice

Susan Rodger, Daniel MacDonald, Elizabeth Onstwedder, Bella Onwumbiko, Edwin Ward, *Duke University*

Use of Problem Solving Approach to Teach Scratch Programming for Adult Novice Programmers

Chiung-Fang Chiu, *National Chi Nan University*

Motivational Active Learning for Computer Science Education

Johanna Pirker, Christian Gütl, *IICM, Graz University of Technology, Austria*

The Impact of Math Preparedness on Introductory Programming (CS1) Success

Emmett Tomai, Christine Reilly, *University of Texas - Pan American*

But How Do We Measure Success?: A New Instrument for Evaluating Girls' Progress in Middle and High School Computing Programs

Catherine Ashcraft, Wendy DuBow, Zhen Wu, *National Center for Women & IT*

Developing a Game-Based Learning Curriculum for "Big Data" in Middle School

Allison Martínez-Arocho, *Meredith College*
Philip Buffum, Kristy Boyer, *North Carolina State University*

Kodu, Alice and Computer Science Unplugged: A Model of Effective Introducing Middle School Students to Computer Science and Computational Thinking

Daniela Marghitu, Lavaris Thomas, Yasmeeen Rawajfih, Jillian Hall, Andrew Marshall, *Auburn University*

Who Drops CS1?

Diane Horton, Michelle Craig, *University of Toronto*

Revitalizing the Computer Science Undergraduate Curriculum Inside and Outside of the Classroom Using Mobile Computing Platforms

Josh Dehlinger, Siddharth Kaza, Shiva Azadegan, *Towson University*

A first year common course on computational problem solving and programming

Bruce Char, Thomas Hewett, *Drexel University*

Altruism among Programmers: the availability and effectiveness of on-line, spontaneous peer mentoring in competitive problem solving.

David Sturgill, *North Carolina State University*

Observations of First Learners with Different Capabilities

Amber Wagner, Jeff Gray, *University of Alabama*

Come Code with Codester: An Educational App that Teaches Computer Science

Gili Rusak, Darren Lim, *Siena College*

Implementing a Living Lab Approach to Foster Innovation in an Advanced Software Engineering Course

Jean French, *Coastal Carolina University*

MyCS: Building a Middle-years CS Curriculum

Thomas Ashmore, Sorathan Chaturapruet, Zachary Dodds, Corinne Druhan, Bridgette Eichelberger, Michael Erlinger, Elizabeth Schofield, *Harvey Mudd College*

OCTAL: Online Course Tool for Adaptive Learning

Dan Armendariz, Zack MacHardy, Daniel Garcia, *University of California, Berkeley*

Session II: Friday, 3:00 pm- 5:00 pm, Grand Hall

Use of Mobile Application to Improve Active Learning and Student Participation in the Computer Science Classroom

Debzani Deb, Mohammad Muztaba Fuad, *Winston Salem State University*

New Hands-on Labs on Browser Security

Wenliang (Kevin) Du, *Syracuse University*

Li Yang, Joseph Kizza, *University of Tennessee at Chattanooga*

Xiaohong Yuan, *North Carolina A&T State University*

An Integrated Approach to Teaching of Abstract Query Languages and their Implementations

Rajshekhar Sunderraman, *Georgia State University*

The Rising Renaissance Engineer Spectrum Awards

Martha Kosa, Ambareen Siraj, *Tennessee Technological University*

Developing and Using an in-house Plugin for Easy Social Network Programming

Anna Koufakou, Dahai Guo, *Florida Gulf Coast University*

Utilizing Gamification with Social Network to aid students in programming languages lessons in Higher Education IT Courses

Marcell Mesquita, *Centro Universitário do Pará, Brazil*

Armando Toda, Jacques Brancher, *Universidade Estadual de Londrina, Brazil*

Ricardo Carmo, *Centro Universitário do Pará, Brazil*

A Comparison of Two Approaches for Hint Generation in Programming Tutors

Andrew Hicks, Barry Peddycord III, Irena Rindos, Christopher Simmons, *North Carolina State University*

Collaborative Programming Exercises in Virtual Worlds

Johanna Pirker, Christian Gütl, Frank Kappe, *IICM, Graz University of Technology*

Impact of Programming Language on Success in High School Programming Contests

Stoney Jackson, Heidi Ellis, Robert Crouse, *Western New England University*

Mission Critical: Building Community to Engage Young Women in Computer Science

Amanda Ochsner, *University of Wisconsin-Madison*

Rane Johnson-Stempson, *Microsoft Research*

Matthew Berland, *University of Wisconsin-Madison*

Interactive E-Learning Modules for Teaching Secure Coding: A Pilot Study

Sagar Raina, Blair Taylor, Siddharth Kaza, *Towson University*

A Comparison of Two Hands-On Laboratory Experiences in Computers, Networks and Cyber Security for 10th-12th Graders

Lisa Marvel, *US Army Research Laboratory (ARL)*

Stephen Raio, *US Army Communications-Electronics Research, Development and Engineering Center (CERDEC)*

Lori Pollock, *University of Delaware*

David Arty, *CERDEC*

Gerard Chaney, *ARL*

Giorgio Bertoli, Christopher Paprcka, Wendy Choi, Erica Bertoli, *CERDEC*

Sandy Young, *ARL*

Scare and Prepare: Increasing Awareness, Safety, and Passion for Cyber-Security

Prem Uppuluri, Jeff Pittges, Joseph Chase, *Radford University*

An Extensible Scene Graph Library for Teaching Computer Graphics along the Programmable Pipeline

Volker Ahlers, *University of Applied Sciences and Arts Hannover, Germany*

Teaching Mobile App Software Development is a Challenge!

Roy Pargas, Punit Kulkarni, *Clemson University*

Gregory Edison, *Clemson University Minor Outlying Islands*

Barbara Speziale, *Clemson University*

The Relationship between Task Difficulty and Emotion in Online Computer Programming Tutoring

Joseph Wiggins, Joseph Grafsgaard, Kristy Boyer, Eric Wiebe, James Lester, *North Carolina State University*

Looking Glass: A C++ Library for Testing Student Programs through Reflection

Scott Turner, *University of North Carolina at Pembroke*

Parallel programming paradigms illustrated

Michael Graf, Deyu Han, David Bunde, *Knox College*

Jens Mache, *Lewis & Clark College*

RIT's New Minor in Free and Open Source Software and Free Culture

Stephen Jacobs, Amit Ray, Jonathan Schull, *RIT*

Making Use of the Cognitive Apprenticeship Framework in an Undergraduate Robotics Course

D. Brian Larkins, *Coastal Carolina University*

Copper Country Programmers: A Novel Curriculum for Beginning Programmers in Middle and High School

Leo C. Ureel II, John Earnest, Charles Wallace, *Michigan Technological University*

Studio K: A Game Development Environment Designed for Gains in Computational Thinking

Gabriella Anton, Matthew Berland, *University of Wisconsin-Madison*

PVA (Privacy through Visual Anonymity) Lab for Enhancing CS Education and Outreach

Ankur Chattopadhyay, Thomas Nehring, *Adams State University*

Adventures in Hackademia: Leveraging Humanitarian Free/Open Source Software Development in the Class Room

Remy DeCausemaker, *RIT Lab for Technological Literacy*

Stephen Jacobs, *RIT Center for Media, Arts, Games, Interaction, and Creativity (MAGIC)*

Data-Driven Broadened Participation

Michele Roberts, *IUPUI*

Introducing CodeWorkout: An Adaptive and Social Learning Environment

Kevin Buffardi, Stephen H. Edwards, *Virginia Tech*

A First-Year Experience Report on a Model for Statewide Deployment of CS Principles Courses

Jeff Gray, *University of Alabama*

Mary Boehm, Carol Crawford, *A+ College Ready*

Kathy Haynie, Sheryl Packman, *Haynie Research and Evaluation*

Deepa Muralidhar, *North Gwinnett High School*

Jeff Baker, *Huntsville High School*

Roy Black, *LAMP Magnet School*

Sandy Falgout, *Baker High School*

Leella Holt, *Muscle Shoals High School*

Albert Lilly, *Alabama School of Math and Science*

Gina McCarley, *Lawrence County High School*
James Morse, *New Century Technology High School*
Jennie Rountree, *Bob Jones High School*
Jill Westerlund, *Hoover High School*
Carol Yarbrough, *Alabama School of Fine Arts*
Mokter Hossain, Jonathan Corley, Amber Wagner, Cassidy Lamm, University of Alabama

Remote Pair Programming (RPP) in Massively Open Online Courses (MOOCs)

Jonathan McKinsey, *University of California, Berkeley*
Samuel Joseph, *Hawaii Pacific University, United Kingdom*
Armando Fox, Daniel Garcia, *University of California, Berkeley*

Resources for Teaching Web Science to Computer Science Undergraduates

Frank McCown, *Harding University*
Michael Nelson, *Old Dominion University*

2014 ACM SIGCSE Student Research Competition*Supported by Microsoft Research***Thursday, March 6, 10:00am – 11:30am
Grand Hall Exhibits****Saturday, March 8, 9:00am – 12:00pm
GreenBrier (graduate) and
Fairlie (undergraduate)**

The Student Research Competition (SRC) supported by Microsoft Research awards prizes to the top three graduate and undergraduate students as determined by conference attendee evaluations of their research projects. Initially, students use the interactive nature of a visual presentation to highlight different aspects of their research to individual evaluators. These presentations are evaluated on their quality, the significance of the work, and the clarity of the informal discussion. The semi-finalists, the top five students in each category, present their contributions using the standard forum of conference presentation during two conference sessions. This venue provides selected audience attendees with another platform for evaluation, the student with experience in formal presentations, and conference participants with the opportunity to learn of ongoing, current research in computer science.

The first round of competition takes place in Plaza Exhibits area from 10:00-11:30am on Thursday. Semi-finalists give their conference presentations in Governors 16 (graduate) and Governors 17 (undergraduate) from 9:00am-noon on Saturday. The winners will be announced and receive their awards during Saturday's luncheon.

Graduate Research Projects**Using Interactive Storytelling Agents to Broaden Participation in Computing**David Brickler, *Clemson University***Computational Thinking Pattern Analysis**Kyu Han Koh, *University of Colorado at Boulder***Evaluating Quality of Student-Written Tests**Zalia Shams, *Virginia Tech***Myna: A VUI for Programming by Voice**Amber Wagner, *University of Alabama***Secure Coding Integrative Touchpoint Model**Michael Whitney, *University of North Carolina Charlotte*

Undergraduate Research Projects

CABECTPortal: An Investigation of Social Computational Systems

Joseph Canero and Conor Kelton, *The College of New Jersey*

Building a Collision Free Environment Using Reciprocal Velocity

Obstacles Methods

David Cherry, *Morehouse College*

BookNav: A System for Accessible Indoor Navigation on Mobile Android Devices

Patrick D'Errico, *The College of New Jersey*

A Novel Approach to Analyze Adult Users' Learning of Technology by Utilizing Usability Study

Shannon Fallon, Nik Gardipee, Lindsay Vogt, Joshua Werner, and Mohsen Doroodchi, *Cardinal Stritch University*

Network Analysis of Nuclear Databases

John A. Hirdt, *St. Joseph's College*

Comparative Review of the ECA and SMS Recycling Tools

Jassiem Ifill and Joshua Posey, *Morehouse College*

Strengthening Computer Science Education with Scribbler Robots

Connor Kerns and Kyle Wong, *University of Southern California*

A Modern CS2: Implementing Social Good and Mobile Technologies into CS2

Spencer B. Liberto, Lea M. Sonnenschein, and Daniel Torres, *Grinnell College*

A Real-Time Visualization of Topic Popularity on Twitter

Elise Richards, *Moravian College*

Properties of Twitter Network Communications among Teenagers

Gili Rusak, *Siena College*

Linac Early Symptoms Detection

Kevin Sanders, *St. Joseph's College*

Collision Sensing with Sphero's Accelerometer

Daniel Tobin and Melissa Mulcahy, *Central Connecticut State University*

SIGCSE 2014 Workshops

The following workshops are available to attendees at a nominal fee, see the conference website for details, <http://sigcse2014.sigcse.org/>.

Wednesday Workshops, 7:00 p.m. to 10:00 p.m.

1. ITSEED: Hands-on Labs for IT Security Education Hanover C

Yan Bai, *University of Washington Tacoma*
Xinli Wang, *Michigan Technological University*

With NSF funding, we have developed a collection of instructional laboratories to enhance the security component in IT education. The labs are developed with a layered and modular design that can be tailored for different courses, accommodating new tools and being conducted in various environments with minimum modifications. This workshop introduces to participants these labs and the environment to conduct them. The workshop proceeds in four sessions in which we: 1) introduce the labs, techniques and environment; 2) demonstrate a lab; 3) guide participants to practice with a lab, 4) debrief. The intended audience is educators who teach IT security courses or other courses with security components at colleges or universities. Experience is not required. Each participant receives an electronic version of 1) the lab assignments that we have developed and used in our teaching practice, and 2) preconfigured virtual machines and tools used to conduct the labs.

2. Making Games and Apps in Introductory Computer Science Regency VI

Tiffany Barnes, *North Carolina State University*
Veronica Catete, *North Carolina State University*
Andrew Hicks, *North Carolina State University*
Barry Peddycord III, *North Carolina State University*

The new CS Principles curriculum, a pilot Advanced Placement course, offers novice students an exciting opportunity to learn computing in a hands-on, fun way. High school and college teachers of introductory computer science course are invited to this workshop to learn basic game and mobile phone development. Participants will learn GameMaker, AppInventor, and Touch Develop. These tools allow students to create and have fun with computing while teaching object-oriented and event-driven programming and game architectures. Participants should bring their own laptops (ideally with AppInventor installed). Windows 7 phones will be provided during the workshop. We will provide links to curricular modules for the CS Principles: Beauty and Joy of Computing course.

3. Reviewing NSF Proposals: Learn about Effective Proposal Writing via the Review Process Hanover AB

Paul Tymann, *NSF*
Valerie Barr, *NSF*

This workshop focuses on the NSF proposal review process. Via close examination of the review process, participants gain an understanding of how to write good reviews and how to improve their own proposal writing. The workshop covers the following topic areas: the proposal review process from submission of a proposal to award or decline; elements of a good review; NSF merit criteria (intellectual merit and broader impacts); elements of a good proposal; and how to volunteer to review proposals.

4. Integrating Software Testing into Programming Courses (WISTPC 2014) Hanover FG

Peter Clarke, *Florida International University*
Yujian Fu, *Alabama A&M University*
James Kiper, *Miami University*

The WISTPC workshop introduces participants to a minimally intrusive approach to integrating software testing into software engineering and advance programming courses using a cyberlearning environment. The focus of the workshop will be to introduce participants to (1) software testing techniques, and (2) the features of WReSTT – Web-Based Repository of Software Testing Tutorials, that supports testing in the classroom. WReSTT integrates aspects of collaborative learning and social networking to improve students’ ability to learn software testing techniques and testing tools. We expect participants to know Java and we assume they have little or no formal training in software testing. At the end of the workshop participants should: (1) have a basic understanding of software testing and testing tools, (2) be able to use WReSTT in their classes, and (3) be able to use learning objects to support software testing instruction. URL: <http://wrestt.cis.fiu.edu/cen/wistpc-14> Laptop Required – a web browser and wifi enabled.

5. Teaching Computing with the IPython Notebook Regency VII

Greg Wilson, *Mozilla Foundation*
Fernando Perez, *University of California Berkeley*
Peter Norvig, *Google Inc.*

The IPython Notebook is an interactive browser-based environment where you can combine code execution, text, mathematics, plots, and rich media into a single document. Originally designed for use as an electronic lab notebook for computational science, it is increasingly being used in teaching as well, and a rich ecosystem of open source plugins and extensions for teaching is growing around it. The first half of this hands-on workshop will introduce the Notebook and present examples of lessons and instructional materials built around it. In the second half, attendees will explore future directions for the Notebook as a teaching platform.

**6. Teaching Service-Oriented Programming to CS
and SE Undergraduate Students**

Dunwoody

Xumin Liu, Rajendra Raj, Thomas Reichlmayr, *Rochester Institute of Technology*
 Alex Pantaleev, *SUNY Oswego*
 Chunmei Liu, *Howard University*

Service-Oriented Programming (SOP) is a relatively new programming paradigm that supports the development of new software applications using existing web services as building blocks. SOP has gained significant popularity in industry as it increases software reuse and productivity. As the SOP paradigm can improve modern software development, the presenters have created a course-module based approach for incorporating SOP into Computer Science (CS) and Software Engineering (SE) curricula; a course module is a distinct, self-contained curricular unit such as a lab or teaching component that an instructor may incorporate into an existing course, typically without requiring formal curricular approval. The workshop presenters have developed SOP course modules for inclusion in standard CS and SE courses. There is an introductory SOP module for a course such as Computer Science 2, a mid-level SOP module for a course such as Programming Language Concepts, and a more advanced module for a course such as Software Engineering or Web Services. These developed course modules have been used in courses at three universities, and have been improved based on these teaching experiences. This workshop will present basic concepts and techniques of SOP and the three course modules, and describe how the course-module approach toward SOP can be adapted for the participants' own teaching.

**7. GENI as a Virtual Laboratory for Networking and
Distributed Systems Classes**

Hanover DE

Vicraj Thomas, Niky Riga, Sarah Edwards, *GENI Project Office/BBN*

This hands-on workshop will introduce GENI to instructors of computer networking and distributed systems classes. Instructors can use GENI [<http://groups.geni.net/geni/wiki>], an easy-to-use virtual laboratory, to improve the educational experiences of their students by having them experiment with new concepts without requiring expensive laboratory facilities. It has been used by over twenty graduate and undergraduate classes.

GENI is being used by over 1200 researchers and educators. It enables them to run large-scale, well-instrumented, end-to-end experiments engaging real users. These experiments may be fully compatible with today's Internet, variations or improvements on today's Internet protocols, or indeed radically novel "clean slate" designs. GENI includes compute and communications resources distributed across the United States. GENI is "deeply programmable" i.e. experimenters can install their custom software or operating systems on the compute nodes and can program the behavior of the switches that connect these nodes.

GENI is funded by the National Science Foundation and is free to use for research and education.

Workshop participants will have the opportunity to set up and run experiments using GENI. They will also learn about class logistics when using GENI and support

resources such as ready-to-use exercises. Those doing the hands-on activity will need a laptop running relatively a recent version of Mac OS, Windows or Linux; at least 4GB of memory; a modern processor (at least dual core and faster than 1.5 GHz) and a WiFi interface.

Tutorial URL: <http://groups.geni.net/geni/wiki/Tutorials/SIGCSE14>.

8. CABECT: Collaborating Across Boundaries to Engage Undergraduates in Computational Thinking Greenbrier

S. Monisha Pulimood, Kim Pearson, Diane C. Bates, *The College of New Jersey*

Innovative solutions for complex problems entail diversity of perspectives, and students must learn to integrate concepts from multiple disciplinary areas. Yet, to provide collaborative experiences that cross disciplinary boundaries, educators must navigate numerous administrative and pedagogical challenges. In this hands-on workshop participants will learn how to leverage existing courses for students and faculty to collaborate across disciplines and with a community partner, to develop socially-relevant computational solutions for real-world problems. Participants will also brainstorm ideas on addressing specific challenges at their own institutions. The intended audience is educators interested in engaging their students in deep computational thinking through immersive multidisciplinary collaborative experiences. Registered participants will be reimbursed the workshop registration fee through NSF Award# 1141170. We will additionally offer a stipend to participants who adopt our model, administer assessments and provide us with their results for analysis and inclusion in reports. More information will be available at <http://tardis.tcnj.edu/cabect/>. Laptop Recommended.

9. Enhancing Computer Science Education (CSE) with the Use of 3D Printer Technology Courtland

Robert Lutz, Evelyn Brannock, *Georgia Gwinnett College*

This workshop provides an introduction to three-dimensional (3D) printing. This tutorial will: cover the general background of 3D printing, summarize popular software tools, describe associated challenges and offer suggestions for application within computer science (CS) coursework. Participating CSE educators will get hands-on experience with 3D printing tools and will be able to print a limited number of items during the workshop. Attendees will perform a full lifecycle exercise in the printing workflow, progressing from a concept, to a digital model, to a physical implementation. The workshop will also describe the authors' experience integrating this authentic learning into several IT and CS courses. Experience gained will be useful after the session in both printer and printer-less environments. See <http://tinyurl.com/k65jxsm> for more information. Laptop required.

10. Scala for Introductory CS and Parallelism

Fairlie

Mark Lewis, *Trinity University*Konstantin Läufer, George Thiruvathukal, *Loyola University Chicago*

Scala is one of a new breed of hybrid languages with both object-oriented and functional aspects. It happens to be the most successful of these languages coming in at #12 on the Red Monk language ranking and leading all languages in their 2nd tier. This workshop will introduce participants to the Scala programming language, how it can be used effectively in introductory CS courses, and the parallel tools that are available for it. We begin with simple examples in the REPL and scripting environment, then look at doing larger, object-oriented projects. We finish off with an exploration of composable futures and the Akka actor library. Participants are strongly recommended to bring a laptop.

11. Teach Algorithm Design and Intractability with a Project-Based Curriculum Centered on a Single Intractable Problem: Three Domains to Choose From

Regency VI

Andrea F. Lobo, Ganesh R. Baliga, *Rowan University*

This workshop presents an award-winning, NSF-funded, project-based curriculum for algorithm design that includes algorithmic strategies for intractable problems. This curriculum is a sequence of laboratory projects comprising increasingly sophisticated solvers for a single intractable problem, designed to integrate into existing, one-term, undergraduate courses that teach algorithm design and/or intractability without sacrificing traditional course content. The presenters have used the curriculum in the Design and Analysis of Algorithms course at their institution to help students tackle and appreciate intractability. This workshop presents versions of the curriculum centered on TSP, SAT and Sudoku. Attendees will receive adoption materials and access to an adopters forum. NSF is funding the development, evaluation, dissemination and adoption of the curriculum, and potential adopters are encouraged to apply for funding to attend this workshop and SIGCSE 2014 at <http://www.rowan.edu/~lobo/AlgosCurriculum>. This material is based upon work supported by the National Science Foundation under Grant No. 1140753. Laptop optional.

Friday Workshops, 7:00 p.m. to 10:00 p.m.
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12. Exploring Computer Science: Computational Practices in Action Hanover DE

Gail Chapman, *University of California, Los Angeles*
 Joanna Goode, *University of Oregon*

The ECS program includes an inquiry-based college-preparatory curriculum that introduces students to the creative nature of computing, technology as a tool for solving problems, and the relevance and impact of CS. This workshop will provide participants the opportunity to engage in activities from the ECS curriculum that highlight the six computational practices common to ECS and CS Principles. We will explicitly model the inquiry-based design of the activities and facilitate discussions that highlight how inquiry manifests itself in the computational practices. This workshop is appropriate for K-12 educators and college/university faculty who are interested in deepening their understanding of how teacher pedagogy is critical to broadening participation in computing. Laptop Optional.

13. Teaching Shared Memory Parallel Concepts with OpenMP Dunwoody

Joel Adams, *Calvin College*
 Richard Brown, *St. Olaf College*
 Elizabeth Shoop, *Macalester College*

Curriculum 2013 brings parallelism into the CS curricular mainstream. This hands-on workshop is intended for faculty with little or no background in parallel computing. OpenMP is a platform independent, industry-standard library for shared-memory parallel programming supported by all modern C and C++ compilers. The workshop introduces the basics of OpenMP multithreading using parallel patterns, including single program multiple data (SPMD) execution, fork-join threading, and pragmas for parallel for loops, parallel blocks, mutual exclusion, etc. The workshop includes: (i) an overview of OpenMP, (ii) self-paced hands-on experimentation with the OpenMP programs, and (iii) a discussion of how these may be used to achieve the goals of Curriculum 2013. Workshop materials will be distributed from csinparallel.org. Participants will receive and explore 15 short programs designed to help students understand multithreading concepts, plus longer programs that use OpenMP to solve significant problems. A participant may explore these programs on their own laptop, provided it has installed a C/C++ compiler that supports OpenMP (e.g., gcc 4.2 or later; Visual Studio 2008 or later). Those comfortable with the commandline may explore the programs on our remote servers using a laptop or tablet with a suitable SSH client. Laptop recommended.

14. Creating Stimulating, Relevant, and Manageable Introductory Computer Science Projects that Utilize Real-Time Web-Based Data Fairlie

Eli Tilevich, Clifford Shaffer, Austin Cory Bart, *Virginia Tech*

This workshop introduces participants to RealTimeWeb, a software architecture framework that makes real-time web data, such as weather reports, news updates, and restaurant recommendations, accessible for introductory programming projects. The presented technology offers technical scaffolding for the students to gradually ease into

(or completely circumvent if appropriate) some of the most vexing complexities of distributed computing. At the heart of RealTimeWeb are carefully engineered client libraries through which students can access the data provided by real-time web services. To support computing educators teaching introductory CS classes in a variety of programming languages, each library is available in Python, Java, and Racket, with compatibility on key platforms, including Android. These libraries are readily available through an online curated gallery, designed to be quickly adapted to instructors' specific academic needs. This gallery also provides a tool for rapidly prototyping new libraries based on our framework. RealTimeWeb enables computing educators to introduce important real-time distributed computing concepts without overwhelming students with the low-level details that working with such data typically requires.

This workshop introduces RealTimeWeb via a hands-on approach by introducing participants to the core functionality of our architectural framework and client libraries. The workshop proceeds in three parts in which we: (1) present RealTimeWeb by working through a case study of creating a programming project in a typical CS 2 course; (2) demonstrate how the framework can be used to rapidly prototype a new library of the participants' choice; and (2) critically discuss the technology in small and large groups.

15. Computational Music Remixing with EarSketch

Regency VI

Brian Magerko, Jason Freeman, *Georgia Tech*
 Mike Reilly, *Lanier High School*
 Christopher Michaud, *Georgia Tech*

EarSketch (ears sketch.gatech.edu) is an integrated curriculum, software toolset, audio loop library, and social sharing site that teaches computing principles through digital music composition and remixing. Attendees will use Python to place audio clips, create rhythms, and add and control effects to a multi-track digital audio workstation (DAW) while learning computing concepts such as variables, iteration, conditionals, strings, lists, and functions. Participants write code to make music, with a focus on popular genres such as hip hop. The agenda outlines the pedagogy of connecting musical expression to computation. EarSketch has been used in introductory computing summer camps and academic courses and works well with CS Principles. It is currently being used in a 21,000-student MOOC.

16. Scratch + Xbox Kinect: A Magical Combination for Outreach

Centennial II

Victor Norman, *Calvin College*

Participants will learn how to install Scratch, the Xbox Kinect libraries, and the software that integrates the two. The participant will then practice basic Scratch programming, and then learn how to program Scratch when connected to an Xbox Kinect. Five programming challenges will be given to participants, ranging from easy to difficult. During these activities, the participants will experience the excitement of using their bodies (instead of a mouse and keyboard) as the program controller. Discussions will be held to think about human-computer interactions, standard interaction models, etc., as well as how to help students engage more deeply with computer programming activities. Participants will work in teams of 3 or 4 using participant-supplied laptops running Windows 7.

17. The Absolute Beginner's Guide to JUnit in the Classroom

Hanover AB

Stephen Edwards, Manuel Perez-Quinones, *Virginia Tech*

Software testing has become popular in introductory courses, but many educators are unfamiliar with how to write software tests or how they might be used in the classroom. This workshop provides a practical introduction to JUnit for educators. JUnit is the Java testing framework that is most commonly used in the classroom. Participants will learn how to write and run JUnit test cases; how-to's for common classroom uses (as a behavioral addition to an assignment specification, as part of manual grading, as part of automated grading, as a student-written activity, etc.); and common solutions to tricky classroom problems (testing standard input/output, randomness, main programs, assignments with lots of design freedom, assertions, and code that calls exit()).

18. Teaching with HFOSS to Provide Students with Real Hanover FG

Darci Burdge, Lori Postner, *Nassau Community College*
 Becka Morgan, *Western Oregon University*
 Heidi Ellis, Stoney Jackson, *Western New England University*
 Gregory Hislop, Michelle Purcell, *Drexel University*

Have you ever wanted your students to contribute to or learn from a real-world software project that benefits society? Want some help getting started? Many students find involvement in Humanitarian Free and Open Source Software (HFOSS) projects engaging and motivating. As a first step, this workshop will introduce faculty to FOSS tools and culture. Through a virtual field trip into the world of HFOSS you will learn how to find a project, discern characteristics of a good project for student participation and understand how to use IRC, a communication tool used by FOSS developers. The use of version control to support project development will also be discussed. Additional information at: http://www.foss2serve.org/index.php/SIGCSE_2014_Workshop. Laptop required.

19. Guiding Students to Discover CS Concepts and Develop GreenBrier
Process Skills using POGIL

Clifton Kusmaul, *Muhlenberg College*
 Helen H. Hu, *Westminster College*
 Matthew Lang, *Moravian College*

This workshop is for anyone who teaches CS, and introduces process-oriented guided inquiry learning (POGIL) in computer science. In a POGIL classroom, teams of 3-5 learners work on instructor-facilitated activities. Through scripted inquiry and investigation, learners discover concepts and construct their own knowledge. Using assigned team roles and meta-cognition, learners develop process skills and individual responsibility. Studies show that POGIL can significantly improve student performance. Workshop participants will experience POGIL activities, learn core practices, and draft activity pieces. POGIL materials for a variety of CS concepts will be shared. More information is available at <http://cspogil.org>, including sample activities for CS1, CS2, and other courses. Laptops optional.

20. Mobile Computational Thinking with App Inventor 2

Regency VII

Franklyn Turbak, *Wellesley College*
 Fred Martin, *University of Massachusetts Lowell*
 Shaileen Crawford Pokress, *MIT*
 Ralph Morelli, *Trinity College*
 Mark Sherman, *University of Massachusetts Lowell*
 David Wolber, *University of San Francisco*

Computational Thinking Through Mobile Computing is an NSF-funded project for introducing students to computational thinking through creating mobile apps. In this hands-on workshop, which is targeted at undergraduate and secondary school computer science teachers, participants will develop Android apps using MIT App Inventor 2. This is a new version of the visual blocks-based programming environment with additional language features (e.g., local variables) and browser-based blocks editing. The workshop will also present pedagogical materials (lessons, tutorials, assignments), evaluation materials (blocks-based quizzes, surveys, project rubrics), and student projects. All of the pedagogical materials presented in the workshop, as well as all of the materials used by the workshop presenters in their individual courses, are posted on the Web and are available to everyone under a Creative Commons license. A laptop is required for this workshop. Each participant will be provided with an Android mobile device to use during the workshop. Participants who have their own Android phones or tablets can use them if they choose. This workshop is based upon work supported by the National Science Foundation under Grant Numbers 1225680, 1225719, 1225745, 1225976, and 1226216.

21. Using the New Lego MindStorms EV3 Robotics Platform in CS Courses

Centennial I

Frank Klassner, *Villanova University*
 Ben Schafer, *University of Northern Iowa*

This workshop will conduct an exploration of the newly released Lego Mindstorms EV3 robot platform and its applicability to the college computer science curriculum. Participants will learn about the EV3 through handouts and hands-on programming exercises. The first part of the workshop will focus on demonstrating EV3 robots as well as the STEM concepts and computing concepts they illustrate. The second part of the workshop will focus in on the new capabilities of the EV3. This workshop will be more detailed than the vendor led workshop. It will be of benefit to participants new to Mindstorms robotics as well as those with NXT/RCX experience who want to see the evolution of the platform and new components featured in the EV3. These include a revision of the controller brick hardware and software, new color and gyroscopic sensors, and increased processing and memory capabilities. The organizers have a combined 20 years of experience using Mindstorms in CS courses (including courses in introductory programming, systems, and artificial intelligence) with Lego and third party programming environments. Participants must bring a Bluetooth-capable laptop (Mac or Windows), and will have a robot, software, and kit to use for the workshop. Participants will receive a promotion code to purchase a 10% discounted Mindstorms kit.

22. AP CS Principles and The Beauty and Joy of Computing Curriculum

WORKSHOPS WORKSHOPS WORKSHOPS WORKSHOPS WORKSHOPS

Daniel D. Garcia, Brian Harvey, *UC Berkeley*
 Tiffany Barnes, *North Carolina State University*
 Dan Armendariz, Jon McKinsey, Zachary MacHardy, Omoju Miller, *UC Berkeley*
 Barry Peddycord III, *North Carolina State University*
 Eugene Lemon, *Ralph J Bunche High School*
 Sean Morris, *Albany High School*
 Josh Paley, *Henry M. Gunn High School*

The Beauty and Joy of Computing (BJC) is an introductory computer science curriculum developed at UC Berkeley (and adapted at the University of North Carolina, Charlotte), intended for high school juniors through university non-majors. It was used in two of the five initial pilot programs for the AP CS Principles course being developed by the College Board and the National Science Foundation. Our overall goal is to support the CS10K project by preparing instructors to teach the AP CS Principles course through the BJC curriculum. In this workshop, we will share our experiences as instructors of the course at the university and high school level, provide a glimpse into a typical week of the course, and share details of NSF-funded summer professional development opportunities.

23. Hands-on Cybersecurity Exercises in the EDURange Framework Hanover C

Richard Weiss, The Evergreen State College
 Michael Locasto, The University of Calgary
 Jens Mache, Lewis & Clark College
 Vincent Nestler, Capitol College

Cybersecurity is a topic of growing interest for CS educators. The goal of this workshop is to provide faculty with tools and interactive exercises that would facilitate adding this topic to their curriculum. We will introduce the EDURange framework for developing interactive cybersecurity exercises. We have several exercises for participants to try, including network scanning and firewall configuration. We will give an introduction to some tools such as nmap, as well as the basic concepts. We have tested our framework several times in classrooms and workshops for students and faculty. One of its advantages is that faculty can use it in their classes with very little set-up. It uses Amazon's EC2/AWS to make the exercises readily available, so instructors will be able to access them with an account. We will also discuss other security exercises, including ones in the RAVE. It also provides each user with a number of VMs with tools and vulnerabilities. We will discuss using exercises as assessment tools. No previous experience in security is necessary. Laptop required. <http://blogs.evergreen.edu/edurange>.

Saturday Workshops, 3:00 p.m. to 6:00 p.m.

24. Server-side Web Development with JavaScript and Node.js Hanover AB

Ariel Ortiz, *Tecnologico de Monterrey, Campus Estado de Mexico*

Node.js is one of the hottest open source web platforms currently available. It's built on Google Chrome's V8 JavaScript runtime engine and it allows you to write all kinds of network applications and servers in just a few lines of code. Node.js uses an asynchronous programming model built on non-blocking I/O and a single-threaded event loop. What this means, basically, is that you don't need to be concerned with awful race conditions or synchronization issues that arise when programming for a concurrent multi-user environment. This workshop is aimed mainly at web development instructors that would like to consider teaching a single programming language, JavaScript, for both client-side and server-side coding. Participants will learn how to employ Node.js on Windows, Mac OS or Linux in order to write scalable web servers and applications. Additionally, the Express web framework will be introduced in order to demonstrate how to quickly program traditional webapps and single-page applications (SPA) with the aid of jQuery, AJAX and RESTful web services. The resulting programs will be usable from any modern web browser, including those found in desktop and laptop computers, and mobile devices such as tablets and smart-phones. Participants should have prior working knowledge of client-side (running on a browser) JavaScript and HTML. More information: <http://node.arielortiz.info/> Laptop Required.

25. Artbotics with Lego Mindstorms Centennial II

Adam Norton, *University of Massachusetts Lowell*

Michael Penta, *Northern Essex Community College*

This workshop introduces participants to the Artbotics program, which combines art and robotics to teach students about computer science while creating kinetic, interactive sculptures. The material covered will be provided in introductory fashion, requiring no prior experience with computer science, art, or robotics. The Lego Mindstorms NXT platform will be used to create two projects during the workshop: a spirograph-like drawing produced by programming a car holding a marker to drive using a sequence of motor movements (teaching the need for looping in programming) and an interactive, kinetic sculpture that reacts to sensor input (teaching the need for decisions in programming and building simple mechanisms). Examples of both projects can be seen at youtube.com/artbotics. The workshop will end with a short discussion of lessons learned and best practices, using examples from previous Artbotics programs for a variety of ages. Topics will include appropriate time frames, how to best use limited resources, and appropriate levels of depth for each age group. The workshop administrators will be providing laptops with the proper Lego Mindstorms NXT software, Lego Mindstorms NXT kits, and all needed building materials.

26. Using the AP CS Labs in the Classroom

Hanover C

Paul Tymann, *Rochester Institute of Technology*
 Lester Wainright, *Charlottesville High School*
 Robert Martin, *School for the Talented and Gifted*

The Advanced Placement (AP) Computer Science (CS) A Development Committee is replacing the large case study (GridWorld) with a hands-on structured lab component with the following characteristics:

- At least three labs explore computing in context at a significant level, building upon supplied code that provides examples of good style and appropriate use of programming language constructs
- Each lab contains a significant problem-solving component in which students study alternative approaches for solving a problem, solve new problems, or modify existing code to solve altered problem.
- At least one lab provides students with experience working with programs involving multiple interactive classes and may involve decomposing a program into classes and using inheritance, interfaces, and other object-oriented concepts as identified in the AP Computer Science A topic outline.
- Collectively, lab experiences will cover at least 80% of the topics listed in the course description and will involve at least 20 hours of class time.

In investigating the use of labs, the AP CS A program developed three labs that cover many introductory topics and may be used at various times throughout a course. Since these labs cover many basic concepts and perspectives, the labs are appropriate for both AP CS A courses and many college CS1 courses. This workshop will introduce teachers to the AP CS A lab materials and provide practical experience in using these materials within introductory courses.

27. Learn Java in N Games

Hanover DE

Peter Drake, *Lewis & Clark College*
 Mark Goadrich, *Centenary College of Louisiana*

The Learn Java in N Games project (ljing.org) aims to teach topics in CS1, CS2, and other courses by having students implement a variety of games. Each game is presented as a stand-alone module, easily incorporated into an existing course without committing to major curricular changes. Modules include unusually clear solution code, skeleton code for students to complete, JUnit tests for quick feedback to students and automated grading, and clear assignment statements with learning objectives. Program code strictly separates game logic from graphic user interfaces (GUIs), allowing the same code to be used in both conventional and mobile Android environments. In this three-hour tutorial, participants will complete two assignments. These assignments are ready to be used in classes the next day. Laptop required.

28. Chapel: A versatile tool for teaching undergraduates parallel programming

Hanover FG

David Bunde, *Knox College*
Kyle Burke, *Colby College*

Chapel is a programming language being developed for high-performance applications. It is well-suited for teaching parallelism in a wide variety of undergrad courses. Chapel is easy to learn since it supports a low-overhead style like a scripting language as well as a full OO style. It is concise, needing a single keyword to launch an asynchronous task, run a parallel loop, or perform a reduction. This helps undergrads focus on the main point of examples and lets them quickly try different parallel algorithms. It is also versatile, usable on both multicore systems and clusters. In this workshop, attendees will learn basics of Chapel, complete hands-on exercises, and see possible uses in algorithms, programming languages, and parallel programming courses. Laptop with SSH client required.

29. Introduction to analysing the BlueJ Blackbox data

Fairlie

Neil Brown, *University of Kent*

The Blackbox project, launched in 2013, collects large amounts of data about beginner student behaviour in the BlueJ IDE. In this workshop, we will introduce researchers to the Blackbox data and show them how to get started with analyzing it to answer their own research question(s). The workshop provides an ideal opportunity to find out what can be done with the Blackbox data, and will be run by the system's architect and maintainer. The data set includes Java source code as well as information about compilations, debugger usage and other compiler interactions. The Blackbox project has over 150,000 users, over 10,000,000 compilations and tens of gigabytes of source code. (For more detailed information, see the paper "Blackbox: A Large Scale Repository of Novice Programmers' Activity" by Brown et al. in the SIGCSE 2014 proceedings.) Computing education researchers may apply for free, permanent access to the data, but is not necessary to do so before this workshop. The session will be hands-on, and participants should bring a laptop that is capable of running an SSH terminal (e.g. Mac OS X, Linux, or PuTTY on Windows) over a wireless connection.

30. Introducing Secure Coding in CS0, CS1, and CS2

Regency V

Blair Taylor, Siddharth Kaza, *Towson University*
Elizabeth K. Hawthorne, *Union County College*

The CS 2013 curriculum includes Information Assurance and Security as a pervasive knowledge area. However, introducing security in lower level courses is challenging because of lack of appropriate teaching resources and training. This workshop will provide a well-tested strategy for introducing secure coding concepts in CS0, CS1, and CS2. We will introduce attendees to secure coding through hands-on exercises, and provide self-contained, lab-based modules designed to be injected into CS0-CS2 with minimal impact on the course (www.towson.edu/securityinjections). Participants will be encouraged to bring in their own syllabus and labs to modify to include secure coding concepts. The first 15 participants will be reimbursed for the workshop cost on attendance (through NSF DUE-1241738). Laptop recommended.

**31. Projects for Computing Summer Camps for
4th-12th Grade Students**

Centennial I

Barbara Ericson, *Georgia Institute of Technology*
 Christopher Michaud, *Marist School*
 Xin Xu, *Georgia Gwinnett College*
 Krishnendu Roy, *Valdosta State University*

This workshop will provide details on the projects that we recommend for non-residential computing summer camps for 4th – 12th grade students. Georgia Tech has been offering computing summer camps since 2004. These camps are financially self-sustaining and effective at improving attitudes towards computing, especially for females and African-American students. Items used in the camps include: CS Unplugged, LightBot, Scratch, Alice, LEGO robots (WeDo, NXT, and Tetrax), EarSketch, and App Inventor. Georgia Tech has also helped eleven other colleges and universities in Georgia start or expand computing summer camps. Some of these other institutions also offer camps on GameSalad, GameMaker, and web development. These other camps also have improved attitudes towards computing.

The workshop will include an overview of the projects that we have found to be successful and hands-on work with App Inventor, GameSalad, LEGO NXT robots, and LEGO EV3 robots.

32. SNAP! (Build Your Own Blocks)

Regency VI

Brian Harvey, Daniel Garcia, *University of California, Berkeley*
 Tiffany Barnes, *North Carolina State University*
 Nathaniel Titterton, Omoju Miller, Dan Armendariz, Jon McKinsey, Zachary Machardy,
University of California, Berkeley
 Eugene Lemon, *Ralph J Bunche High School*
 Sean Morris, *Albany High School*
 Josh Paley, *Henry M. Gunn High School*

This workshop is for high school and college teachers of general-interest ("CS 0") computer science courses, especially the AP CS: Principles course.

SNAP! (Build Your Own Blocks) is a free, browser-based, graphical, drag-and-drop language inspired by Scratch. The beauty of the Scratch programming environment, designed for 8-14 year olds, is that it makes abstract concepts more concrete and understandable to a broader audience. SNAP! extends Scratch to support older learners (14-20) with built-in named procedures (thus recursion), procedures as data (thus higher order functions), structured lists, and sprites as first class objects with inheritance.

Participants will learn SNAP! hands-on. See <http://snap.berkeley.edu> for details. Network connected laptop required.

**33. Puzzle-Based Learning: Introducing Creative Thinking
and Problem Solving for Computer Science and Engineering**

Greenbrier

Raja Sooriamurthi, *Carnegie Mellon University*
Nickolas Falkner, *University of Adelaide*
Ed Meyer, *Baldwin Wallace University*
Zbigniew Michalewicz, *University of Adelaide*

Puzzle-based learning (PBL) is a new and emerging model of teaching critical thinking and problem solving. Today's market place needs skilled graduates capable of solving real problems of innovation in a changing environment. A learning goal of PBL is to distill domain independent transferable heuristics for tackling problems. While solving puzzles is innately fun, companies such as Google and Yahoo also use puzzles to assess the creative problem solving skills of potential employees. In this interactive workshop we will examine a range of puzzles and games. What general problem solving strategies can we learn from the way we solve these examples? Participants will emerge with the needed pedagogical foundation to offer a full course on PBL or to include it as part of another course.

34. Dynamic Program Visualizations for Java

Regency VII

James Cross, Dean Hendrix, David Umphress, *Auburn University*

This workshop introduces embedded programming and hardware using Arduino in a creative context to make machines that make drawings. This is a powerful way to introduce programming and physical computing concepts to students from high school to undergraduate and to students who might not normally be intrigued by a computing course. Participants experience this curriculum first hand by using breadboards and electronic components to create circuits that they control programmatically. Using the Arduino C-based software, participants modify and develop code to control light sensors, range finders, pressure sensors, and servos. Provided art materials turn the circuits into mesmerizing contraptions that draw. Laptop required. Arduino and electronic components provided during the workshop.

35. Mobile Computer Science Principles: A Professional Learning Center Development Sampler for Teachers

Ralph Morelli, *Trinity College*

David Wolber, *University of San Francisco*

Jennifer Rosato, *College of St. Scholastica*

Chinma Uche, *Greater Hartford Academy of Mathematics and Science*

Pauline Lake, *Trinity College*

The College Board's CS Principles (CSP) Project is an effort to develop a language-neutral, breadth-first advanced placement (AP) course in computer science. MobileCSP is an NSF-funded effort to train high school teachers to teach a CSP course that engages students in building mobile apps with App Inventor. The workshop will provide an overview of MobileCSP training including a hands-on introduction to App Inventor and a representative sample of CSP-based lesson plans, assessment materials, and other resources. MobileCSP training will be available for free to all high school teachers in summer 2014 through an online course. Attendees will be provided information about getting involved in the summer 2014 training. Target audience: high school teachers. Laptop required.

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SIGCSE 2014 Evaluations

Please visit this link (or scan below right) and share your thoughts about SIGCSE 2014!

<http://sigcse2014.sigcse.org/attendees/evaluations.php>

Upcoming Events

ITiCSE 2014: June 23-25, Uppsala, Sweden

<http://iticse2014.it.uu.se/>

ICER 2014: August 11-13, Glasgow, Scotland

<http://icer.hosting.acm.org/>

SIGCSE 2015: March 4-7, *Kansas City, MO, USA*

<http://www.sigcse2015.sigcse.org/>

