ISEC 2022

12th IEEE Integrated STEM Education Conference

Virtual Online Conference
Princeton, New Jersey, USA
Saturday, March 26, 2022

PRELIMINARY

Program Book

◆IEEE

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CONFERENCE WELCOME AND ACKNOWLEDGEMENTS

IEEE PCJS acknowledges Princeton University and SEAS for their continued support towards the previous IEEE STEM Conferences.

We also appreciate very much the contributions of the volunteer reviewers, session chairs, conference staff, and "friends of the conference." The conference benefits greatly from the gifts of your time, skills, and knowledge. We would like to acknowledge the following IEEE officers for their support of the 2021 IEEE Integrated STEM Education Conference. {Select and Click to see current information}

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  - Mr. Habib Ahson

CALENDAR of EVENTS – MARCH 26, 2022

9:00am – 9:15am	-	**Introduction**
9:15am – 10:00am	-	**Keynote Speaker 1 – Dr. Sami Kahn**

"Another 'M' for STEM: Moral Consideration for Advancing STEM Literacy"
Dr. Sami Kahn, J.D., Ph.D.
Executive Director, Council on Science and Technology (CST)
Princeton University

10:00am – 10:45am	-	**Keynote Speaker 2 – Dr. Steve O'Brien**

"Stories of Integrative-STEM, K-12 and HigherEd"
Dr. Steve O'Brien, Dean,
School of Engineering,
The College of New Jersey

10:45am – 11:30am	-	**Keynote Speaker 3 – Mrs. Sharnet R. Chavis**

"IEEE- Honoring Your Resilient Spirit"
Mrs. Sharnet Chavis, Co-CEO,
ChavisOnTheGo and Dean of Students
Sr. Social Worker at The Katherine Thomas School

11:30am – 11:30am	-	**Closing Remarks**

{Virtual – available for six months}

12:00pm – 9/30/2022	-	**K-12 Poster Presentations**
12:00pm – 9/30/2022	-	**Paper Presentations**
12:00pm – 9/30/2022	-	**Workshop Presentations**

KEYNOTE SPEAKER
Dr. Sami Kahn, J.D., Ph.D.
"Another 'M' for STEM: Moral Consideration for Advancing STEM Literacy"

As Executive Director of the Council on Science and Technology (CST) at Princeton University, Dr. Sami Kahn works to promote scientific literacy for all through quality interdisciplinary course development, robust STEM education research, and creative programming. An award-winning STEM educator, teacher educator, and author, she uses her background in science education and law to inform her research on inclusive science practices, socioscientific issues (SSI), argumentation, and social justice. Dr. Kahn has authored/co-authored numerous journal articles and five books on enhancing scientific inquiry experiences for learners of all ages including a co-edited/authored book entitled, Towards Inclusion of All Learners Through Science Teacher Education (Brill, 2018) and a sole-authored book entitled, It's Still Debatable! Using Socioscientific Issues to Develop Scientific Literacy, K-5 (NSTA Press, 2019) which uses controversial societal issues related to science to promote an informed, participatory, STEM-literate citizenry. Other recent efforts include moderating a New York Times panel on STEM teaching and learning in times of public mistrust, serving as a research mentor to emerging STEM education scholars in Thailand for the National Association of Research in Science Teaching (NARST), and spearheading NSTA's position statement on gender equity. Dr. Kahn holds an M.S. in Ecology and Evolutionary Biology from Rutgers University, a J.D. in Law from Rutgers School of Law, and a Ph.D. in Curriculum and Instruction with a specialization in Science Education from the University of South Florida where she served as a Presidential Doctoral Fellow. Prior to arriving at Princeton, Dr. Kahn served as Assistant Professor of Science Education at Ohio University (promoted to Associate Professor with tenure), with earlier appointments at Rutgers University and Collegiate School in New York City.

Dr. Steve O'Brien
"Stories of Integrative-STEM, K-12 and HigherEd"

Dr. Steve O'Brien holds B.S. degrees in mathematics & physics from Western Washington University, and Masters and Ph.D. degrees in electrical engineering from Cornell University. Dr. O'Brien has 18 years of industry experience, as well as 15 years at TCNJ in the Integrative-STEM (ISTEM) Education department which prepares both elementary and secondary teachers. Dr. O'Brien was also the Director of TCNJ's Center for Excellence in STEM Education for 10 years, impacting thousands of K12 teachers and students. Dr. O'Brien also led the development of a Masters in ISTEM education at TCNJ. Dr. O'Brien's area of engineering expertise is the design and application of semiconductor lasers. Dr. O'Brien has accumulated ~60 refereed publications and 17 patents. Dr. O'Brien is currently the interim Dean of TCNJ's School of Engineering.

KEYNOTE SPEAKER
Mrs. Sharnet Chavis
"IEEE- Honoring Your Resilient Spirit"

Mrs. Sharnet R. Chavis is a Licensed Clinical Social Worker, a Registered Yoga Teacher, a Certified Mindful Informed Clinician, a Certified Clinical Anxiety Treatment Professional and a Certified Wellness Practitioner. She Is the Co-CEO ChavisOnTheGo, a wellness services LLC that develops mindfulness, meditation and movement practices to support regulation and self-management for individuals with various needs and for those that work with special populations. Mrs Chavis also serves as the Dean of Students/Sr. Social Worker at The Katherine Thomas School a school for individuals with unique learnings needs. Mrs. Chavis has 31 years of experience supporting clients in the regulation of their emotions as a Clinical Social Worker. She is the creator of "Mindful Minutes with Mindful Movements" a motivational Mindful Practice. Mrs Chavis has a BSW from University of Maryland Baltimore County, a MSW from Howard University, and a MS from Johns Hopkins University School of Education. She is currently perusing her DSW Doctoral degree at Simmons University with a focus on social justice and mindfulness.

AWARDS CEREMONY

H. ROBERT (BOB) SCHROEDER BEST PAPER AWARD

Bob Schroeder, a life-long resident of the Trenton, NJ area, was a founding member of the Princeton / Central Jersey Chapter of the IEEE Education Society, serving as its inaugural chair. He retired as the communications and warning officer for the New Jersey Office of Emergency Management, New Jersey State Police, and led a technology consulting company, Adro!t.   The Best Paper Award is given in his memory to honor his devotion to and expertise in technical writing and engineering education as well as his service to the conference.

DAVID SOLL AWARD

David Soll, a member and a leader in many different positions of the Princeton / Central Jersey Section. His engagement in the memberships by reaching out to the schools and universities in the section to support their programs and provide guidance in the technology. Dave had ideas to improve the section and then went about working to make the changes happen. He was a patient leader who helped to train the new volunteers on how to get the best out themselves in their chapter or society.

2022 BEST PAPER AWARD NOMINEES

{TBA}

2021 BEST PAPER AWARD WINNER – FULL PAPER

1st Place
"Implementing Blended Learning in K-12 Programming Course: Lesson Design and Student Feedback"
Shuhan Zhang (The University of Hong Kong, Hong Kong); Chunyu Cui (Tencent Holdings Ltd., China)

2nd Place
"Using Coding Competitions to Develop STEM Skills in Graduate Education"
Andres Fortino and Maria Rivera (NYU, USA)

3rd Place
"Training Workers to Thrive in Future Technology-Driven Environments: A Blueprint"
Wenbing Zhao (Cleveland State University, USA)

2021 BEST PAPER AWARD WINNER – WORKING IN PROGRESS

1st Place
"Instill Autonomous Driving Technology into Undergraduates via Project-Based Learning"
Weitian Wang and Laura Paulino (Montclair State University, USA)

2nd Place
"Fine-grained Analysis of Gender Bias in Student Evaluations"
Eric M Dillon, Haroon Malik and David Dampier (Marshall University, USA); Fatma Outay (Zayed University, United Arab Emirates)

3rd Place
"StartlearnING- an example for cross-domain learning arrangements combining engineering and biology"
Markus Reiser, Martin Binder and Holger Weitzel (Weingarten University of Education, Germany)

2021 POSTER AWARD

CATEGORY: **BIOLOGY/MEDICINE**

FIRST PLACE

1570702792	Covid-19 Case Prediction using Nesting Fitting	Bomin Wei (Princeton International School of Mathematics and Science, China)

SECOND PLACE

1570702418	Predictive Analytics in Agriculture using Geospatial Mapping	Sreya Jonnalagadda (Princeton International School of Matematics and Science, USA)

THIRD PLACE

1570698087	Novel application to improve communication for children affected by Autism Spectrum Disorder	Veda R Murthy (Rachel Carson School, USA)

CATEGORY: **COMPUTER SCIENCES**
FIRST PLACE

1570702706	Comparison of effectiveness of Machine Learning algorithms for Vehicle Path Prediction	Sumanth R Moole (TJ USA)

SECOND PLACE

1570705784	Smart City Overview	Syeda J Zeeshan (Atholton High School, USA); Jeffrey Chavis (Johns Hopkins University Applied Physics Laboratory, USA)

THIRD PLACE

1570702254	Comparing Grover's Quantum Search Algorithm with Classical Algorithm on Solving Satisfiability Problem	Runqian Wang (Princeton International School of Math and Science, USA)

CATEGORY: **ENGINEERING**
FIRST PLACE

1570702215	Desalination and Purification of Water using a Solar Powered Hydrogel Multistage	Kevin A Murphy (PRISMS, USA)

SECOND PLACE

1570705234	Design and Testing of Solar Power Heating	Victor I Robila (Hunter College High School, USA)

THIRD PLACE

1570702930	A Design of the Extrusion System for Chocolate 3D Printing	Hong Jiang (Princeton International School of Mathematics and Science, China)
1570698823	An Autonomous Driving Simulation Platform as a Virtual HSAVC Competition Environment	Daren Hua (Eleanor Roosevelt High School, USA)

CATEGORY: **SOCIAL STUDY INTERDISCIPLINARY**
FIRST PLACE

1570704251	Consumer Barriers For The Adoption Of Climate Friendly Packaging In Mercer County	Inara D Jain (Princeton High School, USA)

SECOND PLACE

1570702920	Edison High School WiSTEM | FOCUS: Addressing Female Underrepresentation in STEM	Vasumathi Venkat (Edison High School & WiSTEM | FOCUS club, USA); Ishani Kunadharaju (Edison High School & WiSTEM | FOCUS club, USA)
1570702935	High School STEM Clubs In A Virtual World	Anastasia A Ibrahim (Edison High School & iSTEM Club, USA); Sunrit Panda (Edison High School & TEDxEdisonHighSchool, USA); Gunjan Adya (Edison High School & iSTEM Club, USA)

THIRD PLACE

1570702897	Analysis and Construction of a Small International High School's Social Network	Daniella Reyes (Princeton International School of Mathematics and Science, USA)
1570705776	Sensitivity of Voter Turnouts in Presidential Elections - An Analysis	Kavin S Sankar (Enloe High School, USA)

CATEGORY: **HIGHER EDUCATION**
FIRST PLACE

1570705708	Exploring ethics in IoT-based smart cities	Michelle S Feng and Jeffrey Chavis (Johns Hopkins University Applied Physics Laboratory, USA)
1570702445	Household 3D Cream Printer for Cake Decoration	Junjing Zeng (Branksome Hall, Canada); Fangzhou Xia (Massachusetts Institute of Technology, USA)

SECOND PLACE

1570702613	Low-cost Portable Ventilator Design for Underdeveloped Regions	Rui Wang (Renmin University of China, China); Fangzhou Xia (Massachusetts Institute of Technology, USA)...fixed

CATEGORY: **Math SUB-SESSION**
FIRST PLACE

1570705749	The Math Behind Piano Chords	Zuko A Ranganathan (Hart Magnet School, Stamford CT, USA)

SECOND PLACE

1570705775	The Fibonacci Sequence and The Golden Ratio in Math and Music	Nicole E Vassilev (Princeton High School, USA)

CATEGORY: **PHYSICS**
FIRST PLACE

1570702899	The Floating Compass: A Demonstration of Electromagnetism and Lenz's Law	Helena Rittenhouse (Princeton University EPICS, USA)

SECOND PLACE

1570702929	Franklin's Bells: Converting Electrical Energy Into Continuous Mechanical Motion	Stella C Firmenich (Engineering Projects In Community Service, Princeton University & Stuart Country Day School of the Sacred Heart, USA)

THIRD PLACE

1570706744	Magnetic Levitation in Motion	Jesse Miller (USA)

CATEGORY: **SCIENCE**
FIRST PLACE

1570705055	Guide-Bot	Rishi Balaji (Gates Elementary School, USA)

SECOND PLACE

1570705622	Photophone Re-invented	Roshan S Natarajan (Whittle School and Studios, USA)

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We would like to take this opportunity to thank our external reviewers for the effort and expertise that you contribute to reviewing, without which it would be impossible to conduct the 2020 IEEE Integrated STEM Education Conference.

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IEEE ISEC 2022 Program

{PLACEMENT OF PROGRAM FILE}

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{PLACEMENT OF PROGRAM DESCRIPTION FILE}

SAVE THE DATE!

13TH IEEE INTEGRATED STEM EDUCATION CONFERENCE

PRINCETON UNIVERSITY

SATURDAY, MARCH 18, 2023
(Tentative)