

The Twenty-Seventh Annual Consortium for Computing Sciences in Colleges Northeastern Conference

April 14 – 15, 2023

Hosted by Ithaca College Ithaca, New York





ccsc.org

In Cooperation with the ACM Special Interest Group on Computer Science Education (SIGCSE)





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CCSCNE 2023 Chair's Welcome

Welcome to the Twenty Seventh Annual Consortium for Computing Sciences in Colleges Northeast Region Conference held at Ithaca College. We'd like to thank everyone who has been involved with this conference since its inception at the University of Hartford in April 1996.

We have two excellent plenary speakers. Reuben Fischer-Baum from the Washington Post will talk on "How journalists create data visualization," and Jon Kleinberg, Professor of Computer Science at Cornell University, will talk on "Choices and Consequences in Computing." In addition, there will be a variety of activities at the conference including paper presentations, workshops, panels, tutorials, lightning talks, a student programming contest, and faculty and student posters. A special thanks goes out to the many volunteers who have worked on our conference. This includes the conference committee, the CCSCNE board, and the conference reviewers. You will find their names listed below. We also want to thank the National Partners whose support made the conference possible: Google Cloud, GitHub, NSF, zyBooks, and Rephactor. Additional support is provided to the conference for being in cooperation with the ACM Special Interest Group on Computer Science Education (SIGCSE).

There were 23 papers submitted to this year's conference, out of which 15 were accepted with an acceptance rate of 65%. There are also 3 pre-conference workshops, 2 panels, 2 tutorials, 1 lightning talk, 6 faculty posters and 61 student posters. We hope that you enjoy the conference and find it informative and engaging. We look forward to seeing you in 2024, when the conference will be held at the College of St. Rose in Albany, New York.

CCSCNE-2023 Conference Co-Chairs Ali Erkan, Ithaca College Lawrence D'Antonio, Ramapo College of New Jersey

CCSCNE 2023 Host

ITHACA COLLEGE

Ithaca College is a private residential campus where students find life-changing academic pathways, powerful career networks, and lifelong community. Situated near 150 majestic waterfalls in the Finger Lakes region of New York State, the city of Ithaca, New York, Ithaca College has been ranked as the best college town in the United States — hosting tech startups, a "killer music scene," Broadway-caliber theatre, and world-class restaurants as well as alumni-owned ice cream shops. Founded by a homesick violinist with a big vision, Ithaca College started out as the Ithaca Conservatory of Music — combining theory, practice, and performance from its inception. By the 1920s, academic programs expanded to include business, speech therapy, physical education, and the dramatic arts. IC was originally located in downtown Ithaca and moved to the present campus on South Hill overlooking Cayuga Lake in the 1960s.



CCSCNE 2023 Conference Committee

Conference co-Chair, Ali Erkan, Ithaca College Conference co-Chair, Larry D'Antonio, Ramapo College of New Jersey Program Chair, Mark Bailey, Hamilton College Papers co-Chair, Bonnie MacKellar, St. John's University Papers co-Chair, Yana Kortsarts, Widener University LT/P/T/W co-Chair¹, Joan DeBello, St. John's University LT/P/T/W co-Chair, **Susan Imberman**, The City University of New York LT/P/T/W co-Chair, Ting Liu, Siena College Faculty Posters Chair, **Daniel Rogers**, SUNY Brockport Speakers Chair, **Mike Gousie**, Wheaton College (Massachusetts) Undergraduate Posters co-Chair, Sandeep Mitra, SUNY Brockport Undergraduate Posters co-Chair, John Barr, Ithaca College Undergraduate Posters co-Chair, Liberty Page, University of New Haven Undergraduate Posters co-Chair, Adita Kulkarni, SUNY Brockport Registration co-Chair, Mark Hoffman, Quinnipiac University Registration co-Chair, Rick Kline, Pace University Programming Contest co-Chair, Del Hart, SUNY Plattsburgh Programming Contest co-Chair, Adam Lee, Ithaca College Programming Contest co-Chair, Paul Olsen, The College of St. Rose Vendors Chair, Kevin McCullen, SUNY Plattsburgh

Host Site Committee

Peter Alario, Conference Services John Barr, Computer Science Department Adam Lee, Computer Science Department

¹ Lightning Talks, Panels, Tutorials, and Workshops

CCSCNE 2023 Conference Program

The conference proceedings will appear in the ACM Digital Library as an issue of the Journal of Computing Sciences in Colleges (TBA). A draft of that issue is available <u>here</u>.

Friday, April 14

Registration (7:30 AM - 4:00 PM)

North Foyer

Research Poster Setup (8:00 AM - Noon)

Emerson Suite A

Programming Contest (7:45 AM - 12:45 PM)

Register first at Main Registration		North Foyer
7:45AM	Continental Breakfast	Emerson Suite B+C
8:40AM	Pre-contest Instructions	Williams Hall 225
9:00AM	Contest	Williams Hall 225
12:00PM	Lunch and contest discussion	Emerson Suite B+C

Pre-conference Workshops (9:00 AM - 12:00 PM)

Details about the workshops may be found in the draft journal issue.

Note that there is no pre-registration for workshops, and there is no additional cost to attend CCSCNE workshops.

Workshop

PLCC: A Tool Set for Teaching Programming Languages Courses Stoney Jackson, Western New England University Tim Fossum, SUNY Potsdam James Heliotis, Rochester Institute of Technology

Workshop

Klingenstein Lounge

How Do Computer Systems Work? Peter Henderson, Butler University

Workshop

Ithaca Falls

Enhancing Computing Accessibility Education Using Experiential Labs: A Focus on Screen Readers and Dexterity Impairments

Su Thit Thazin, Rochester Institute of Technology Kyle Messerle, Rochester Institute of Technology Heather Moses, Rochester Institute of Technology Domenic Mangano, Rochester Institute of Technology Samuel Malachowsky, Rochester Institute of Technology Daniel Krutz, Rochester Institute of Technology

Lunch on your own (12:00 PM - 1:00 PM)

Options include restaurants in the <u>Ithaca Commons</u> area before you get to campus or the <u>Ithaca Bakery</u> on campus.

Welcome to CCSCNE (1:00 PM - 1:15 PM)

Emerson Suite B+C

Ali Erkan, CCSCNE 2023 Co-chair, Ithaca College Larry D'Antonio, CCSCNE 2023 Co-chair, Ramapo College of New Jersey

Dr. Melanie Stein, Provost and Senior Vice President for Academic Affairs, Ithaca College

Clark Lounge

Invited Speaker (1:15 PM - 2:15 PM)

Emerson Suite B+C

Session chair: Michael Gousie, CCSCNE 2023 Speakers Chair

Reuben Fischer-Baum The Washington Post

How journalists create data visualization

Journalists use a variety of tools to create static and interactive data visualizations. For investigating data, iterating on chart decisions, and mocking up complex visualizations, exploratory tools like ggplot are valuable. To create polished work that's ready to be put in front of a broad audience, a separate set of tools like d3.js or vector-editing software are often required. We'll walk through these different options, and talk through what it even means for a chart to be "polished" in terms of design, usability, and performance.

Break (2:15 PM - 2:30 PM)

CCSC Partner Displays (11:00 AM - 5:30 PM)

Emerson Lounge

Concurrent Session 1 (2:30 PM - 3:45 PM)

Clark Lounge

Concurrent Session 1A (Papers + Lightning Talk) Note: this session ends at 4:00 PM Session Chair: Micheal Gousie

How Many Languages Does It Take to Be a Programming Languages Course?

Michel Charpentier, University of New Hampshire Karen H. Jin, University of New Hampshire *Functional programming, in the data structures course, in Java* John MacCormick, Dickinson College

 A Kubernetes Framework for Learning Cloud Native Development Austin Reppert, West Chester University of Pennsylvania Brian Montecinos-Velazquez, West Chester University of Pennsylvania Harrison Kahl, West Chester University of Pennsylvania Rackeem Reid, West Chester University of Pennsylvania Danielle Rivas, West Chester University of Pennsylvania Dominic Spampinato, West Chester University of Pennsylvania Hudson Zhong, West Chester University of Pennsylvania Linh Ngo, West Chester University of Pennsylvania

Algorithmically Generated Visual Designs (Lightning talk, 10 minutes) Michael Wehar, Swarthmore College

Concurrent Session 1B (Papers)

Klingenstein Lounge

Session Chair: Suzanne Matthews

Spreadsheets As Hands-On Learning Tools In a Discrete Math/Structures Course Ali Erkan, Ithaca College John Barr, Ithaca College

Experiential Learning in Undergraduate Accessibility Education: Instructor Observations

> Saad Khan, Rochester Institute of Technology Heather Moses, Rochester Institute of Technology Samuel Malachowsky, Rochester Institute of Technology Daniel Krutz, Rochester Institute of Technology

Alternative Assessment for Computer Science Classrooms Gabriel De Pace, University of Rhode Island Ed Lamagna, University of Rhode Island

Concurrent Session 1C (Tutorial)

Reflective Curriculum Review for Liberal Arts Computing Programs Jakob Barnard, University of Jamestown Grant Braught, Dickinson College Janet Davis, Whitman College Amanda Holland-Minkley, Washington & Jefferson College David Reed, Creighton University Karl Schmitt, Trinity Christian College Andrea Tartaro, Furman University James Teresco, Siena College

Break (3:45-4:15)

Concurrent Session 2 (4:15 PM - 5:30 PM)

Concurrent Session 2A (Papers)	
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Clark Lounge
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Session Chairs: Mark Sherman and Samantha Schumacher

- A Student-Oriented Simulator for the Arm64 Instruction Set Robert Montante, Commonwealth University of Pennsylvania -Bloomsburg
- An Open-Source BinaryGame for Learning Reverse Engineering D'Angelo Gourdine, United States Military Academy Suzanne Matthews, United States Military Academy

Incorporating Cybersecurity Concepts in Connecticut's High School STEM Education

Liberty Page, University of New Haven Mehdi Mekni, University of New Haven Elizabeth Radday, EdAdvance

Concurrent Session 2B (Tutorial)

GitKit: Teaching Git and GitHub/GitLab Workflow in an Authentic Context Grant Braught, Dickinson College Stoney Jackson, Western New England University Karl Wurst, Worcester State University

Concurrent Session 2C (Panel)

Session Chair: Rick Kline

Infusing Accessibility into Computer Science Education Robert Domanski, NYC Mayor's Office of Talent and Workforce Development - Tech Talent Pipeline

Reception and Poster Sessions (5:30 - 7:00 PM)

Faculty Poster Session

Undergraduate Poster Exhibit and Research Competition Emerson Suite A

All poster titles and authors can be found on pages 16 - 21.

Banquet and Awards (7:00 - 9:00 PM)

Emerson Suite B+C

Emerson Suite A

Jim Teresco, CCSCNE Board Chair

Programming Contest Winners Del Hart, Programming Contest Co-Chair

Undergraduate Poster Display and Research Competition Winners Sandeep Mitra, Undergraduate Posters Co-Chair

Klingenstein Lounge

Taughannock Falls

Saturday, April 15

Registration (8:00 AM - 8:45 AM)

Continental Breakfast (8:00 AM - 8:45 AM)

Emerson Suite B

Concurrent Session 3 (8:45 AM - 10:00 AM)

Concurrent Session 3A (Papers) Session Chair: Bob Montante

Computational Making with Twoville Chris Johnson, James Madison University

Incorporating a Makerspace into Computer Science Courses Michael Gousie, Wheaton College

A Liberal Arts Undergraduate Robotics Major Kevin McCullen, SUNY Plattsburgh Chiranjivi Lamsal, SUNY Plattsburgh Michael Walters, SUNY Plattsburgh

Concurrent Session 3B (Papers)

Session Chair: John MacCormick

A Rotation of Data Structures

Thomas Cook, USMA (United States Military Academy) Alexander Mentis, USMA (United States Military Academy) Chris Okasaki, USMA (United States Military Academy)

Klingenstein Lounge

Clark Lounge

North Foyer

Open Questions for Empathy-Building Interventions for Inclusive Software Development

Kyle Messerle, Rochester Institute of Technology Samuel Malachowsky, Rochester Institute of Technology Daniel Krutz, Rochester Institute of Technology

Practical Machine Learning for Liberal Arts Undergraduates Mark Sherman, Emmanuel College Alyssa Hogan, Emmanuel College Jamison O'Sullivan, Boston College Samantha Schumacher, Emmanuel College

Concurrent Session 3C (Panel)

Taughannock Falls

Curricular Practices for Computing for Social Good in Education Heidi Ellis, Western New England University Gregory Hislop, Drexel University

Break (10:00 AM - 10:15 AM)

Invited Speaker (10:15 AM - 11:15 AM)

Emerson Suite B

Session chair: Ali Erkan, CCSCNE 2023 Conference Co-chair

Jon Kleinberg Cornell University

Choices and Consequences in Computing

Computing requires difficult choices that can have serious implications for real people. The design of our course "Choices and Consequences in Computing" covers a range of ethical, societal, and policy implications of computing and information. It draws on recent developments in digital technology and their impact on society, situating these in the context of fundamental principles from computing, policy, ethics, and the social sciences. A particular emphasis is placed on large areas in which advances in computing have consistently raised societal challenges: privacy of individual data; fairness in algorithmic decision-making; dissemination of online content; and accountability in the design of computing systems. As this is an area in which the pace of technological development raises new challenges on a regular basis, the broader goal of the course is to enable students to develop their own analyses of new situations as they emerge at the interface of computing and societal interests.

Membership Meeting (11:15 AM - 11:45 AM)

Emerson Suite B

All members (if you registered for this year's conference, you're a member) are welcome to join the regional board and conference committee to share your thoughts about CCSCNE and find out more about the organization.

Board Meeting (12:00 PM - 1:45 PM) Emerson Suite B

Invited Speakers

Reuben Fischer-Baum is an editor on the graphics team at *The Washington Post*, where he leads a team of reporters focused on trackers and reader tools. He previously worked as a visual journalist at *FiveThirtyEight* and *Deadspin*, and has taught data visualization at Parsons School of Design. He has a BA in Environmental Studies from Yale University, where his coursework focused on urban planning, geographic information systems (GIS), and statistics. He was a 2021-2022 fellow at the Nieman Foundation for Journalism at Harvard.

Jon Kleinberg is the Tisch University Professor in the Departments of Computer Science and Information Science at Cornell University. His research focuses on the interaction of algorithms and networks, the roles they play in large-scale social and information systems, and their broader societal implications. He is a member of the National Academy of Sciences and National Academy of Engineering, and serves on the National AI Advisory Committee. He has received MacArthur, Packard, Simons, Sloan, and Vannevar Bush research fellowships, as well awards including the Harvey Prize, the Nevanlinna Prize, the Allen Newell Award, and the ACM Prize in Computing.

Faculty Posters

Abstracts are included in the conference proceedings issue of JCSC (TBA) and can be found on our website (ccscne.org).

Fnu Kaleemunnisa (Pace University), Christelle Scharff (Pace University), Begimai Zhumakova (Pace University), Pooja Girishkumar Patel (Pace University) and Krishna Mohan Bathula (Pace University). *A Reformer Chatbot to Support Beginners in Learning Python Programming.*

Steve Earth (Drexel University), Jeremy Johnson (Drexel University) and Bruce Char (Drexel University). *Prove It with Proof Buddy: The Programmer's Sidekick For Learning Proof Writing.*

Bruce Char (Drexel University), Steve Earth (Drexel University) and Jeremy Johnson (Drexel University). *A web app for writing with mathematical logic*.

Jingnan Xie (Millersville University of PA). On Teaching Recursion in Lower Level Courses.

Hal Smith (Penn State New Kensington) and Devon Cook (Penn State New Kensington). *Code That Communicates*.

Bruce Char (Drexel University) and John Dougherty (Haverford College). A Study of the Perception of Mathematics as a Learning Tool for Computer Science Undergraduates.

Undergraduate Student Posters

Poster abstracts are in a separate booklet, which can be found in the student poster area and on the conference website (ccscne.org).

A Novel Smart Electronic Liaison to Support International Students, Ahmed Muntasir Hossain, Killian Meehan, Emmanuel Amoh (University of New Haven)

Hierarchical Ensemble Machine Learning for Fake News Detection, Ryan Himes (Pennsylvania State University)

HellSmoke, Ryan Gibbons, Lester Barrios (University of New Haven)

Sentiment Analysis and Recurrent Neural Networks Utilizing The Sentiment140 Dataset, Tye Leckinger (SUNY Brockport)

Sentiment Analysis of Social Media (SASM), Ahmed Muntasir Hossain (University of New Haven)

Experiences in Enhancing Functionalities in Apps Using a Customer-Focused Agile-Oriented Approach, Ethan L. Baker, Matthew E. Morgan (SUNY Brockport)

Performance Evaluation of MQTT & CoAP for IoT Applications, Diego Segovia Ayala (Eastern Connecticut State University)

Enhancing the Mead Art Museum Metadata: Using Google Cloud Vision API for Tagging Artwork, Reihaneh Iranmanesh, Adam Rogers (Amherst College)

Soldier Activity Recognition: Are they "rucking", riding, or running?, Andrew Zhang (United States Military Academy)

Blood Glucose Prediction for Juvenile Diabetes: Learning RNN-LSTM Models Using Real-World Datasets, Yijia Chen (Wellesley College) Visualizing Music Preferences: Using Physical Features in Images to Construct Preference Models, Henry Zelenak (SUNY Fredonia)

Internet Store: Time to Go Shopping, Andriy Martynyshyn (SUNY Buffalo State University)

Walking the Rover, Eric Barton (SUNY Buffalo State University)

Port is Open!, Farah Al-Karkhi (SUNY Buffalo State University)

UNICON Server Secure Socket Layer Encryption, Chase Leckinger, Ajay Bhattacharya (SUNY Brockport)

Sink and Source: Understanding the Impact of Urban Heat Island Effect on Campus using IoT and Heat Mapping Methods, Caprice Williams, John Burns, Hephzibah Rajan (Quinnipiac University)

Evaluating the Efficacy of Worked Solution Videos in a Computer Systems Course, Grace Kim, Dylan Green (United States Military Academy)

The Cyber Domain, Christian Tanguay (Wentworth Institute of Technology)

Unveiling The Ambiguity In Acronym Definitions Using Natural Language Processing, Izhar Ali, Million Haileyesus, Dominick Profico (Rowan University)

Neural Networks Implemented through Bio- Nanorobots for the Early Detection and Elimination of Cancer Cells in the Human Body, Vincenzo D'Aria (Central Connecticut State University)

Porchfest Pro App, Keegan Palmo, Laci Young, Emmett Barry (Ithaca College)

Junkademy: An Interactive Educational Web Application for the Java Programming Language, James Gonsalves, John Theall, MacArthur Mills (Quinnipiac University)

Image Compression, George Stark (SUNY Fredonia)

PostgreSQL vs. MongoDB in the Music Industry, Amrita Acharya, Ashley Jagai, Olivia Sorensen (Smith College)

Database Efficiency in Dynamic Generation of Map Graphs, Olivia Sorensen (Smith College)

Improved Automated Analysis of Mass Spectra for Proteomics Experiments, Dominick Profico, Samuel Costantino (Rowan University)

Improving Graph Neural Network-based Fake News Detection with Data-centric AI, Austin Barr (SUNY Brockport)

Night Life - A Smart Thermal Car Camera for Enhanced Vehicle Safety, Issah Abakar, Scott Van Alstine, Mackenzie Hiddie, Nick Farrell (SUNY Brockport)

Partitioning and Efficiency Improvements for METAL Algorithm Visualizations, Michael Plekan (Siena College)

Developing an Interactive Simulation for Non-Inertial Reference Frames, Ted Karanja Mburu (Ithaca College)

UX Design - Siena College's Programming Contest, Amani Walker, Jeremy Bult, Jason Macutek (Siena College)

UX Research - Inclusivity Study, Amani Walker (Siena College)

How Technology is Used to Track Climate Change: Earth Observational Satellites, Sophia Sjogren (Kalamazoo College)

Hyperspectral Imaging Application, Edward Wynman (Montclair State University)

MindBellows: Fan Your Mental Flames!, Michael Tambascio, Loki Simeon (Quinnipiac University)

Explainable AI and Data Optimization, Art Marciano (Southern Connecticut State University)

Machine Learning in Prosody and Meaning, Shirley Fong, Sofia Hirschmann, Madeleine Guettler (Simmons University)

Development of Instructional Physics Simulations for Classical Mechanics, Mikolaj Konieczny (Ithaca College)

Introduction to AVL Trees through Visualization, Xingyu Dong, Anarsaikhan Tuvshinjargal, Lizbeth Zarate-Hernandez, Ryan Oet (Swarthmore College)

Racial Representation in Television: Building a New Dataset Through Web Scraping and Machine Learning, Jenny Wang (Wellesley College)

Combating Misinformation and Disinformation in the Digital Age: The Importance of Computer Scientists, Aleksandr Molchagin (Kalamazoo College)

Food Justice Map Software, Antonio Craveiro (Merrimack College)

Examining the Efficacy of Social Media Data Extraction on Multiple Platforms, Marios Petrov, Shawn Nash (New College of Florida)

Warrior Shuttle, Owen Enestvedt, Derek Costello, Alex Elguezabal (Merrimack College)

STEM Data Dashboard, Jared Rathbun, Kathryn O'Neil (Merrimack College)

The Meeseeks Project: Real-Time 3D Motion Capture Data Visualization, Thomas Eckert, Yadel Negash (Quinnipiac University)

Online Food Ordering App with React.js, Kurt Mueller, Jacob Thibault (SUNY Brockport)

Campus Navigation Mobile App, Alex Santeramo, Adam Chirico, Jakob DeBroff (Quinnipiac University)

Benchmarking Machine Learning Methods on Simulated Bioinformatics Data, Victor I. Robila (CUNY New York)

Accessible Learning Labs, Jaden Wedner, Ryan Webb, Heather Moses (Rochester Institute of Technology)

Graduation Roadmap for Academic Institutions, Peter Sabio, Jordan Mayo (Quinnipiac University)

HeartBuddy, Devyn Souza, Joshua Shaw, Matthew Smith, Jake Intravaia, Nicolas Bennett (University of New Haven)

Arclight, Robert Debinski, Emiliano Vega, Tyler Nguyen, Tyler Ruocco, Lucien Zheng (University of New Haven)

Quantifying the Increase in Climate Instability, Patrick Bierach (Ithaca College)

Backpropagation is expensive. Is it necessary?, Nika Gedenidze (Caldwell University)

Predictive Modeling of Critical Business Decision-Making Amid Russia-Ukraine War, Lily Tobin, Chi-Ni Lin, Anthony Gatti (Wheaton College)

Multi-Armed Bandit EvaLuator (MABEL), Alex Hetrick, Kaiy Muhammad (Rochester Institute of Technology)

Snail Language Support, Charles Reinhardt (St. Lawrence University)

A Unified Election Database in Relational as well as Key-Value Form, Emmett Barry (Ithaca College)

Analyzing Colonialism in Africa through Relational and Graph-Based Databases, Simret Melak, Nardos Mamo (Ithaca College)

Spatial Analysis of the Iron March Data Dump, Will Regalado Succop, Mateo Hernandez (Ithaca College)

Thank You CCSCNE 2023 Reviewers

Chris Alvin, Furman University Kailash Chandra, Pittsburg Lawrence D'Antonio, Ramapo College Joan DeBello, St. John's University Dan DiTursi, Siena College Peter Drexel, Plymouth State University Alfreda Dudley, Towson University Matthew Ferland, University of Southern California Alice Fischer, University of New Haven Timothy Fossum, Rochester Institute of Technology Martin Gagne, Wheaton College Michael Gousie, Wheaton College Lama Hamandi, Northeastern University Nadeem Hamid, Berry College Delbert Hart, SUNY Plattsburgh Zach Kissel, Merrimack College Daniel Krutz, Rochester Institute of Technology John MacCormick, Dickinson College Sriharsha Mallapuram, Plymouth State University Stephanos Matsumoto, Olin College of Engineering Kevin McCullen, SUNY Plattsburgh Sunjae Park, Wentworth Institute of Technology Sofya Poger, Felician University Raghav Sampangi, Dalhousie University Unnati Shah. SVNIT Hal Smith, Penn State New Kensington Ashley Suchy, SUNY New Paltz William Tarimo, Connecticut College James Teresco, Siena College Scott Valcourt, Northeastern University Marc Waldman, Manhattan College Michael Walters, SUNY Plattsburgh Yang Wang, La Salle University



Northeastern Region

We look forward to seeing you again next year for CCSCNE 2024.

The College of Saint Rose Albany, New York

