CENTER FOR INNOVATION THROUGH VISUALIZATION & SIMULATION

PURDUE UNIVERSITY CALUMET

Giving to CIVS

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CIVS Activities at AISTech 2015 and Steel Consortium Update

CIVS participated in a number of activities at this year's AISTech conference, held in Cleveland, Ohio. CIVS staff and students presented 7 technical papers, 2 posters, and were recognized for winning the grand prize in the AIST "Real Steel" Video Challenge. CIVS hosted a booth highlighting new technologies, and CIVS Director, Dr. Chenn Zhou, also presented on Workforce Development through Simulation and Visualization at the University-Industry Relations Roundtable.

CIVS presentations covered natural gas injection, co-injection of natural gas and pulverized coal, vertical edger simulation, safety training, basic oxygen process hydrodynamics, interactive phase diagram visualization, and mixing improvement in a torpedo vessel. A full list of presentations is available here. CIVS student Alrazy Sonet's grand prize video submission titled "Steel: Backbone of the Universe" was highlighted at the President's Award Breakfast which had over 1,000 attendees. CIVS and the Steel Manufacturing Simulation and Visualization Consortium (SMSVC) were also highlighted during the President's Breakfast speech.
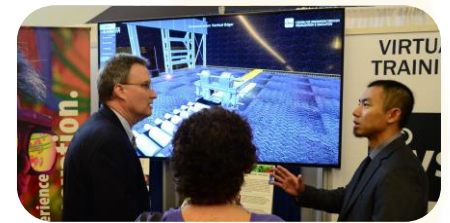
CIVS' booth featured new technology applications of interactive hands-on 3D software, augmented reality, and portable virtual reality devices. Projects were demonstrated in the areas of *workplace safety, energy efficiency, operational efficiency, reliability and maintenance, workforce development, environmental impacts, raw materials, and smart manufacturing*. These are focus areas of the new Consortium SMSVC which has already enrolled several companies recently. The charter member enrollment period is open through January 15, 2016. Additional details are available at www.steelconsortium.org.

This year, over 7000 people attended AISTech 2015 and it featured 108 technical sessions, 543 technical presentations, and 549 companies in the expo.

CIVS Facts and Impacts

The following are some CIVS highlights since 2009.

- $38++ million savings for companies
- 3,400+ students used CIVS for experiential learning and virtual labs
- 90 external organizations collaborated with CIVS
- 138 completed projects
- 111 technical publications
- 723 graduate and undergraduate students employed and mentored
- 82 Purdue Calumet collaborators
- 44 student awards
- 180 national and local news
- 16,000+ local, and international visitors since October 2011

Selected Examples of Funded Projects

Project Title	Sponsor
AMTEC II - Virtual "Aims" Simulator for Maintenance and Troubleshooting	KCTCS
3D Visualization of Steel Component Inclusions and Stress	Timken Steel
Flue Structural and Thermal Modeling of an Anode Baking Furnace	Alcoa
CFD Modeling of a Ladle with Rotational Stirring Lances	ESM Group
Burns Harbor Lake Water Intake Study	ArcelorMittal
3D Dynamic and Static Images of the Steel Making Process	AIST
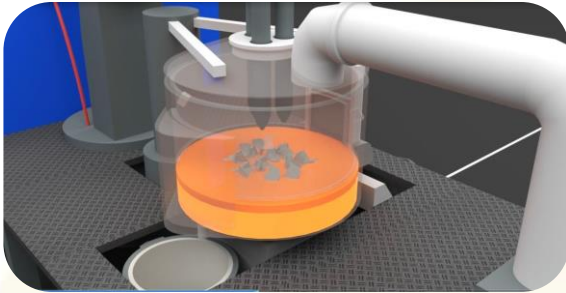
3D animations of processes from the steel industry, such as this electric arc furnace, are being created to accompany AIST's Steel Wheel.
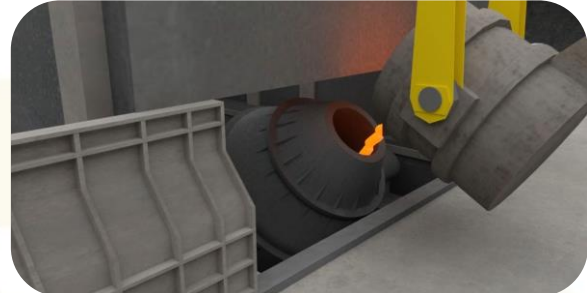
3D animations of processes from the steel industry, such as this basic oxygen furnace, are being created to accompany AIST's Steel Wheel.

CIVS Kicks off Virtual Training Project for Automotive Manufacturing

CIVS is collaborating with the Automotive Manufacturing Technology Education Collaborative (AMTEC), a National Science Foundation (NSF) ATE Center in the Kentucky Community and Technical College System. The NSF project will develop a virtual simulator for multi-skilled maintenance technician education. The simulator will help community colleges to better prepare a critically needed workforce and increase the number of students through widespread deployment. The simulator, designed by industry subject matter experts within the AMTEC Strategy Board, utilizes the same parts and equipment that are common to multiple auto manufacturers and includes systems for troubleshooting electric, mechanical, hydraulic, pneumatic, and PLC-related problems that occur on the assembly line.

CIVS staff and students visited the country's largest auto manufacturing plant, located in Smyrna, Tennessee, to learn how the Nissan Training Center is already using AMTEC's curriculum and physical simulator. The virtual simulator will provide AMTEC college and industry partners with unlimited troubleshooting practice.

AMTEC is supported by the National Science Foundation (NSF), and is partnered with over 70 colleges, companies, and other organizations and is poised to expand into other industry sectors where there is a need for colleges to provide these skillsets. "AMTEC has seen the previous work of CIVS and is proud to have such a distinguished team of Purdue's best engineers on our project" states AMTEC Executive Director Danine Alderete-Tomlin.

Education Professor Collaborates with CIVS on NSF Research Projects

Dr. Emily Hixon has been collaborating with CIVS and other Purdue Calumet faculty on two NSF sponsored research projects. She is Co-PI acting as evaluator and pedagogical consultant for a TUES grant (PI Chandramouli Viswanathan) focusing on 3D virtual learning materials, developed by CIVS, and being used at PUC, University of Kentucky, Florida Atlantic University, and University of Washington D.C. She is also project evaluator on a REU grant (PI Shuhui Grace Yang) that provides research experience to undergraduate students from around the country.

Dr. Hixon is currently Associate Professor of Education and started at Purdue Calumet in 2006. She has collaborated on numerous external grant proposals, published peer-reviewed articles, book chapters, presented at conferences, and directs the Digital Learning Faculty Certificate Program.
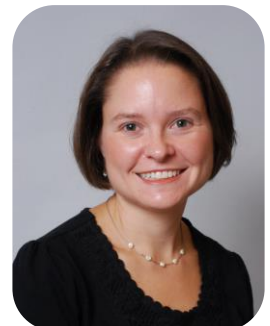
Indiana Governor Mike Pence Experiences 3D Simulation & Visualization at CIVS

Indiana Governor Mike Pence visited Northwest Indiana on Thursday, June 4th. The governor said that he "was particularly impressed by CIVS… This is a great example of a great university campus, but also a campus that is lending great strength and collaboration to industry all across the region… These programs help assure the state's future."

CIVS staff and students demonstrated projects and technologies including the Virtual Blast Furnace which has been used by the steel industry for troubleshooting, optimization, design, and training, saving millions of dollars and reducing downtime significantly.

A GIS project was also demonstrated which created an interactive tool for regional planning and economic development. In addition, technologies such as augmented reality were demonstrated for education and training. The Governor encouraged CIVS staff and students to "keep up the good work". The visit was featured in a NWI Times article and in a video on Lakeshore Report.

CIVS Engages High School Counselors

The Center of Workforce Innovations collaborated with CIVS to host the Northwest Indiana Counselor Day, held on April 17. During this event, counselors from schools all across Northwest Indiana visited CIVS. They were given an in-depth demonstration of many of the exciting projects and technologies and their impacts to industry, education, and society. This helps counselors guide students into STEM career paths for the critically needed workforce.

Engineering Summer Camp

Forty-five area middle school and high school students visited CIVS on June 1 and June 8 as part of the 2015 Engineering Summer Camp hosted by PUC Engineering Departments. The students were excited to learn about computer simulation and 3D visualizaton in the Immersive Theater. They also participated in a variety of hands-on activites that taught them how to calculate flows, use head-mounted virtual reality devices, and prepare models for 3D printing. The CIVS experience motivates students to pursue studies in STEM areas.

Student Successes – Richard Zakrzewski

CIVS student, Richard Zakrzewski, started school at Purdue University Calumet in 2011, and graduated with a B.S. in Civil Engineering in May, 2015. In his junior year, Richard joined CIVS, working on Flood Modeling Simulation for an NSF project. Later, he went on to work on a Geographic Information System (GIS) project, titled "Interactive GIS Tool for Regional Planning and Economic Development," collaborating with the Northwestern Indiana Regional Planning Commission (NIRPC) and the Alliance for Regional Development. Richard recently presented his GIS work to Indiana Governor Mike Pence, during the Governor's visit to CIVS. Among other activities, Richard was also a member in the student chapter of ASCE, the American Society of Civil Engineers. Recently, he was hired at the Indiana Department of Transportation La Porte District, as a Construction Manager in Training.

CIVS Students Win 4 Awards at 2015 Purdue Calumet Student Research Day

CIVS students presented 26 undergraduate and graduate projects at the 2015 Purdue University Calumet Student Research Day. Four projects went on to win awards in both graduate and undergraduate poster and oral presentation categories as listed below.

- **2nd Place Undergraduate Oral Presentation**
  Nicole Bandy, Liyuan Gong – "Evaluation of 3D Printing Design and Process"
- **3rd Place Undergraduate Poster Presentation (College of Business in collaboration with CIVS)**
  Kaley Young – "Interactive Cultural Simulation of Munich, Germany"
- **3rd Place Undergraduate Oral Presentation**
  Xiang Liu, Yifan Wang, Xianrui Wang – "Design of a Virtual Power Plant Boiler Training Program"
- **3rd Place Graduate Poster Presentation**
  Qiuyi Wei, Majed Alhelal, Matt Cross – "Selective Catalytic Reduction Flow Model Analysis"

CIVS Administrative Assistant Wins Award

CIVS is very proud to congratulate Linda Robinson for receiving the 2015 Outstanding Operations Technical Employee of the Year. The award was presented at Purdue Calumet's annual Faculty and Staff Service Recognition Luncheon held on April 24. Linda has served as Administrative Assistant at CIVS since 2010. She is a campus leader, currently serving as vice chair of APSAC (Administrative and Professional Staff Advisory Committee) and serving on the University's unification committee. She will receive a plaque, a parking space, and a monetary award. An excerpt from her nomination: *"Linda is thoughtful, hardworking, and very deserving of this award. She constantly shows motivation and a strong will to help CIVS and the university succeed in our missions."*

Nationwide Undergrad Students Experience CIVS Technologies

Purdue University Calumet has been designated as a Research Experiences for Undergraduates (REU) site by the National Science Foundation and hosted 10 undergraduate students from across the country. The students learned about Simulation and Visualization tools used for advanced research. CIVS is part of the grant lead by principal investigator Dr. Grace Yang and Co-PI Dr. Besma Smida. The REU program aims to inspire students of underrepresented minorities and/or from institutions with limited research opportunities to pursue advanced education and targeted careers.