

2017 HI-TEC Poster Sessions

PS01

Strengthening an Advanced Manufacturing Program by Infusing Laser Applications into FABLAB Curricula

North Central State College acquired a FABLAB in the fall of 2015. Determined to use the equipment to complement engineering programs, the presenter adapted tool designs and projects for development and fabrication using the Optix Scanner and Epilog CO₂ laser. In a semester course focused on laser applications in manufacturing, students engineer and create. Projects include the design and fabrication of a 3D hologram viewer, steel rule die, various inspection gages, and fixtures. Various materials are used and machine settings are calculated. The laser is the most popular machine in the FABLAB.

Christina Barker, North Central State College, Mansfield, OH

PS02

Apprenticeship 321: Multiple Pathways to Careers in Advanced Manufacturing

Apprenticeship 321 is a multi-employer, multi-path training program registered to, and sponsored by, Gaston College in collaboration with regional advanced manufacturers. An emphasis has been placed on recruiting women into advanced manufacturing apprenticeships.

Carol Faust, George Hendricks, Gaston College, Dallas, NC

PS03

Bringing Nanotechnology to the Native American Population

Over the last few years Nano-Link personnel have been interacting with students and educators from several North Dakota reservations. These rewarding interactions have brought technology awareness to over 500 students and over 100 educators. Nano-Link has created culturally relevant technical educational content. This content uses examples from various ceremonies and items from traditional processes and couples this cultural aspect with the nanoscale technical explanation of the phenomena observed at the macro scale. This poster describes the interaction approach, activities, lessons learned, and the culturally relevant modules.

Deb Newberry, Linda Black Elk, Luke Black Elk, Nano-Link, Rosemont, MN

PS04

Enhancing Critical Reasoning in Computer Education

The project seeks to increase practical knowledge, critical thinking, and reasoning skills in computer science and information technology (IT) students. The project draws from successful problem-based learning (PBL) in engineering and computer education to integrate critical thinking into the IT curriculum at St. Johns River State College. The project also seeks to improve participation of nontraditional groups in computer science education to meet the demands for highly trained technicians, prepared to innovate and thrive in the highly competitive global economy.

John Etienne, Walter Lara, St. Johns River State College, Palatka, FL

PS05

Portable Hands-on Interactive Learning

The project goal is to build a sustainable program to enhance community college process technology education by introducing new hands-on opportunities through use of light-weight, extremely low-cost miniature industrial equipment (LCMIE) with a small footprint that fits on a standard desktop or that can be taken home for use in homework assignments. The objectives are to develop student and instructor materials for the hydraulic loss, shell and tube heat exchanger, and injector; assess LCMIE implementation within an existing two-year process technician program at Kenai Peninsula College; and disseminate activities to the broader process technology education community regionally and nationwide.

Jeffrey Laube, Kenai Peninsula College, Soldotna, AK

PS06

Exploration of Historical Mapping as a Case Study in Geospatial Technologies

Two historical mapping case studies will be explored that are part of the topics of georeferencing and digitization. One of these case studies involves the use of Sanborn maps in conjunction with aerial imagery to determine the amount of impervious surface from a historical view. The other involves the use of Civil War battlefield maps with the understanding of elevation data through the use of line of sight.

Vince DiNoto, GeoTech Center, Louisville, KY

PS07

Surface-Enhanced Raman Scattering and Electrochemically Active Nanoparticle Films

The purpose of this work was to determine the orientation of two molecules (referred to as MM or PP, dependent on structure) when adsorbed to gold and silver nanoparticles. The molecules were engineered to be catalysts in electrochemical hydrogen reduction reactions. A perpendicular orientation relative to the surface is considered critical for optimum performance. Analysis was performed using surface-enhanced Raman spectroscopy of each molecule in a nanoparticle colloid as well as on

electrochemically active nanoparticle films. Initial results suggest that MM exhibits perpendicular adsorption and is the better catalyst candidate.

Evan Douglass, North Seattle College, Seattle, WA

PS08

The Effects of Hyperbaric Oxygen on Cellular Metabolism

Lack of sufficient blood flow and vascularization is an obstacle for in-vitro tissue engineering. Hyperbaric oxygen utilizes increased pressure and concentration of oxygen, and has shown evidence for increased growth rate and differentiation with in-vitro tissue cultures. Increasing oxygen concentration may provide a direct growth stimulus, while providing adequate oxygen to cell cultures in media and in tissue scaffolding. In this study, *Saccharomyces cerevisiae* is used to research the effects hyperbaric oxygen has on simple cellular metabolism with the use of spectroscopy, a confocal microscope, and resazurin reagent dye.

Josef Henthorn, North Seattle College, Seattle, WA

PS09

Multi-Vendor Application to IT Education

This session will cover teaching multi-vendor approaches to students in the field of network engineering. Students learn how to apply common protocols like OSPF, ACLs, NAT, DHCP, RSTP, MSTP, and VLANs to multi-vendor equipment to show that the protocols work no matter what vendor equipment they use. Students understand that the protocol and its use are just as important as the equipment.

Jerry Snyder, Sinclair Community College, Dayton, OH

PS10

Microsystem Photolithography Process Characterization

Photolithography is one of the most critical process steps in microsystem device manufacturing. There are dozens of variables that contribute to overall quality and yield. This poster will provide results of clean room process characterization experiments done as part of an advanced manufacturing technician course.

Brett Schmidt, Southwest Center for Microsystems Education, Albuquerque, NM

PS11

Microsystems Thin Film and Etch Processes and Characterization

Processes for thin films deposition and subsequent etching are essential to get working MEMS devices. This poster will show results of a variety of experiments done as part of a two-year Advanced Systems Technology program. Sample wafers and devices will be displayed.

Brian Esquibel, Southwest Center for Microsystems Education, Albuquerque, NM

PS12

Teaching and Learning in the Telepresence Classroom

Project ReVAMP is using and evaluating an innovative distance learning model to offer education in vacuum technology. The model consists of both asynchronous and synchronous course delivery components. Students experience course learning activities in part through self-directed online resources but also through face-to-face experiences set in a telepresence classroom. The telepresence classroom allows students at distance locations to join an instructor and students at the host institution live through high-speed video and audio connection. The telepresence classroom experience is further enhanced through the use of a new vacuum equipment trainer system. The trainer system is sent to the distance locations, so all students have an opportunity to participate in hands-on learning activities.

Nancy Louwagie, Delmar Smith, Normandale Community College, Bloomington, MN

PS13

The Oakton Remote Access to Nanotechnology Guidance for Educators (O.R.A.N.G.E.)

To accelerate exposure of students in grades 10–14 to the nanotechnology field and careers as nanotechnicians, Oakton Community College has held hands-on training workshops for educators since spring 2014. We train participants on the use of instruments and techniques such as scanning electrons, atomic force and fluorescence microscopes, nanoparticle synthesis and analysis, and DNA isolation and detection. Participants develop activities to use in the classes they teach that employ remote access to the instruments in our lab. We will present data on participants who have completed our workshops, examples of projects they have developed, and the numbers of students impacted.

Bob Sompolski, John Ireland, Oakton Community College, Des Plaines, IL

PS14

Incorporating Professional Skills into Engineering Technology Projects

Data shows that industry is seeking employees who have not only the essential technology skills for a job in manufacturing, but also the professional skills that will make them reliable leaders within their companies. Mechanical and Manufacturing Technologies for Energy and Sustainability Program (MET2) projects are highlighted, showcasing the journey from project proposal to prototype manufacturing and how professional skills were necessary throughout the process. Projects include the use of additive manufacturing, app development, and microcontrollers as well as other exciting technologies.

Karen Wosczyzna-Birch, Wendy Robicheau, Regional Center for Next Generation Manufacturing, Farmington, CT; **Eric Flynn**, Mechanical and Manufacturing Technologies for Energy and Sustainability, New Haven, CT; **John Birch**, The Birch Group, Farmington, CT

PS16

A START to a POWER Career (Providing Opportunities for Women in Energy Related Careers)

POWER Careers, an ATE project at Idaho State University, is collaborating with a pre-college transition program to increase participation of returning adult women in energy programs. POWER Careers project leaders had anticipated working with the START (Successful Transitions and Retention Track) program, but they underestimated the extent to which START would attract women to engineering technology careers and help them build the self-confidence needed to succeed in these rigorous programs. START includes values-based career exploration, career-focused math, and program retention support. This collaboration may redefine the entry-strategies of women and other special populations into engineering technology majors.

Lawrence Beaty, Nancy Lauts, Jodi Johnson, POWER Careers, Idaho State University, Pocatello, ID;
Amy Christiansen, Idaho State University, Pocatello, ID

PS17

Development of a Photonics Academic Program in Puerto Rico for Workforce Education

At the Universidad Metropolitana Puerto Rico Photonics Institute we have responded to the need for a competitive workforce that is well prepared for entry into the fields of lasers and photonics by creating a one-year Photonics and Lasers Technical Certificate, supported under a TAACCCT grant from the US-DOL, followed this fall by an Associate Degree in Engineering Technology. Through these, we are offering displaced workers, veterans, high-school graduates, and others an opportunity to develop new and highly marketable skills for the 21st century. We provide a roadmap of plans and pitfalls, sharing our successes, challenges, solutions, and future expectations.

Jonathan Friedman, Andres Diaz, Elsa Trujillo, Liznerie Floran, Francisco Rivera, Universidad Metropolitana, San Juan, PR

PS18

Convergence Technology Students Present a New Perspective

Student representatives from schools in the CTC's Convergence College Network (CCN) community of practice will provide an overview of recent research, learning projects, and career opportunities in the information communications technology space.

Michael Cyrus, Collin College, Frisco TX; **Olivia Hughes**, University of North Texas, Denton TX