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# MNT<sup>e</sup>SIG

MICRO NANO TECHNOLOGY  
education  
SPECIAL INTEREST GROUP

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**[mnt-conference.net](http://mnt-conference.net)**

## **2018 Community Asset Book**

As part of the MNT<sup>e</sup>SIG Community Meeting

July 24, 2018

Miami, Florida



# MNT<sup>e</sup>SIG Program Agenda

July 24, 2018 - Miami, Florida - InterContinental Miami

Please check in at the HI-TEC Registration Desk

Breakfast Room: **Chopin Ballroom**

Meeting Room: **Alhambra/Escorial**

7:00-8:00 - Check-in if you have not done so, at the HI-TEC registration desk.  
You need your badge to enter MNTeSIG.

7:00-8:00 - Poster setup, Alhambra/Escorial  
See Bob Ehrmann for assistance

7:30-8:00 - Continental Breakfast - Chopin Ballroom.  
Bring Coffee with you to the MNTeSIG meeting room.

8:00-8:30 - Video Showcase - Alhambra/Escorial  
Networking and Short videos from MNT Centers. Posters will be available for viewing.

8:30-9:30 - Welcome & Keynote - Amy Brunner, Program Manager, Lockheed Martin

## **Title: Being the Change: The Power of Community**

About the Presenter: Amy's 18-year career has spanned both academia and industry in engineering and engineering management roles. After leaving education she continues to have a passion for encouraging students of all ages and backgrounds to pursue careers in micro and nanotechnology. Outside of work, she volunteers for the United Way, Girls Inc, and 4H programs and is constantly looking for opportunities to merge community programs with education institutions and industry partners. Amy is honored to be a part of this year's MNT Special Interest group to support programs such as these that fostered her own development and opened the many doors to a fulfilling and diverse career.

9:30-10:15 - Lightning Round #1: Moderator – Barbara Lopez

Presentations are strictly limited to 7 minutes each

1	Rick Vaughn	Rio Salado College	Nano Knows No Limits
2	Richard Hill	Erie Community College	Recruiting High School Students to Community College STEM Programs
3	Marco Curreli	Omni Nano	Digital Curricula for Online and Hybrid Nanotechnology Courses
4	Yawen Li	Lawrence Technological University	Promoting micro and nano education through active collaborative learning in biomedical engineering
5	Jared Ashcroft	Pasadena City College	Contextualizing Technology in the Classroom Via Remote Access

10:15-10:30 - Break - Grand Ballroom Foyer - Posters available for viewing

10:30-11:15 – Lightning Round #2: Moderator Kate Alcott, NEATEC, Suny Polytechnic

Presentations are strictly limited to 7 minutes each

6	Gary Mullett	Springfield Technical CC	Emerging micro-photonic sensors and the Nanotechnology Technician
7	Tanya Faltens	Purdue University	Do the CNT Dance and simulate their structures on nano HUB
8	Ahmed Khan & Salahuddin Qazi	Devry University SUNY Poly	Learning through Visualization and Simulation at the Nanoscale
9	Jamal Uddin	Coppin State University	Energy Efficient Dye Sensitized Solar Cell and its Business Perspective in the Society

11:15-12:00 – Community Discussion: Moderator Mike Opp, Nano Link, Dakota County CC

MNT<sup>e</sup>SIG – Building the Collaboratory

How do we want to grow, sustain and improve the MNT educational special interest group?

Moving forward - periodic online meetings/seminars which could include:

- Short presentations from researchers, industry and members on new technologies, hiring trends, new resources available...
- Collaborative opportunities – writing project proposals together
- Breakout sessions, special interest sub-teams
- Collaboration with MNT organizations and Industry
- Certifications/Badges ....

12:00 MNTeSIG adjourns - Lunch is on your own

12:30 Posters must be removed in preparation for the next workshop session beginning at 1 PM

Accepted Posters

Steve Sadow	University of South Florida	Silicon Carbide Biotechnology
Huajun Fan	Prairie View A & M University	An innovative way of teaching light and energy
Ahmed Kamal	Tennessee Tech University	BioMEMS Device for assessment of Autonomic Nervous System
Josee Horton	Pasadena City College	Using Remotely Accessible Microscopy in the Middle School Classroom
Sara Jeros	Pasadena City College	Using Active Learning in Tandem with Remote Instruments in a General Chemistry Classroom
Saiful Khondaker	University of Central Florida	Creation of a Florida Nanotechnology Technician Education Program (FNTEP)
Ahmed Khan Salahuddin Qazi	Devry University SUNY Poly	Learning through Visualization and Simulation at the Nanoscale
Nancy Louwagie	Normandale CC	Expanding Pathways into Vacuum Technology with Hands-on Technical Education
Andy Bell	Ivy Tech	Using LabView to Teach MEMS Fabrication Process

# LIST OF PRESENTATIONS

## ***Jared Ashcroft***

**Title:** Contextualizing Technology in the Classroom Via Remote Access.

**Abstract:** Multidisciplinary science experiments were designed and integrated into K-12 classrooms, focusing on the interconnection between technology and Problem-Based Learning (PBL) teaching pedagogy. Increased engagement and passion for science of middle and high school students was shown using remote/PBL experiences. We will share the five RAIN/PBL labs that were developed and discuss the impact and practicality of using the activities in K-12 and undergraduate STEM courses. We will also share our work in developing a RAIN/PBL lab textbook that aims to bring the activities into one shared space to be shared as an open education resource (OER).

**Impact:** We have shown that using the RAIN/PBL experiences a 2.5-fold increase in interest of science for K-12 students from underrepresented populations.

## ***Marco Curreli***

**Title:** Digital Curricula for Online and Hybrid Nanotechnology Courses

**Abstract:** Omni Nano, a non-profit organization devoted to nanotechnology education, has created the first and only complete digital curricula for online/hybrid high school and undergraduate nanotechnology courses. Our student-centered, teacher-approved materials include everything required to teach nanotechnology, whether as a stand-alone class or integrated into another science class, including lesson plans, presentations, assignments and answer keys, and hands-on laboratory activities. Their modular structure gives schools and teachers the flexibility to add and edit content to fit their schedule. Compatibility with popular learning management systems like Blackboard and Canvas make the adoption and use of our NGSS-aligned curricula simple and straightforward.

**Impact:** Introducing youth to nanotechnology and STEM inspires and prepares them for their professional careers in the globalized, high-tech economy of the 21st century.

## ***Tanya Faltens***

**Title:** Do the CNT Dance and simulate their structures on Nano HUB

**Abstract:** Carbon nanostructures are a ubiquitous feature of many nanotechnology courses. In this fully-interactive lesson, available on Nano HUB, students learn a Carbon Nanotube (CNT) "dance" that activates their kinesthetic learning pathways to help them remember names of the different types of carbon nanotube. Freely accessible Nano HUB simulations are used to create visualizations of different CNTs, along with their band structures, in a lesson that explains how to interpret this band structure to determine the electrical conductivity of the CNT. Links to additional content for nanotechnology education and workforce development will be provided.

**Impact:** Students learn about CNTs quickly, through multiple learning modes, and have fun in the process.

## ***Huajun Fan***

**Title:** An innovative way of teaching light and energy

**Abstract:** Teaching the wavelength, frequency, & energy of various lights is the first step in introduction the atomic structure and quantum mechanics. Students always found it difficult in understanding these concepts and relationship. A hands-on approach has been adopted and students found the practice is simple, straightforward, and easy to master. Combining an array of different color LED lights with a diffraction grating sheet can explain the relationship much effectively. If needed, one can further teach the voltage, amperage, & resistance, then allow students to assemble their own LED kit with fraction of cost.

**Impact:** Students found the hands-on experiments help them understand the relationship among wavelength, frequency and energy of light. The demo is simple but effective way to be used in chemistry.

### ***Richard Hill***

**Title:** Recruiting High School Students to Community College STEM Programs

**Abstract:** I would like to share what happens when recruiting brings in High Schools to visit the Nanotechnology department. The first thing we do is give them a brief talk about Nano technology and our AAS program. Then we do a remote session with our SEM and some Vacuum experiments to get them engaged. We finish with a window tour of the cleanroom and hand out some cleanroom swag.

**Impact:** These activities were recently added to the recruiting process and visiting students are more engaged than before with hopes to increase interest in STEM programs.

### ***Ahmed Khan***

**Title:** Learning through Visualization and Simulation at the Nanoscale

**Abstract:** Visualization at the nanoscale and simulation of nanoscale phenomena are important techniques to enhance students' understanding of abstract nanoscience concepts. An instructor can also utilize these techniques to teach difficult concepts and design without buying and using expensive equipment. The purpose of our presentation is to discuss both the use of remotely accessible on-line visualization instruments and web-based simulation tools which are freely available through the internet. There are 19 RAIN (remote access instruments in nanotechnology) nodes for accessing visualization instruments and over 320 simulation tools available through Nano HUB which allows students to simulate, understand and explore nanotechnology related areas.

**Impact:** This presentation will impact the students' understanding of nanoscience concepts by learning to use RAIN for visualization and use Nano HUB for simulating nanoscale phenomena

### ***Yawen Li***

**Title:** Promoting micro and nano education through active collaborative learning in biomedical engineering

**Abstract:** The Biomedical Engineering (BME) undergraduate curriculum at Lawrence Technological University (LTU) includes an introductory MEMS lecture and Lab. A Nanotechnology minor program has also been established to train students interested in nanotechnology with a broad range of knowledge and skills. We will share in this presentation how we use student-centered active collaborative learning to enhance the students' learning in micro and nano courses, and to promote the students' interest in applying the micro and nano technologies to solve biomedical problems.

### ***Gary Mullett***

**Title:** Emerging micro-photonic sensors and the Nanotechnology Technician

**Abstract:** Recently, the Optics & Photonics Technology program at Springfield Technical Community College has joined a collaboration led by MIT's AIM Photonics Academy consisting of other colleges, and business and industry partners in Massachusetts. STCC's role in this alliance will be to develop an innovative lab facility that will be used primarily for workforce development. Many advances are being made in the field of photonic integrated circuits (PICs). Many of the anticipated applications of PICs are in the field of micro/nano-sensors. Applications span sensors for autonomous vehicles, chemical leak detection, and sensors for advanced biomedical devices and home e-health care. This talk will focus on the emerging technology of these photonics-based sensors and the workforce skill set needed to test and characterize their performance.

**Impact:** The impact of this initiative by STCC will be to enhance the skill sets of our graduates to support local and New England business and industry and to serve as a model for other Optics/Photonics Technology programs across the country.

### ***Salahuddin Qazi***

**Title:** Learning through Visualization and Simulation at the Nanoscale

**Abstract:** Visualization at the nanoscale and simulation of nanoscale phenomena are important techniques to enhance students' understanding of abstract nanoscience concepts. An instructor can also utilize these techniques to teach difficult concepts and design without buying and using expensive equipment. The purpose of our presentation is to discuss both the use of remotely accessible on-line visualization instruments and web-based simulation tools which are freely available through the internet. There are 19 RAIN (remote access instruments in nanotechnology) nodes for accessing visualization instruments and over 320 simulation tools available through Nano HUB which allows students to simulate, understand and explore nanotechnology related areas.

**Impact:** This presentation will impact the students' understanding of nanoscience concepts by learning to use RAIN for visualization and use Nano HUB for simulating nanoscale phenomena

### ***Jamal Uddin***

**Title:** Energy Efficient Dye Sensitized Solar Cell and its Business Perspective in the Society

**Abstract:** Our company has developed dye-sensitized solar cells that generate electricity using light energy. What's more? We're teaming up with a toting company to put that technology in your accessories so that students and professionals like me and you can charge on the go--our backpacks, purses, our brief cases. Point is, you can charge on the go. You may ask, "what about current solar cells, portable chargers and solar backpacks?" Forget them, we're more affordable, more environmentally friendly, and capable of suiting every style and fashion with a variety of dye colors. Our initial market will be Coppin students (3,000 students) and subsequently students in Maryland (371,000 students) and then to ends of the world. Silicon cell solar chargers and existing solar bags are our competitors, but our device uses natural material and it's less expensive and more attractive.

**Impact:** Our student team is solving this problem by creating an alternative. We are using titanium dioxide slides and natural dyes to create dye sensitized solar cells which are a budget friendly, environmentally safe and transportable way to produces renewable energy.

### ***Rick Vaughn***

**Title:** Nano Knows No Limits

**Abstract:** Rio Salado College used grant funding to develop key messaging and assets for a new marketing campaign. Three videos featuring students and instructors emphasize the innovative program that is accessible to everyone leading to a prosperous future.

**Impact:** Through our program, students learn the foundations of nanotechnology to innovate a variety of industries in an everchanging world.

# LIST OF POSTERS

## ***Andy Bell***

**Title:** Using LabView to Teach MEMS Fabrication Process

## ***Josee Horton***

**Title:** Using Remotely Accessible Microscopy in the Middle School Classroom

**Abstract:** Middle School children are at an age of exploration. Microscopy is a key component in fostering this exploration. Presented here is a conglomerate of University, Community College and High School sites that bring advanced microscopy to the Middle School classroom. We also present the activities and labs developed at Pasadena City College, as well as assessment data that show the effectiveness the remote activities have in the classroom setting.

**Impact:** Developing the activities and labs, plus performing them in the middle school classroom has fostered a sense of excitement in the students for STEM.

## ***Sara Jeros***

**Title:** Using Active Learning in Tandem with Remote Instruments in a General Chemistry Classroom

**Abstract:** Increasing the success and retention of students is paramount and will lead to a more diverse STEM field. We have developed active learning laboratories in tandem with using remotely accessible instruments through the RAIN Network in order to increase the success rate of Pasadena City College students in General Chemistry. We will present the activities and labs and show that by using these teaching pedagogies, our success and retention rate has increase by twenty percent with an achievement gap of zero.

**Impact:** By using active learning and the RAIN network, we are seeing a greater success and retention rate of our Pasadena City College students and have closed the achievement gap.

## ***Ahmed Kamal***

**Title:** BioMEMS Device for assessment of Autonomic Nervous System

**Abstract:** assess autonomic nervous system in health and disease. The poster will address the following: Advantages, Design of the device and Manufacturing it as well as the future work.

**Impact:** The application of Nanotechnology in Medicine is crucial to diagnosis and treatment of diseases. The poster will address the application and manufacturing Micro nano device to assess the autonomic system in health and disease. The poster will motivate students to the application of nanotechnology specially manufacturing of biosensors for different uses in diagnosis and monitoring Biological signals in health and disease.

## ***Ahmed Khan***

**Title:** Learning through Visualization and Simulation at the Nanoscale

**Abstract:** Visualization at the nanoscale and simulation of nanoscale phenomena are important techniques to enhance students' understanding of abstract nanoscience concepts. An instructor can also utilize these techniques to teach difficult concepts and design without buying and using expensive equipment. The purpose of our presentation is to discuss both the use of remotely accessible on-line visualization instruments and web-based simulation tools which are freely available through the internet. There are 19 RAIN (remote access instruments in nanotechnology) nodes for accessing visualization instruments and over 320 simulation tools available through Nano HUB which allows students to simulate, understand and explore nanotechnology related areas.

**Impact:** This presentation will impact the students' understanding of nanoscience concepts by learning to use RAIN for visualization and use Nano HUB for simulating nanoscale phenomena/

### ***Saiful Khondaker***

**Title:** Creation of a Florida Nanotechnology Technician Education Program (FNTEP)

**Abstract:** University of Central Florida (UCF) in partnership with local community colleges plan to create a nanotechnology technician education program. UCF Nanoscience Technology Center (NSTC) was established in 2004 as a state funded institution with the mission of promoting nano-education, research and workforce development. NSTC and UCF has the necessary infrastructure and logistics to develop a large-scale Nano technician education program for the benefit Florida's economy. In this poster, I will highlight our unique skill sets and preparation towards establishing FNTEP.

**Impact:** The proposed nanotechnology technician program will provide hands on experience in nanotechnology tools and application developments to students seeking associate degree in local community colleges.

### ***Nancy Louwagie***

**Title:** Expanding Pathways into Vacuum Technology with Hands-on Technical Education

**Abstract:** Project DELIVER combines post-secondary coursework with hands-on training and uses telepresence technology to deliver vacuum technician education nationwide. Vacuum technicians play critical roles in high-tech industries and research. Starting with a Foundations course in vacuum science that contextualizes math and chemistry concepts for vacuum technology, students' progress through a series of four courses to earn a Certificate in Vacuum Technology from Normandale, an accredited higher education institution. Students use Vacuum Equipment Trainer systems to reinforce their learning. With a Certificate, students can move directly into the workforce or continue towards a degree. Employees can advance their careers.

**Impact:** Projects NSF-ATE DUE #1400408 (ReVAMP) and NSF-ATE DUE #1700624 (DELIVER) have involved 4 higher-ed institutions including Normandale, 5 industries, and 1 National Lab. There have been over 225 enrollments in Vacuum Technology courses during the NSF-ATE project funding period (since January 2015). Student registrations from distance sites represent almost half of these course enrollments. Eleven students including four students who attended Normandale's Vacuum Technology classes via telepresence at a National Lab recently earned Normandale's Vacuum Technology Certificate after the completion of spring semester 2018.

### ***Salahuddin Qazi***

**Title:** Learning through Visualization and Simulation at the Nanoscale

**Abstract:** Visualization at the nanoscale and simulation of nanoscale phenomena are important techniques to enhance students' understanding of abstract nanoscience concepts. An instructor can also utilize these techniques to teach difficult concepts and design without buying and using expensive equipment. The purpose of our presentation is to discuss both the use of remotely accessible on-line visualization instruments and web-based simulation tools which are freely available through the internet. There are 19 RAIN (remote access instruments in nanotechnology) nodes for accessing visualization instruments and over 320 simulation tools available through Nano HUB which allows students to simulate, understand and explore nanotechnology related areas.

**Impact:** This presentation will impact the students' understanding of nanoscience concepts by learning to use RAIN for visualization and use Nano HUB for simulating nanoscale phenomena.



***Stephen Sadow***

**Title:** Silicon Carbide Biotechnology

**Abstract:** With the experimental proof that silicon carbide (SiC) is compatible with many cell lines (in-vitro) and with three animal models (mouse, rat and pig) the opportunity to interface bioelectronic devices with the body now includes a semiconducting interface. While silicon has long been used in bioelectronics for short-term applications, SiC provides a long-term (years instead of days or months) solution to many healthcare challenges. This includes implanted sensors, neural interfaces, and more recently the treatment of deep-tissue cancer using SiC nanotechnology. This poster will both review applications where SiC biotechnology has already found commercial use and outline cutting-edge research at the University of South Florida to engineer a long-term neural interface.

**Impact:** looking at novel materials and novel applications can show students how interdisciplinary applications of technologies can have a major impact

***Rick Vaughn***

**Title:** Nano Knows No Limits

**Abstract:** Rio Salado College used grant funding to develop key messaging and assets for a new marketing campaign. Three videos featuring students and instructors emphasize the innovative program that is accessible to everyone leading to a prosperous future.

**Impact:** Through our program, students learn the foundations of nanotechnology to innovate a variety of industries in an everchanging world.

# LIST OF CONTACTS

## Amy Brunner



MNT<sup>®</sup>SIG Keynote Speaker

Program Manager

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Lockheed Martin in Santa Barbara, California

Amy Brunner is a Program Manager at Lockheed Martin in Santa Barbara, California. Her 18-year career has spanned both academia and industry in various engineering and engineering management roles. After leaving education she continues to have a passion for encouraging students of all ages and backgrounds to pursue careers in micro and nanotechnology. Outside of work, she volunteers for the United Way, Girls Inc, and 4H programs and is constantly looking for opportunities to merge community programs with education institutions and industry partners. Amy is honored to be a part of this year's MNT Special Interest group to support programs such as these that fostered her own development and opened the many doors to a fulfilling and diverse career in state of the art technologies.

## Dr. Ahmed S. Khan



Professor of Electronics and Electrical Engineering

Dr.a.s.khan@ieee.org

DeVry's College of Engineering and Information Sciences

Dr. Ahmed S. Khan, a Professor of Electronics and Electrical Engineering in DeVry's College of Engineering and Information Sciences, has been selected as Fulbright Specialist Scholar (2017-2020) by U.S. Department of State's Bureau of Educational and Cultural Affairs (ECA). Dr. Khan has Thirty-five years of experience in research, instruction, curricula design & development and program accreditation, management and supervision. He has authored many research papers and books on many technical topics, including the most recent book Nanotechnology: Ethical and Social Implications. Dr. Khan is a senior member of IEEE, ASEE, and serves as a program evaluator for ABET.

## Ahmed Kamal



Associate Professor  
akamal@tntech.edu  
Tennessee Tech University

Research/Innovation/Creative Interest Areas: Modeling and simulation the biomedical control system in health and disease, Using Nanotechnology devices (Biosensors) to detecting the biological signals, Advanced methods of Biomedical Signals, Nonlinear modeling of Biomedical Systems, Assessment of Autonomic function in Parkinson's Disease

### List of Selected Published papers

Ahmed Kamal "Novel Method to assess Autonomic Function in health and disease: an application to Epileptic Patients, International Journal of neuro rehabilitation, 1, 133, Dec 14/January 15

Ahmed Kamal "Assessment of Autonomic Function in Children Autism and normal Children Using Spectral Analysis and Posture Entrainment: A Pilot Study, Journal of Neurology and Neurosciences, Vol. 6 No. 3:37, 2015

Autonomic Function Assessment in Post Traumatic Brain Injury patients with Yoga Practicing Using Kernel Method and Entrainment Techniques, Current Opinions in Neurological Science, Vol1, Issue 1, 74-80, July 17.

## Abe Michelen



Managing Director & Co-PI of Northeast Advanced Technological Education Center (NEATEC)  
AMichelen@sunypoly.edu

Abe is the original awardee and the Managing Director and Co-Principal Investigator (Co-PI) of the Northeast Advanced Technological Education Center (NEATEC). He is a retired professor of Electrical Engineering at a local college in Troy, New York, where he taught courses on semiconductor manufacturing, nanotechnology, electromechanical systems and analog and digital electronics, among others. A graduate of Rensselaer Polytechnic Institute Abe is the author of two textbooks and of many technical conference papers. He is a senior engineer at IEEE GlobalSpec, where he manages databases of semiconductor, photovoltaic and software products, and regularly publishes technical articles on IEEE publications.

## Andrew Bell



Department Chair – Engineering  
abell118@ivytech.edu  
Ivy Tech Community College – Northeast

Andy Bell has a BS and MS degrees in Electrical Engineering from SMU and RPI respectively and has completed all the course work for a PhD in Systems Engineering from Stevens Institute of Technology. He worked in industry for 30 years on space and defense programs at GE and ITT before starting in 2011 as the department chair for the engineering programs at Ivy Tech Community College – Northeast. His faculty website is at <http://faculty.ivytech.edu/~abell118/>.

## Barbara C. López



Program Manager for the Support Center for Microsystems Education  
botero@unm.edu  
University of New Mexico

Barbara López is a Research Engineer at the University of New Mexico and has been working for the Southwest Center for Microsystems Education since its inception in 2004 as a curriculum developer, instructional designer, and instructor.

Currently, Barb is the Program Manager for the Support Center for Microsystems Education and a PhD student in the Organization, Information, & Learning Science department at the University of New Mexico. She has a B.S. and M.S. in Mechanical Engineering and has 10 years industry and government experience.

## Billie Copley



Project Manager at Nano Link  
billie.copley@dctc.edu  
Dakota County Technical College

Project Manager of Nano-Link: Center for Nanotechnology Education, graduate of the Dakota County Technical College Nanoscience Technology program, Mom of four, rock hound and amateur wood building hobbyist.

## Caitlin McGough



Student  
cnmcgoug@icloud.com

I recently graduated with a Certificate of Nanotechnology, and I am pursuing a degree in Chemical Engineering. I believe my life's purpose is to help others through research and applications of nanotechnology. I currently work at Infiniti, but I am looking forward to building a career in Nanotechnology. I was drawn to Nanotechnology due to the innumerable applications it can provide toward integral advancements in our world. I also am a nationally certified cheerleading coach in Arizona. For the past three years, I have built a strong, empowering program to educate teenagers in the sport, as well as organized and implemented educational outreach/tutoring groups, community service, and life skill building activities for them which has lead to competing at nationals in Florida. I also helped build The Wildflower AZ, which was voted best florist in Arizona two years in a row and has been featured on the Bachelor and E! for celebrity weddings and events. I am creative and always have a thirst for knowledge, and I am looking forward to applying that toward a rewarding career.

## Daniel Kainer



Director  
Daniel.B.Kainer@lonestar.edu  
Lone Star College Biotechnology Institute (LSCBI)

Dr. Daniel Kainer has served as director of the Lone Star College Biotechnology Institute (LSCBI) since 2009, where he has initiated LSCBI-sponsored undergraduate research initiatives centered primarily on algae biotechnology, including a current project involving the effects of zero-gravity on algal physiology. For a history of these unique community college-based initiatives see the following reference:

Kainer, D.B. Undergraduate Research: A Platform to Enhance Community College STEM Education. *Industrial Biotechnology*. October 2013, 9(5): 289-292.

Dr. Kainer is married to a pharmacogenomics laboratory manager and has three daughters who keep him busy when he is not teaching or supervising research projects.

## Gary J. Mullett



Professor  
gmullett@stcc.edu  
Springfield Technical Community College, Springfield, MA

Gary J. Mullett, a Professor of Electronics Technology and Co-Department Chair, presently teaches in the Electronics Group at Springfield Technical Community College (STCC) located in Springfield, MA. Since the mid-1990s, he has been active in the NSF's ATE and CCLI programs as a knowledge leader in the wireless telecommunications field. His current interests are: the development of novel and innovative systems-level approaches to the education of technicians, applications of the emerging field of wired and wireless networked embedded controllers and sensor/actuator networks, and cyber-physical system applications in the context of the Internet of Things (IoT).

## Hua-Jun Fan



Professor  
hjfan@pvamu.edu  
Prairie View A&M University

Dr. Hua-Jun Fan, a chemistry professor at Prairie View A&M University, is one of students' favorite professors on campus. He is creative in assisting student learning and a strong advocate of undergraduate research. He introduced various teaching techniques such as the Process Oriented Guided Inquiry Learning (POGIL), peer led team learning (PLTL) model, context-led approaches (CLA), modified flipped classroom model, and Vernier Technology into the classroom and laboratory. Dr. Fan was 4-time winner of the Most Outstanding Teaching Award of College and finalist for the President's Most Outstanding Teaching Award. He also received Outstanding Service Recognition for his Service-Learning and Community Service at Prairie View A&M University.

## Jim Schifley



CTE Administrator  
James\_Schifley@CABOCES.org  
Cattaraugus-Allegany BOCES, Western New York

James Schifley is the CTE Administrator for Curriculum for Cattaraugus-Allegany BOCES, a Career and Technical Education school in Western New York.

After ten years as a CAD Technician, designer, and inspector for an environmental engineering firm, Mr. Schifley joined CA BOCES in 1995 as a CAD instructor for 14 years. The curriculum was changed to Project Lead the Way which he taught for seven years. Mr. Schifley has an Associate's degree in Drafting, a bachelor's Degree in Technical/Vocational Educational Studies, and a Master's in Educational Leadership. He has lead the Nanotechnology initiative at CA BOCES since its inception in 2014.

**Jonathan S. Friedman**



Director, Puerto Rico Photonics Institute  
jsfriedman@suagm.edu  
Universidad Metropolitana

Jonathan Friedman is the Founding and Executive Director of the Puerto Rico Photonics Institute at the Universidad Metropolitana in San Juan, Puerto Rico. He joined UMET from the Arecibo Observatory, where he spent 26 years as a researcher, studying the upper atmosphere and near-space environment using optical remote sensing techniques, primarily high-spectral-resolution resonance lidar.

**Josée Horton**



Student  
joseehorton@aol.com  
Pasadena City College

Hello! I am currently a student at Pasadena City College and I am majoring in animal biology. I plan to transfer next year to UC Davis and I want to pursue a DVM/ PhD in animal biology. In the past year I have fallen in love with research and I continue to do what I love as an intern for the summer at Oak Crest Institute of Science. I am excited for all the opportunities that await me, and I am thankful for the opportunity to present.



**Kate Williams Alcott**



Associate Director, Northeast Advanced Technological Education Center (NEATEC)  
alcottk@sunyit.edu  
SUNY Polytechnic Institute, Utica, NY

NEATEC's mission is to attract and train a technician workforce for the semiconductor/advanced manufacturing industries. To that end, I work with three specific cohorts to build a pipeline of talent, transitioning soldiers from Fort Drum, high school students including those from the refugee community and college students. Activities to support this outreach include providing Advanced Manufacturing Technician training for soldiers, mentoring a refugee robotics team and hosting a Manufacturing Day Expo. Before joining NEATEC in 2013, I worked for an educational consulting firm as a trainer and curriculum developer.

**Dr. Marco Curreli**



Executive Director and Founder  
marcocurreli@omninano.org  
OMNI NANO

Dr. Marco Curreli is an educator, technology and social entrepreneur, and nanotechnology research scientist. In 2012, he founded the nonprofit organization Omni Nano to educate students about the cutting-edge science of nanotechnology. Omni Nano's curricula have been adopted by numerous institutions, and Dr. Curreli has educated thousands of students and professionals about nanotechnology and its applications. He holds a BS in Chemistry from Cal State LA and a PhD in Chemistry from USC.

**Dr. Matthias W. Pleil**



Principal Investigator – SCME  
Research Professor and Lecturer  
mpleil@unm.edu  
University of New Mexico, NM

Matthias Pleil, Ph.D. is the Principal Investigator for two NSF funded centers, the Southwest Center for Microsystems Education (2004-2018) and the Support Center for Microsystems Education (2017). He is a University of New Mexico Research Professor and Lecturer (Mechanical Engineering) and Cleanroom Manager (MTTC). He teaches several engineering courses and promotes micro and nanotechnology. He has been a faculty member at Central New Mexico Community College in both the Schools of Applied Technologies and Math, Science and Engineering (MSE). He has 12 years of experience in Semiconductor Manufacturing Engineering from Texas Instruments and Philips Semiconductors. Dr. Pleil received his Ph.D. in Physics in 1993 from Texas Tech University, where he completed original research on Time-Resolved Fluorescence Spectroscopy.

**Michael Lesiecki**



Principal at Luka Partners LLC  
Co-PI for NACK Support Center  
mlesiecki@gmail.com

Lesiecki has over 20 year's experience as a Principal Investigator, managing grants and managing grant evaluation and grant evaluators. He has led proposal development teams for TAACCCT and NSF grants and served as a reviewer for the NSF, NIH and ED grants. He has 27 peer reviewed publications in the area of Chemical Physics, has presented over 50 webinars, and presented at national conferences in the US and internationally. Mike started Luka Partners LLC in 2017 to focus on evaluation and specialized web services. He remains a co-Principal investigator for the NACK Support Center

## Mike Opp



Vice President of Academic and Student Affairs  
Mike.opp@dctc.edu  
Dakota County Technical College in Rosemount, Minnesota

Mike Opp is the Vice President of Academic Affairs at Dakota County Technical College in Rosemount, Minnesota. He has worked with Nano-Link and NSF since 2003 when he was the college's Dean of Transportation and Industry. He has an automotive service diploma, bachelor's degree in Vocational Technical Teacher Education, and a doctorate in Adult and Higher Education.

He worked as an automotive technician and automotive technology instructor in South Dakota, a state supervisor for trade and technology education in Washington state before moving to Minnesota.

## Nancy Louwagie



Chair, Engineering Technology Programs  
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Normandale Community College, Bloomington, MN

Chair of the Engineering Technology Programs Department at Normandale Community College in Bloomington, MN. I have been chair of the department for seven years and an instructor at Normandale for 14 years. Prior to Normandale, I worked as a Quality Assurance Engineer at a medical device company. Normandale's Engineering Technology Programs Department offers two AAS degree programs: (1) Computer Technology and (2) Vacuum and Thin Film Technology. Normandale's Vacuum and Thin Film Technology program has received three NSF-ATE project awards. I am the PI for the currently funded NSF-ATE DUE #1700624 DELIVER project.

## **NT Izuchi**



Tenured Professor of Computer Systems Engineering  
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Quinsigamond Community College in Worcester, MA

NT Izuchi is a tenured Professor of Computer Systems Engineering and has served as the department chair for both the Computer Information Systems programs and the Telecommunications and Computer Systems Support Technology programs at Quinsigamond Community College in Worcester, MA. He was a past President of the Faculty Senate at QCC. Born in Nigeria, he moved to the United States in the mid-seventies to further his education. He attended the University of Massachusetts for his undergraduate degree and Bryant College (now Bryant University), and Northeastern University Graduate School of Engineering where he obtained his graduate degrees.

## **Dr. Osama Awadelkarim**



Professor of Engineering Science and Mechanics  
Director of the Center for Nanotechnology Education and Utilization (CNEU) and the Nanotechnology Applications and Career Knowledge (NACK) Center  
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Pennsylvania State University

Dr. Awadelkarim received his Ph. D. from the J. J. Thompson Physical Laboratory at Reading University, U. K. Prior to joining Penn State, Dr. Awadelkarim worked as a Senior Research Scientist at Linkoping University and the Swedish Defense Research Establishment. His research interests are in electronic materials and devices, nanoelectronics, and nano/microelectromechanical systems (N/MEMS). Dr. Awadelkarim was selected by the National Academy of Sciences as a Jefferson Science Fellow at the United States Department of State. Dr. Awadelkarim worked as a Consultant and Senior Science Advisor to the Bureau of African Affairs and the Bureau of Oceans and International Environmental and Scientific Affairs at the United States Department of State. Dr. Awadelkarim is a Member of the Board of Directors for the Arab Science and Technology Foundation and a Fellow of the African Scientific Institute.

## **Pallavi Sharma**



Student  
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University of New Mexico, NM

Pallavi Sharma is a Ph.D. student in Mechanical Engineering Department at University of New Mexico. She received her M. Tech and Bachelor of Engineering in Mechanical Engineering from National Institute of Technology, India. She is currently a Research Assistant for the SCME.

## **Patrick Fontenot**



Dean of Workforce Education and Training  
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Northwest Vista College

Patrick Fontenot believes that computer literacy is important to each student, regardless of what career they choose. In fact, he says, everyone benefits from understanding and appreciating this rapidly changing field. "Technology is here to stay, and it touches our lives daily in one way or another," he says. As the Dean of Workforce Education and Training, Pat leads a wide range of programs and services to students, businesses and community members. He provides strategic direction to his team of directors, coordinators, faculty and staff to ensure that the programs offered incorporate the latest technology and training. Pat and his team work closely with local employers, the Texas Workforce Commission and the Texas Higher Education Coordinating Board to ensure that all of the technical programs at Northwest Vista College prepare graduates for high demand jobs and lead to employment opportunities in fields such as Information Security, Nanotechnology, Digital Media, 3D Animation, Advanced Water Treatment, Clinical Research and many others. Under Pat's direction, the nearly 20-degree programs have continually improved student graduation and job placement rates. Many local employers such as USAA and the Southwest Research Institute have additionally benefited from customized training for their employees in leadership, teambuilding, strategic planning and customer relations that Pat's team provides as part of the Business Solutions program.

## Paul Weber



Associate Professor  
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Utah Valley University, Utah

Paul is an associate professor at Utah Valley University in Orem, Utah. Originally from Minnesota (B.S., Bemidji State University) he completed his doctorate in experimental particle physics at CU Boulder, after working at the Stanford Linear Accelerator Center and at CERN for many years he switched over to teaching at the small college and university level. At UVU, he has worked with thin film deposition and has put together a photolithography lab before joining an effort with three other faculty members to create an introductory nanotechnology course as part of an NSF-ATE grant.

## Quinn Spadola



Educator and Outreach Coordinator  
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Georgia Institute of Technology.

Quinn Spadola is a biophysicist who discovered her love of science education and outreach while completing her PhD at Arizona State University. Afterward, Dr. Spadola attended Montana State University's Science and Natural History Filmmaking MFA program. She became an AAAS Science and Technology Policy Fellow in the National Nanotechnology Coordination Office in 2014 and then joined the staff there as Education and Outreach Coordinator, and Technical Advisor to the Director in 2016. She is now Director of Education for the National Science Foundation-supported National Nanotechnology Coordinated Infrastructure and its Southeastern Nanotechnology Infrastructure Corridor site at the Georgia Institute of Technology.

## Richard Hill



Master Electronic Tech. / Assistant Professor Part time  
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Erie Community College North Campus, Williamsville, NY

I have been a technician for 27 years and working in the Electrical Engineering Technology Department for Erie Community College since 2001. I have been involved with Nanotechnology for the last five years. I have received training from Penn State's National Nanotechnology Applications and Career Knowledge (NACK), University of New Mexico's Southwest Center for Microsystems Education (SCME) and various equipment manufacturers.

## Rick Vaughn



Faculty Chair  
rick.vaughn@riosalado.edu  
Rio Salado College

Dr. Rick Vaughn holds a Ph.D. in Mathematics from the University of California, Davis where he specialized in Topology and Geometry. His dissertation is entitled "*Planar Soap Bubbles*". After 13 years as residential faculty at Paradise Valley Community College, he moved to Rio Salado College to be the Faculty Chair for STEM Initiatives. At Rio, he has spearheaded the approval, creation, and development of a unique, hybrid, two-year program in Nanotechnology. A regular contributor

## **Robert K. Ehrmann**



Managing Director  
REhrmann@enr.psu.edu  
Penn State Center for Nanotechnology Education and Utilization

Robert K. (Bob) Ehrmann is the Managing Director at the Penn State Center for Nanotechnology Education and Utilization (CNEU). The CNEU is the home of the Nanotechnology Applications and Career Knowledge (NACK) Support Center a National Science Foundation funded Advanced Technological Education National Center. The NACK Support Center has a national mission to provide nanotechnology workforce infrastructure and to facilitate the development of nanotechnology workforce education programs at community and technical colleges and universities across the nation. In addition to this national mission, PSU/CNEU through its 18 credit Nanofabrication Manufacturing Technology (NMT) capstone semester has provided nanotechnology workforce education to over 925 students, through a statewide education-industry partnership consisting of degree programs at post-secondary institutions across Pennsylvania.

Mr. Ehrmann has over 23 years of experience in industry before he joined the PSU CNEU. Mr. Ehrmann worked for Corning, Inc. where he held multiple positions in engineering, product development as well as management positions in engineering, production and project management. Mr. Ehrmann earned a BS in Ceramic Engineering from Rutgers University as well as an MBA West Virginia University.

## **Salahuddin Qazi**



Professor Emeritus  
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State University of New York Polytechnic Institute at Utica, New York

Sala Qazi is a Professor Emeritus at the State University of New York Polytechnic Institute at Utica, New York, on whose faculty he served for nearly 30 years. After retiring and relocating to Maryland, he formed an LLC ( NS Technological Consultant) to consult in technology and higher education. During his tenure at SUNY Poly, he was chairman of the EET department, coordinator of photonics program and Director of the Master of Science program in advanced technology, which he helped to develop. Professor Qazi earned his Ph.D., degree in Electrical Engineering from University of Technology, Loughborough, U.K.



**Saiful I. Khondaker**



Professor of Nanoscience, Physics, and Electrical Engineering  
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University of Central Florida, Orlando, FL

Dr. Saiful Khondaker is a professor of nanoscience, physics, and electrical engineering at the University of Central Florida (UCF). He received Ph.D. degree in 1999 from the Cavendish Laboratory of the University of Cambridge, UK. Khondaker is an expert in the fabrication and electron transport investigation of nanoscale electronic devices. He published more than 85 peer reviewed journal articles (6000+ citations and  $h = 35$ ), delivered 60 invited talks at national and international conferences and prestigious institutions. He received NSF CAREER award (2008), UCF research incentive awards (2010, 2015), JSPS invitational fellowship (2016), and US Airforce Summer Fellowship (2016 - 2018).

**Dr. Salomeh Tabatabaei**

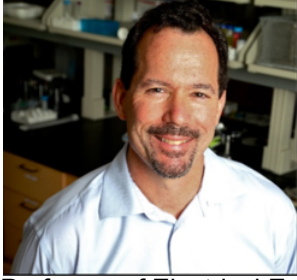


Engineering Professor  
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Dr. Salomeh Tabatabaei received her Ph.D. in Mechanical Engineering and Materials Science from Rice University. In her doctoral dissertation, she synthesized alloy nanoparticles as a lead-free solder to address reliability challenges of high-temperature electronics. During her stay at MD Anderson Cancer Center, she designed injectable nanoparticles as a radiosensitizer to enhance proton therapy. She is currently interested in materials selection, medical imaging, drug delivery, liquid biopsies, and medical devices.

She enjoys yoga, hiking in nature, watching and reading books and watching movies and documentaries on how to lead the globe to equal pay, justice and peace.

**Stephen E. Saddow, PhD**



Professor of Electrical Engineering  
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University of South Florida

Dr. Sadow's research interests are to develop wide-bandgap semiconductor materials for biomedical and MEMS/NEMS applications. His group has demonstrated the compatibility of 3C-SiC to numerous cell lines and in-vivo in two animal models. His prior expertise was in the growth of SiC epitaxial films on Si substrates. Presently he is pioneering the use of SiC for biomedical applications, having demonstrated that 3C-SiC is both bio- and hemo-compatible. His group has demonstrated several advanced biomedical devices, such as microelectrode arrays (MEAs), neural probes, in-vivo and non-invasive glucose sensors, and impedance-based biosensors.

**Dr. Tanya Faltens**



Educational Content Creation Manager  
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Network for Computational Nanotechnology (Purdue University)

Dr. Tanya Faltens is the Educational Content Creation Manager for the Network for Computational Nanotechnology (NCN), which created the open-access nanoHUB.org cyber-platform. She assists faculty in using nanoHUB resources, looks for new content appropriate for nanoHUB, and runs NCN's Undergraduate Research Experience program.

Dr. Faltens' technical background is in Materials Science and Engineering (Ph.D. UCLA 2002). She has taught undergraduate engineering courses (MTE, ECE and FYE) and mentored capstone research projects at Cal Poly Pomona and has several years' experience in hands-on informal science education, including working at the Lawrence Hall of Science at UC Berkeley.

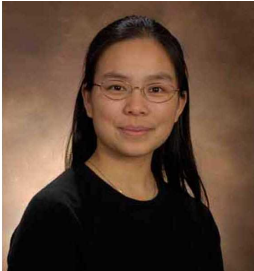
## William Emmanuel Ghann



Research Faculty, Center for Nanotechnology  
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Coppin State University, Baltimore, MD

William Emmanuel Ghann received his B.S. degree in Chemistry at the University of Cape Coast in Ghana. He earned his masters at East Tennessee State University in Johnson City and obtained his Ph.D. in chemistry at the University of Maryland, Baltimore County under the supervision of Dr. Marie-Christine Daniel Onuta. He is currently a research faculty member at the Center for Nanotechnology at Coppin State University. His research interest includes multifunctional gold nanoparticles for imaging, dye sensitized solar cells, and terahertz spectroscopy.

## Yawen Li



Associate Professor  
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Lawrence Technological University

Dr. Yawen Li is an associate professor in the Biomedical Engineering Department at Lawrence Technological University (LTU). Her research interests are in biomaterials, tissue engineering and MEMS. Since joining LTU, she has created and taught a variety of courses including Biomaterials, MEMS, MEMS Lab, Tissue Engineering, Tissue Engineering Lab, Biotransport, and Intro to Nanotechnology.

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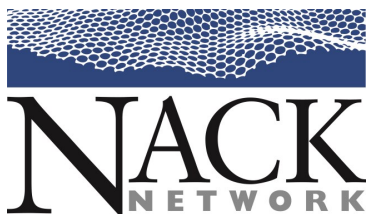
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# MNT<sup>e</sup>SIG

MICRO NANO TECHNOLOGY  
education  
SPECIAL INTEREST GROUP

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## MNT Centers



The **Nanotechnology Applications and Career Knowledge (NACK) Support Center** has assisted more than 300 post-secondary institutions through guidance in planning and design, instruction at educator workshops, and distribution of adaptable curriculum materials to foster nanotechnology workforce education.

Educator, Student, and Industry resources at:

**nano4me.org**



NACK, MNT educators, industry and government facilitated the creation of **nanotechnology workforce education standards** as guidance for foundational material for MNT programs. Six standards are published and available via **ASTM International** ([www.astm.org](http://www.astm.org)):

- health and safety
- infrastructure
- material properties and effects of size
- characterization
- pattern generation
- materials synthesis and processing

**Stackable credentials** for the MNT workforce:

- are being facilitated by the NACK Support Center and the MNT community.
- are performance-based assessment tests.
- are industry endorsed.
- are to be administered and awarded by ASTM International.



The Remotely Accessible Instruments for Nanotechnology (RAIN) Network utilizes real-time face to face distance technology to inspire the next generation STEM workforce across the nation.

**The RAIN Network:**

- Enables remote access and control to engage students.
- Consists of multiple high technology micro-nano-technology instruments.
- Connects with classrooms next door or across the country.
- Expanding library of remote friendly experiments.
- Growing number of nodes across the nation.
- Efficient outreach / technology interaction tool.
- Enables nation-wide micro- and nano-technology facility networking.
- Centralized connection through [nano4me.org/remotearchess](http://nano4me.org/remotearchess)

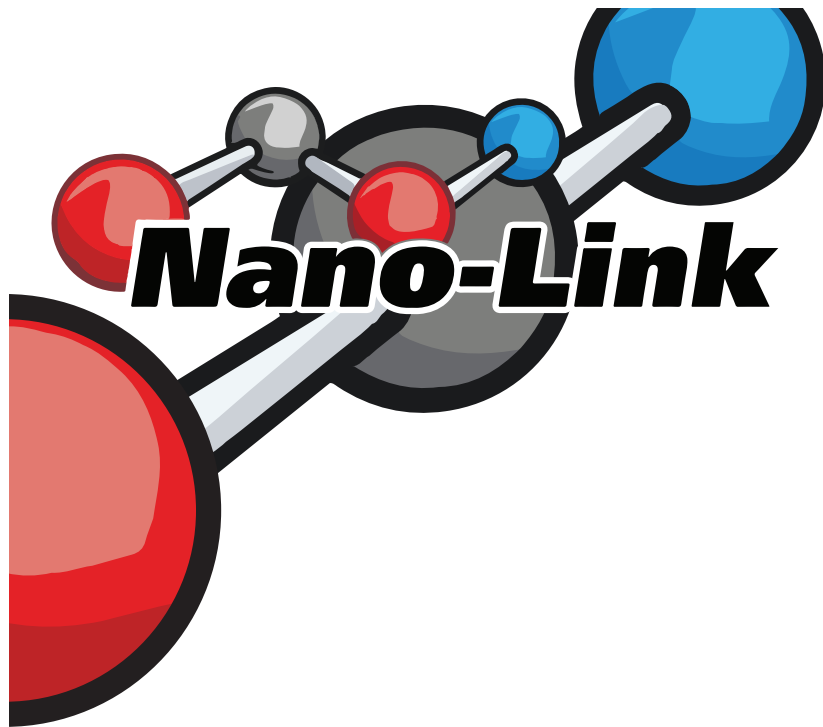
Like our page at [facebook.com/nanotechnology.rain](https://facebook.com/nanotechnology.rain)



RAIN Nodes to date:

Arizona State University (AZ) | Cattaraugus Allegany BOCES (NY) | Coppin State University (MD)  
 Erie Community College (NY) | Forsyth Technical Community College (NC) | Georgia Institute of Technology (GA)  
 Nebraska Nanoscale Facility (NE) | Northcentral Technical College (WI) | North Seattle College (WA—SHINE)  
 Oakton Community College (IL) | Pasadena City College (CA) | Pennsylvania State University (PA)  
 Research Triangle Nanotechnology Network (NC) | Salt Lake Community College (UT) | Stanford University (CA)  
 SUNY Polytechnic Institute (NY) | University of Iowa (IA) | University of New Mexico (NM)  
 University of Texas at San Antonio (TX)



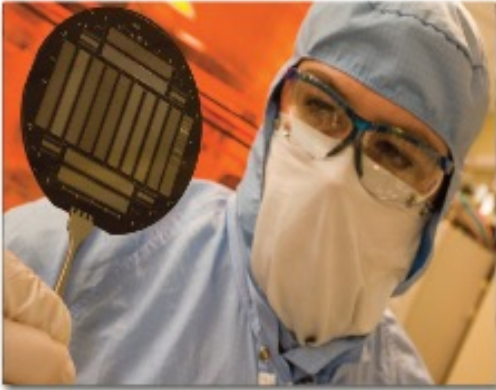


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NEATEC is leading the way in developing model programs for serving the workforce development needs of nanotechnology and nanoelectronics businesses in the Northeast.

In partnership with local education institutions and businesses, NEATEC provides community-college and secondary-school students with extraordinary hands-on opportunities to engage in cutting-edge education and training through cooperative learning, internships and outreach programs—efforts that will have a direct and immediate impact on the readiness and capabilities of the nanotechnology workforce in New York and Western New England.

**NEATEC**

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Technological Education Center

Regional Center for Semiconductor and Nanotechnology Education

- » Partner-based Experiential Learning
- » Outreach, Awareness, Recruitment
- » Attracting students to STEM careers



National Science Foundation

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Albany, New York

[www.neatec.org](http://www.neatec.org)



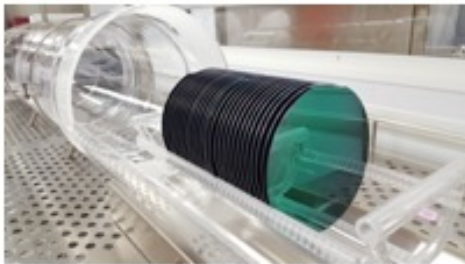


# Support Center for Microsystems Education



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6. A Comparison of Scale
7. Introduction to SPC for Microtechnology
8. Problem Solving for Microtechnology
9. History of MEMS

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