

# **2022 IEEE Integrated STEM Education Conference (ISEC 2022)**

**Virtual Conference  
26 March 2022**



**IEEE Catalog Number: CFP2242S-POD  
ISBN: 978-1-6654-8430-5**

**Copyright © 2022 by the Institute of Electrical and Electronics Engineers, Inc.  
All Rights Reserved**

*Copyright and Reprint Permissions:* Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

***\*\*\* This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP2242S-POD
ISBN (Print-On-Demand):	978-1-6654-8430-5
ISBN (Online):	978-1-6654-8429-9
ISSN:	2330-331X

**Additional Copies of This Publication Are Available From:**

Curran Associates, Inc  
57 Morehouse Lane  
Red Hook, NY 12571 USA  
Phone: (845) 758-0400  
Fax: (845) 758-2633  
E-mail: [curran@proceedings.com](mailto:curran@proceedings.com)  
Web: [www.proceedings.com](http://www.proceedings.com)

CURRAN ASSOCIATES INC.  
**proceedings**  
.com

## TABLE OF CONTENTS

An Interdisciplinary Approach to High School Curriculum Development: Swarming Powered by Neuroscience .....	1
<i>Elise Buckley, Joseph D. Monaco, Kevin M. Schultz, Robert W. Chalmers, Armin Hadzic, Kechen Zhang, Grace M. Hwang, M. Dwight Carr</i>	
Extracurricular Student-Centered Projects to Learn Computer Programming .....	9
<i>Wei Yu, William Haynes, Diane Dimassa</i>	
Design and Development of a Smart Cities General Education Online Course for Undergraduates .....	16
<i>Mohammad Upal Mahfuz</i>	
Design and Development i-AVEN GER as High-Tech Virtual Remote Teaching and Learning Platform with Experienced Based Learning and Self-Regulated Learning Approaches in Facilitating STEAM Education .....	22
<i>Chee Ken Nee, Noraffandy Yahaya, Nor Hasniza Ibrahim, Rafiza Abdul Razak, Mohd Hishamuddin Abdul Rahman</i>	
Automated Robot (Car) Using Artificial Intelligence.....	30
<i>Satyam Mishra, Cao Sy Minh, Hoang Thi Chuc, Tran Viet Long, Thanh Tung Nguyen</i>	
A Personality Types Research Study Based on Personal Values in an Ethics Course for the Engineering and Computer Sc. Undergraduates.....	36
<i>Atma R. Sahu, Keerti Jain, Sean Brooks</i>	
Motivating Potential of the ESP Course Themes at Russian University of Transport.....	44
<i>Natalya Viktorovna Matveeva, Elena Viktorovna Fedotkina</i>	
Hamstring Injury Detection Using Body-Centric Nano Networks.....	50
<i>Lawrence He</i>	
Immersive-Experiential Business-Technology in Simulated Business Cases.....	51
<i>Stephen J. Andriole</i>	
Pandemic and Natural Disasters Driving the Need for AI Driven NEXTGen Medical Services .....	56
<i>David Marimekala, John Lamb</i>	
Assurance of Learning in Technology Management by Curriculum Alignment to a Professional Body of Knowledge.....	59
<i>Andres Fortino, Ming Cai</i>	
An Integrated Approach to Sustainability-Focused Instruction in Undergraduate Engineering Curricula.....	65
<i>Mohammad Upal Mahfuz</i>	
Acknowledging Perceptions, Behaviors, and Beliefs: Exploring What Faculty Need to Integrate Technology into Instruction in Qatar .....	70
<i>Ibrahim M. Karkouti</i>	
Junior High-School Study of RoboPhysics .....	73
<i>Ofer Danino, Gideon Kaplan, Itamar Feldman, Joseph Shapira</i>	
Reading in the Dark - Radar Imaging Demonstrator for STEM Outreach of Autonomous Systems .....	77
<i>Michael A. Saville, Ryan C. Ball, Garrett A. Harris, Sarah S. Willenbrink-Sahin</i>	

Controlling Wildfires Through Aerial Seeding.....	84
<i>Mrinalini Suresh Kumar</i>	
Understanding the Geographic and Temporal Evolution of Asian Hate Crimes in the United States .....	85
<i>Arthur Wang</i>	
Using Mycelium for the Packaging and Transportation of Fossils.....	86
<i>Victor I. Robila</i>	
Exploring Coding Attitudes of Chinese Elementary Students: A Preliminary Study .....	87
<i>Shuhan Zhang, Gary K. W. Wong, Xiaojing Sun</i>	
A <sup>3</sup> Sat: Using CubeSats to Inspire the Next Generation of STEM Professionals.....	91
<i>John D. Moore, Sriram Elango, Maxwell Friedman, Jin S. Kang</i>	
Using K-Wave to Simulate Ultrasound for Optimal Intravascular Ultrasound Device Frequencies .....	95
<i>Zewen Ha</i>	
Project-Based Exploration of Cluster Computing and Parallelization Using Raspberry Pis.....	96
<i>Taylor Powell, Ayman Elmesalami, Soad Ibrahim</i>	
A Semantic Text Processing System for Free-Write English Papers .....	103
<i>Ryan Depascale, Stefan A. Robila</i>	
Building Student Engagement in Mathematics with Interdisciplinary Study of Voting Systems .....	109
<i>Teresa Piliouras, Aaron Kershenbaum, Robert Schiaffino, Steffi Crasto</i>	
Why the Trans Programmer? .....	117
<i>Skye Kychenthal</i>	
Fueling the Future: A Study of Nuclear Fusion Reactors and Their Modern Capabilities .....	123
<i>Suzanne Keilson, Dahlia Shafiq</i>	
Impact of Student Research in Engineering: Case Study of a Non-Doctoral University in the Arab World.....	124
<i>Sawsan El-Zahr</i>	
Quality, Quantity and Impact in Engineering Research: Case Study of a Non-Doctoral University in the Arab World.....	132
<i>Sawsan El-Zahr</i>	
A Unified Aviation STEM Program .....	138
<i>Lyndsay Digneo, Holly Cyrus, Somil Shah</i>	
Synchronous Online Army Educational Research Program for High School Students .....	141
<i>Anitha Sarah Subburaj, Ilham Osman, Gail Alleyne Bayne, Stephen Bayne</i>	
Retrieval of Data from the Database of a BCT–Voting System .....	147
<i>Jacob Wolmer, Avimanyou Vatsa, Dylan Weiss</i>	
Developing MATLAB Data Acquisition and Control Functions for the LABVOLT Electromechanical Training System .....	150
<i>Keven Rall, Hussein Abdeltawab, Mesude Bayrakci-Boz, Sohail Anwar</i>	
Identifying Students’ Progress and Mobility Patterns in Higher Education Through Open-Source Visualization.....	154
<i>Ali Oran, Andrew Martin, Michael Klymkowsky, Robert Stubbs</i>	

Blockchain-Based Electronic Voting System for Modern Democracy: A Review .....	162
<i>Dylan Weiss, Jacob Wolmer, Avimanyou Vatsa</i>	
Evaluating the Safety of COVID-19 mRNA Vaccines by Comparing Its Side Effects to Conventional Vaccines .....	167
<i>Shichun Zhang</i>	
Engineering Project Activities Designed to Promote STEM Engagement .....	168
<i>Zachary Dickinson, Tyler Seelnacht, Ram Sundaram</i>	
Understanding Natural Disasters Through Participatory Simulations: A Pilot Study.....	172
<i>Patricia Marybelle Davies</i>	
Visual Navigation for Autonomous Vehicles: An Open-Source Hands-On Robotics Course at MIT .....	177
<i>Luca Carlone, Kasra Khosoussi, Vasileios Tzoumas, Golnaz Habibi, Markus Ryll, Rajat Talak, Jingnan Shi, Pasquale Antonante</i>	
A Review of Bionics for Bird Flight and Potentially Applicable Mechanisms .....	185
<i>Zhitao Shu, Lufan Wang</i>	
The Impact of Blurb Sentiments on Crowdfunding Success .....	186
<i>Siyuan Liu</i>	
Applying Face Recognition on Smart Family Album Player .....	187
<i>Eckart M Schneider, Shunguang Wu</i>	
Educating Educators on Social Engineering Experiences Developing and Implementing a Social Engineering Workshop for All Education Levels .....	188
<i>Katorah Williams, Rachel Bleiman, Aunshul Rege</i>	
Effect of Cycle GAN in Melanoma Classification .....	195
<i>Tyler R. Jan, Ava Miller, Q'Andre Small, Ayushi Kumar, Avimanyou K. Vatsa</i>	
Using Computational Methods to Identify Small Molecules for Cancer Immunotherapy .....	196
<i>Nicole Liang</i>	
Study of the Eruption Mechanism of Saturn's Moon Enceladus Plume Using the Mathematical Model of a Geyser (Periodic Bubbling Spring).....	197
<i>Hiroyuki Kagami</i>	
Development of Chitosan Encapsulated Thyme Essential Oil as an Alternative Fruit Fly Repellent for Household Use.....	201
<i>Vivian Wu</i>	
AI-Based Recipient Blood Type Matching Blood Transfusion Medical Device Design System .....	202
<i>Atma R. Sahu, Clarence Williams, Sarika Rajeev, Sharad Sharma</i>	
Design and Implementation of an Educational Suit .....	205
<i>Abrar Aleidan, Aishah Almajedi, Abdulazziz Alqattan, Fatmah Alramezi, Seyed Esmaeili, Amal Alateyah</i>	
Identification of Important Factors in Digital Citizenship Learning Curriculum .....	209
<i>Alex Budiyanto, Lukito Edi Nugroho, Paulus Insap Santosa</i>	

Challenges and Good Practices in STEM: A Systematic Review and Implications for Higher Education Institutions.....	215
<i>Eirini Christou, Antigoni Parmaxi, Anastasios A. Economides, Maria Perifanou, Maryna Manchenko, Jelena Mazaj</i>	
Understanding Obstacles in the STEM Career Pipeline Through System Dynamics Modeling .....	221
<i>Daniel C. Appel, Carla Winsor, Ralph Tillinghast, Mo Mansouri</i>	
GAN Assistance in Diagnosis of Melanoma .....	232
<i>Ava Miller, Tyler R Jan, Q'Andre Small, Ayushi Kumar, Avimanyou K Vatsa</i>	
Applying Engineering Techniques on Non-Traditional Real-World Problems.....	233
<i>Pamela A. M. Bogdan, Verderosa V. John</i>	
A Collaborative Approach to Integrate Computational Thinking in an Integrated STEM Curriculum .....	238
<i>Dazhi Yang, Shi Feng</i>	
Tactic Classification of Broadcast Soccer Videos by Using AI .....	241
<i>Jioh In</i>	
Quantitative Study on the Anxiety Level of High School Students in Pandemic Life .....	242
<i>Mofei Shen</i>	
A Microcredentialing Strategy for Crowd Sourcing Support Resources Within an Introductory Engineering Course .....	250
<i>Henry Griffith, Angela Griffith</i>	
Accelerating Freshmen Engineering Students into Undergraduate Research Experiences .....	252
<i>Ashley Larweck, Adam L. Hooker, Henry Griffith</i>	
A Quantum Optimization Algorithm for Single Machine Total Weighted Tardiness Minimization.....	255
<i>Youhao S. Wang, Julian Cheng</i>	
Towards the Effective Selection of Guest Speakers Within an Introductory Electrical and Computer Engineering Course .....	256
<i>Henry Griffith, Jonathan Flores, Ashley Larweck</i>	
Adapting a STEM Robotics Program to the Covid-19 Pandemic - A Validation of the Proposal Presented at ISEC in 2021 .....	260
<i>Neville Jacobs, Eric V. Sudano</i>	
A Multi-Pronged Approach to Boosting STEM Engagement Through Low and No Cost Solutions .....	265
<i>Michael Kozak, Michael Kopack, Samantha Kupersmith</i>	
Statistical Analyses for Fantasy Sports.....	269
<i>Zachary Wu, Vince Pulido</i>	
Developing Surveillance Applications with Raspberry Pi, Django, and Cloud Services .....	270
<i>A. Ravishankar Rao, Brennan Gebusion, Jared Porpora</i>	
Coding Classical Logic Gates on the D-Wave Quantum Annealer.....	278
<i>Naren K. Sathishkumar</i>	
Integrating Theory and Practice in Undergraduate Education Through the Design and Implementation of Pin-Based Multi-Robot Manipulators .....	279
<i>Kyle Pichney, Andrew Romero, Yancy Diaz-Mercado</i>	

Role of Interdisciplinarity and Collaboration in Engineering Design Curriculum .....	285
<i>Olivia Hall, Deeksha Seth</i>	
A Survey of Student Motivations for Enrolling in Engineering and Technology Undergraduate Programs.....	293
<i>A. Ravishankar Rao</i>	
Credibility Based Teaching Assessment in Smart Campus .....	301
<i>Ruizhi Liao, Qianyu Ou, Wenjun Zheng, Zhan Shi, Shuzhen Li</i>	
Closed Loop Digitally Controlled Power Supply Analysis and Design with Register Level Coding Emphasis .....	305
<i>John Tsinetakes</i>	
Undergraduate Research: Cyclostationary Plot Classification Using Machine Learning.....	311
<i>Nicolas Null, Sanish Rai, Ryan S. Lynch, Tyler Kibler, Matthew Gilley, John Morgan</i>	
Integrating Animation and Game-Making in Teaching JavaScript.....	318
<i>Shuting Xu, Shuhua Lai, Lissa Pollacia</i>	
Bird Audio Recognition Using Convolutional Neural Networks .....	324
<i>Kelsey H. Lo</i>	
Analyzing the Environmental Effect of Chlorophyta Using Convolutional Neural Network .....	325
<i>Heyu Li</i>	
Determining a Correlation Between Common Skin Conditions and Anxiety .....	326
<i>Janice Chao, Ching-Yu Huang</i>	
Reducing Plastic Consumption with Molecular Gastronomy.....	327
<i>Shreya Dutt</i>	
Rapid and Automated Detection of Cancer and Immune Cells Using Novel Machine Learning Recognition Algorithms.....	328
<i>Nesara Shree, Eva Vu-Stern</i>	
Chess4Girls - Empowering Girls Through Chess.....	329
<i>Nesara Shree</i>	
Visualizing Territorial Overlap of New Jersey Grapevines and Spotted Lanternflies Using GIS .....	330
<i>Sreya Jonnalagadda</i>	
Color Melting Ice .....	331
<i>Bela Sameep Sanghavi</i>	
Creating an App Using AI to Analyze Eye Movements to Screen for Neurological Disorders.....	332
<i>Srihithaa Vaidya</i>	
Using Unmanned Aerial Vehicles to Test Water Quality .....	333
<i>Arnab Machavarapu, Aadet Samant, Zubin Chhabra</i>	
Influence of GFP GAN on Melanoma Classification .....	334
<i>Ayushi Kumar, Avimanyou Vatsa</i>	
How to Design Single-Sheet Origami Models .....	340
<i>Qi Ao</i>	

Automatic Clothes Finder for the Colorblind.....	341
<i>Bao T. To</i>	
Virtual Summer Research Camp for Incoming Freshmen Students in STEM.....	342
<i>Sanish Rai, Kenan Hatipoglu</i>	
An Integrated Project-Based Learning Approach in Engineering Technology Undergraduate Curricula.....	348
<i>Mohammad Upal Mahfuz</i>	
Stem Project - Straw Roller Coaster.....	353
<i>Jeanine Hancock, Julia Rodriguez, Alex Albiter, Carina Tullo, Juliette Hancock</i>	
Detecting Anomalies in IoT Device Communication Based on MUD Profiles with Zeek and Python.....	354
<i>Rohan Nunugonda, Vyas Sekar</i>	
Project NARWHAL - Nautical Autonomous Robot for Wire Hunting Through Analysis and Localization.....	355
<i>Thomas Edwards</i>	
Comparing the Gains of Bipolar Junction Transistor's (BJT) Using the IV Characteristics of a Transistor.....	356
<i>Roshan S. Natarajan</i>	
Unsupervised GAN for Melanoma.....	357
<i>Q'Andre Small, Avimanyou K. Vatsa, Tyler R. Jan, Ava Miller, Ayushi Kumar</i>	
Girls Teaching Girls: Mentoring Middle School Students in Mathematics.....	358
<i>Sowmya Natarajan</i>	
Minimizing Weight in High Performing Gaming Mice.....	359
<i>Judah Lerman</i>	
ATmega328P-Based Portable Heartrate Monitoring System that Can Transmit SMS Messages in Case of a Cardiac Arrest.....	360
<i>Eugene John, Joseph Matthew Y. Espinas, Ramon Carmelo Y. Calimbahin, Randy O. Zebroff</i>	
Creating an Appropriate Computer Science and Computational Thinking Graduate Curriculum for K–12 Teachers: Context and Initial Results.....	361
<i>Katherine G. Herbert-Berger, Sumi Hagiwara, Elizabeth M. Rogacki, Thomas J. Marlowe</i>	
Facial Recognition for Deepfake Detection.....	364
<i>Firaol Desta, Emily J. Brown</i>	
One Degree of Freedom Copter Design and Control Using Smart and Simple PID Controller.....	365
<i>Zeyad A. Karam, Zaid Shafeeq Bakr, Elaf A. Saeed</i>	
Wireless Body Area Network (WBAN) Applications Necessity in Real Time Healthcare.....	371
<i>Reza Khalilian, Abdalhossein Rezai</i>	
Let the Sunshine: Learning About Solar Energy in Equatorial Africa to Facilitate the Use of Educational Technology.....	375
<i>Jorge Santiago-Aviles, Geraldine Light</i>	
Darwin's Finches Population - Will it Thrive or Dwindle Under Climate Change?.....	378
<i>Kavin Sankar, Laura Wendelberger</i>	



The Ethics of Artificial Intelligence: How Educators Can Adapt to Close the Bias Gap .....	379
<i>Maya Lerman</i>	
The STEM of Origami.....	380
<i>Rishi Balaji</i>	
How Climate Change Effects the Ocean’s Reefs.....	381
<i>Skylar E. Glass</i>	
Parallel Programming with Pictures - A Second Path (Work-in-Progress).....	382
<i>Liam Davis-Wallace, Wu-Chun Feng</i>	
Modeling Historical Devices Using Computer Aided Design (CAD).....	385
<i>Vanisha S. Nagali, Rohan Deb</i>	
Data Science and Analytics for Esports.....	386
<i>Arjun Agrawal</i>	
Physical Meaning of Digital Signal Processing: What Students May Think and What They Really Should Know .....	387
<i>Konstantin A. Grebenyuk</i>	
Engaging Students in E-Waste Management Through Outreach Programs .....	391
<i>Sony Varghese, Mahima Sharma</i>	
Art and Science Education United.....	395
<i>Helena Rittenhouse</i>	
Non-Existence of the Algorithm that Can Obtain the Optimal Solution for a Few Given Options of Investment in Constructive Mathematics .....	396
<i>Jiahong Toby Sun</i>	
Noise Removal of ECG Signal Using Multi-Techniques .....	397
<i>Heyam A. Marzog, Haider. J. Abd, A. Z. Yonis</i>	
Using Social Media to Predict Stock Market Prices.....	404
<i>Samuel T. Ghezze, Alexandru Cara, Nicholas P. Farber</i>	
Using Machine Learning to Identify Gender Bias in Screenplays.....	405
<i>Faith Comising, Hanna E. Wosenu, Jason H. Kang, Irene Shijo</i>	
Training-Free Lane Tracking for 1/10th Scale Autonomous Vehicle Using Inverse Perspective Mapping and Probabilistic Hough Transforms.....	406
<i>Mihir Rao, Laura Paulino, Victor Robila, Iris Li, Michelle Zhu, Weitian Wang</i>	
Multiverse Network Management System: Developing an IP-Based Network Discovery Agent.....	412
<i>Shane E. Jayasundera</i>	
Developing a Noise Canceling Device for Ranged Sound Suppression.....	413
<i>Jason J. Lai, Joseph Townsend</i>	
Dynamic Fused Deposition Modeling for Rapid Development of Aerial Swarms.....	414
<i>Ryan A. Ellis</i>	
Tracking Technology Trends Using Text Data Mining.....	415
<i>Andres Fortino, Yiyi You</i>	

The Fading of Chinese Ethnic Minority Culture - A Case Study of Five Inner Mongolia Novels .....	422
<i>Hao Wen</i>	
Maintenance 4.0 Applied to the Condition Analysis of Rotating Electrical Engines: A Work in Progress .....	423
<i>David Huertas Reynoso</i>	
Transmission Line Fault Detection Using Wavelet Transform & ANN Approach .....	426
<i>Jivitesh Nitin Chavan, Atul Arun Kale, Sawata Ravan Deore</i>	
Performance Analysis of Kalman Filter as an Equalizer in a non-Gaussian Environment .....	433
<i>Ly Thi Khanh Vu, Huu Tue Huynh, Hung Ngoc Do</i>	
Artificial Intelligence (AI) as a Computerized Decision Aid for Selection of Candidates in Higher Education.....	439
<i>V. V. Ravi Kumar, Ramakrishnan Raman</i>	
Segmentation Techniques in Iris Recognition System.....	444
<i>Ruaa Waleed Jalal, M. F. Ghanim</i>	
Student Perceptions on Artificial Intelligence (AI) in Higher Education .....	450
<i>V. V. Ravi Kumar, Ramakrishnan Raman</i>	
Network Communication Intrusion Detection and Classification Security Techniques .....	455
<i>A. Z. Yonis</i>	
Using Statistical Decision Making for a University Examination Scenario .....	460
<i>S. Vijayakumar Bharathi, Dhanya Pramod, Ramakrishnan Raman</i>	
Competitive Study on Public and Private Key Usage in Voice Over Internet Protocol.....	465
<i>Aws Jaber</i>	

**Author Index**