



INNOVATE WITH THE NEW YORK STATE CENTERS OF EXCELLENCE

MEET CENTERS FOCUSED ON SUSTAINABLE
MANUFACTURING AND CLEAN TECHNOLOGIES

WEBINAR

TUESDAY, MARCH 20, 2018 • 11AM-12PM



Alyson Slack

FuzeHub, Statewide Manufacturing
Extension Partnership Center



Edward Bogucz

Syracuse Center of Excellence for Environmental
and Energy Systems at Syracuse University



Colby Creedon

Weather Research &
Development Center at
University at Albany



Steve Czarnecki

Small Scale Systems Integration and
Packaging (S3IP) at Binghamton University



Mike Thurston

Center of Excellence in Advanced &
Sustainable Manufacturing at Rochester
Institute of Technology



Edward Bogucz

Executive Director
SyracuseCoE

Associate Professor
Mechanical & Aerospace Engineering
Syracuse University



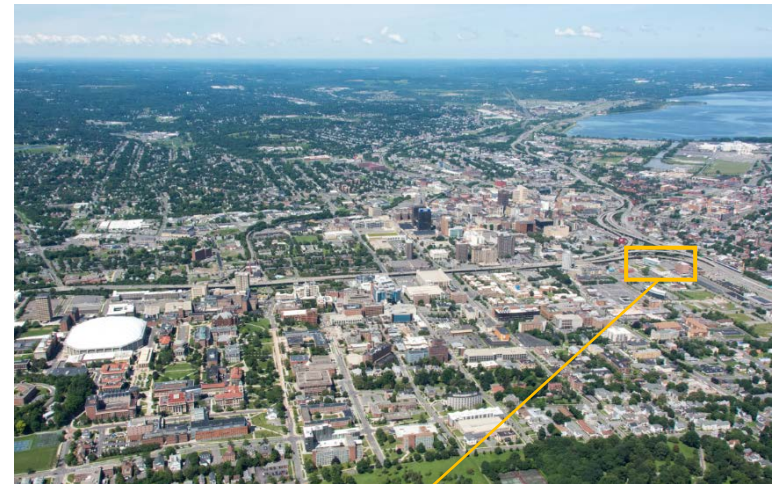
Environmental and Energy Systems
New York State's Center of Excellence

ABOUT THE CENTER

- **Established in 2002**
- **Innovations for built and urban environments:**
 - Healthy Buildings
 - Clean Energy
 - Water Resources
- **Innovation Partner:**
 - Lab to Market
 - Market to Lab
- **Exceptional facilities:**
 - Research & Development
 - Field Demonstrations
- **Impacts (through June 2017):**
 - 197 projects for 67 companies
 - 1,092 jobs created/retained



Environmental and Energy Systems
New York State's Center of Excellence



CAPABILITIES

- **Healthy Buildings**

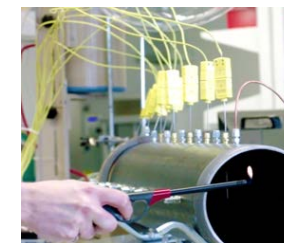
- IEQ (Indoor Environmental Quality)
 - Innovative technologies: HVAC, lighting, sensors, controls, ...
 - Impacts on occupants' cognitive function
- Building materials
- Aerial energy assessments

- **Clean Energy**

- Fuel cells & energy storage
- Clean combustion
- Biofuel production
- Community microgrids

- **Water Resources**

- Urban watersheds
- Green Infrastructure



PROJECT EXAMPLES

- **Ephesus Lighting**

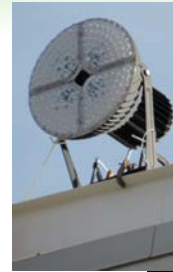
- LED lighting for sports arenas
 - From start-up to Super Bowl, 2010-15
- SyracuseCoE projects:
 - Early field demonstration
 - Proof-of-concept testing
 - New product development

- **NuClimate Air Quality Systems**

- Innovative HVAC terminal
 - Reduces energy & improves IEQ
- SyracuseCoE projects:
 - Computational simulations
 - Proof-of-concept testing
 - Introductions to early adopters
 - Development of derivative products

- **See our Annual Progress Reports for more!**

syracusecoe.syr.edu/who-we-are/progress-report



May 5, 2014



Feb. 1, 2015
Super Bowl XLIX



HOW YOU CAN BENEFIT

- **Analysis & Design Center**

- Computational Fluid Dynamics (CFD) and/or Finite-Element Analysis (FEA) simulations performed by students under faculty supervision
- Up to 25% subsidy for NYS companies from NYSTAR CoE funding

- **SyracuseCoE Partner Program**

- Three levels:
 - Partner
 - Affiliate Partner
 - Start-up Partner
 - Eligible to receive awards from:
 - Innovation Fund (up to \$10K)
 - Internship Program (\$3K)
- Applications due 3/29/18



Environmental and Energy Systems
New York State's Center of Excellence

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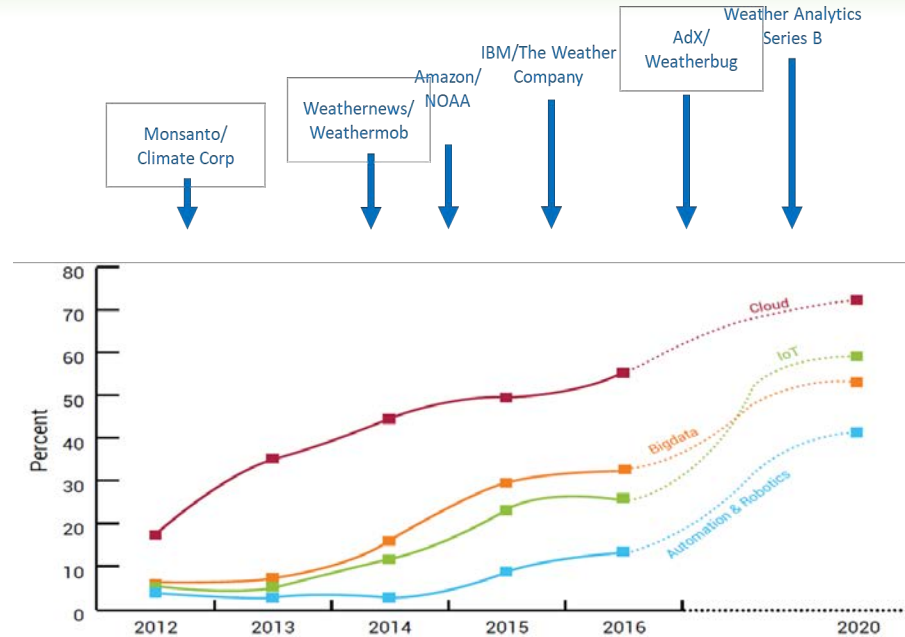
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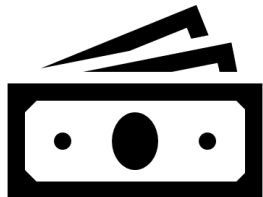
ABOUT THE WEATHER

Businesses are beginning to understand that weather has a significant economic impact - and - We have the technology to improve the forecast



Weather M&A activity has increased with improvements in computing technology

Economic Impact



\$0.5 Trillion

Weather effects every point in the supply chain



13% of Gross State Product is affected by the weather

ABOUT THE CENTER

We help partners leverage the weather to increase margins & reduce risk



How we do it



Results

700% ROI

Previous Partners

VAISALA

MARS
incorporated

Riskpulse



LEOSPHERE

EARTH
NETWORKS



ATMOSPHERIC RESEARCH
FORECASTING, SIMULATIONS



NOAA



FEMA



NYSERDA

CAPABILITIES

Wx Eval

Weather Sensitivity
Assessment



Wx R&D

Product Development

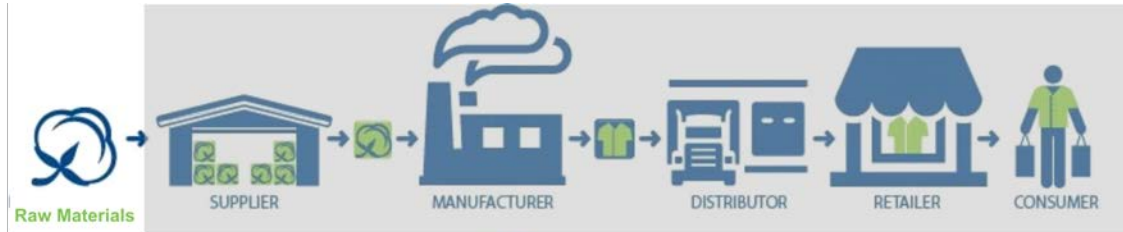


Wx Biz

Analytics & Decision
Support



PROJECT EXAMPLES



Predicting cost of raw materials



Saving fuel costs and enabling on time delivery with weather-based shipment routing



Emissions modeling & forecasting

Helping to maintain predictable operations costs by forecasting power and natural gas prices



Weather-based shipment routing



Helping drive revenue via targeted marketing derived from understanding weather-based demand

WORKING WITH US

To learn more about leveraging the weather's economic power, contact:

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Business Development Director

The Weather Research & Development Center

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Steve Czarnecki

Associate Director
S3IP Center of Excellence
Binghamton University



ABOUT THE CENTER

We perform:

Research, technology transfer, consultation, analytical services, and industry/university collaborations

Our industry focus:

electronics manufacturing for conventional and flexible hybrid substrates, energy harvesting, energy storage, and energy efficiency for electronics systems.

Representative companies:

electronics manufacturers (devices and assemblies); data center operators and builders; battery manufacturers

Sample NY partners:



A New York State Center of Excellence

BINGHAMTON UNIVERSITY

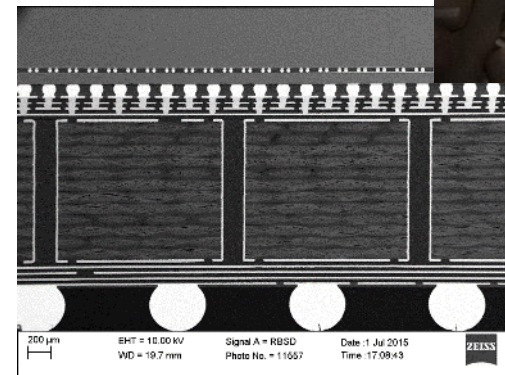
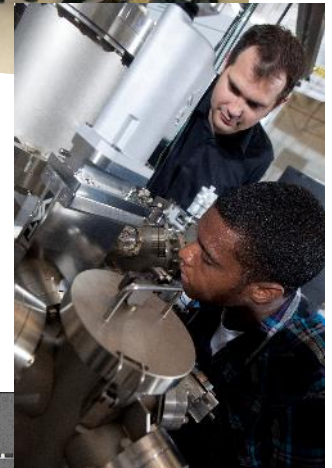
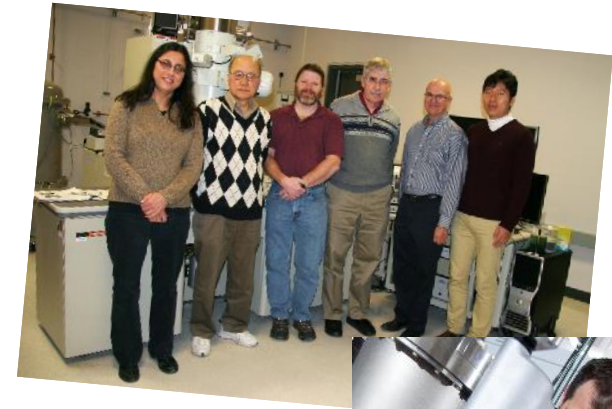


SANMINA-SCI



CAPABILITIES

- failure analysis and reliability improvement of electronic devices and assemblies
- electronics manufacturing methods and materials analysis and advancement
- packaging and assembly of surface mount devices as finished products
- manufacturing process development and prototyping of flexible hybrid electronic assemblies (panels and roll-to-roll techniques via inkjet and vacuum lithography)
- physical characterization of materials and manufactured items (bulk properties, surfaces, interfaces, and construction)
- thermal analysis and modelling of materials, products, and systems
- “chip to chiller” energy modeling, management, and optimization of data centers
- chemistry development, optimization and prototyping of advanced batteries
- thin film material deposition for electronic device construction



PROJECT EXAMPLES

Amphenol

Amphenol Corporation advanced its product quality assurance (QA) processes with assistance from the IEEC research center and ADL lab in S3IP: Amphenol Corporation, a major manufacturer of leading-edge, high-quality, high-reliability connectors for the aerospace and industrial equipment. Minute attention to defect analyses, process controls, materials properties, surface finishes, and inspection techniques are key to continuous improvement. Certain capabilities beyond standard product quality assessment methodologies were not available in the local Sidney, NY facility, As a long-standing partner of the S3IP, Amphenol reached out for assistance.



ADL scientist using SEM

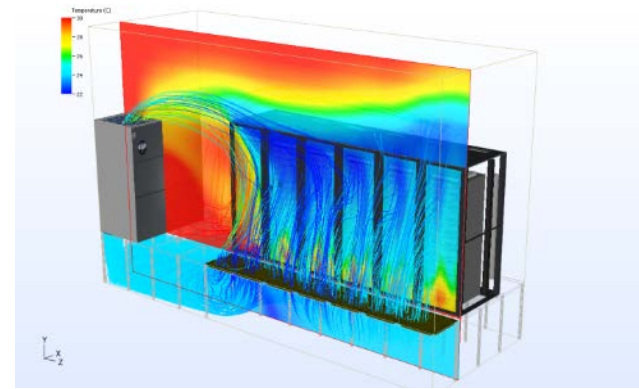
Amphenol worked with scientists in the IEEC and ADL to access non-destructive testing available, including X-ray computed tomography (CT X-ray), acoustic microscopy, scanning electron microscopy with energy dispersive spectroscopy (SEM-EDS), Fourier Transform infrared spectroscopy (FTIR), and X-ray photoelectron spectroscopy (XPS). This specialized equipment and expertise gives greater insight to soldering voiding and delamination, foreign materials and contamination, surface finishes, alignment, registration, and material properties.

As a result, Amphenol enhanced its customer relationships by demonstrating attention to advanced product and process controls, yet avoided major capital investments in analytical instruments. Use of S3IP expertise complemented the Amphenol team focus on product, process, and customer requirement satisfaction.

PROJECT EXAMPLES



Future Facilities advanced its data center engineering simulation software working with the ES2 research center in S3IP: as a member of our ES2 research center, the company shaped a research project aimed at tailoring and validating its computational fluid dynamics (CFD) simulation to the particulars of data center design and operations. For its software to be competitive, it must be tuned to address this niche application of CFD and the company must keep abreast of changes in evolving data center infrastructure and technology.



CFD analysis of airflow in a data center

Work done by the ES2 research center used measurement and simulation to understand key mechanisms involved in data center cooling and accurate representation in simulation. The project provided data against which Future Facilities could develop and test their models, illustrate the importance of these mechanisms, and inject realism absent from other idealized models.

As a result, Future Facilities created a unique software solution using CFD as an operational planning tool, converting the traditional use of CFD as a point solution to a an approach applicable throughout the life cycle of the data center. This is a unique offering in the marketplace and affects all branches of the Future Facilities organized, but is especially focused on its New York City operation. A recent PhD graduate of ES2 was hired to work in the NYC office.

PROJECT EXAMPLES



Quansor Corporation worked with the CASP research center in S3IP to develop a commercial sensor for detecting arsenic, heavy metals, and bacteria in continuous-flow water supply systems: Quansor, a startup company in Binghamton, NY, contacted CASP for assistance in developing a sensor design able to sense these contaminants accurately without the interfering effect of ambient temperature changes. Conventional sensors using quartz crystal microbalances (QCM) can detect the contaminants quantitatively, but are unsuitable for continuous flow situations, being unable to distinguish between readings due to ambient temperature changes vs readings due to presence of *bona fide* contaminants.

CASP worked with Quansor to design and fabricate a dual-resonator QCM sensor along with ancillary circuit features, eliminating the sensitivity to temperature changes.

As a result, Quansor is now on the path to commercializing its sensor with a novel, accurate, low-cost technology for continuous real time monitoring of water system contaminants.



Roll-to-roll photolithography of flexible electronics for sensors and energy harvesting

HOW TO GET INVOLVED

Support ranging from

- Telephone consultation
- Task-specific lab services
- Problem-solving projects
- Sponsored research projects
- Research center membership

minutes



years

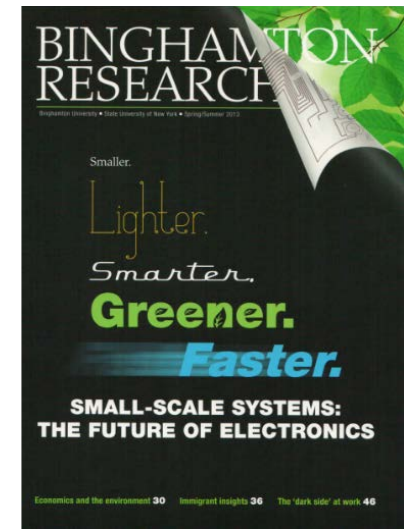


Contact us...
We're here to help!



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Michael Thurston, Ph.D.

Associate Research Faculty & Director
of the Center of Excellence In
Advanced & Sustainable
Manufacturing



ABOUT THE CENTER

The Center of Excellence in Advanced and Sustainable Manufacturing is located at the Golisano Institute for Sustainability at Rochester Institute of Technology.

Research and development projects are worked on by a multi-disciplinary team of industry experienced engineers, technicians, and research scientists.

Our project portfolio includes collaborative projects with start-ups, small and medium companies, and fortune 500 companies. Projects support early stage product and process technology development, and support for product and process improvement.



Golisano Institute for Sustainability

Academic Programs

PhD and MS programs in Sustainable Manufacturing
Masters in Sustainable Architecture

GIS Research Centers

- COE shares staff and lab resources with other GIS research centers
 - NY State Pollution Prevention Institute
 - Center for Sustainable Mobility
 - Center for Sustainable Energy Systems
 - Center for Remanufacturing and Resource Recovery

CAPABILITIES

Technology Areas

Product design and simulation (Life cycle assessment, energy efficiency, design for manufacturing, robustness, performance/durability verification, design for end of life, material substitution)

Manufacturing Process (operational and energy efficiency, process monitoring and controls, digital and smart manufacturing, 3D printing)

Cross-Cutting (Internet of Things and Big Data / Analytics, Condition based maintenance)

Manufacturing USA Institutes

DMDII – Digital Manufacturing and Design Innovation (nexus of design & mfg. data)

REMADE – recycling, repair, reuse, remanufacturing

ARM – Advanced Robotics

CESMII – Smart manufacturing (sensors and data for improved manufacturing control)

Labs and Testbeds

Fuel Cell Vehicle and Components

Product Reliability Industrial Cleaning

Digital Manufacturing Microgrid

3D Printing & Additive Repair

Materials Analysis Battery and PV

Electronic Robustness and Packaging

Bio Fuels

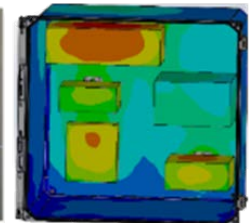


PROJECT EXAMPLES

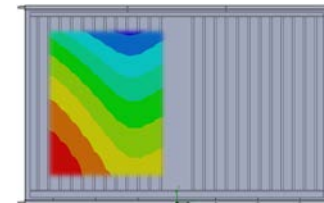
Acro Industries - Plant-wide energy monitoring and analysis: identified opportunities for significant energy consumption reduction, and peak power reduction through process scheduling



Council Rock – Thermal analysis and packaging design for smart grid communications product. Roadmap for communications technology and associated software



Tyll Solar – Design optimization for PV combined heat/power technology (fluid, thermal, structural simulation)



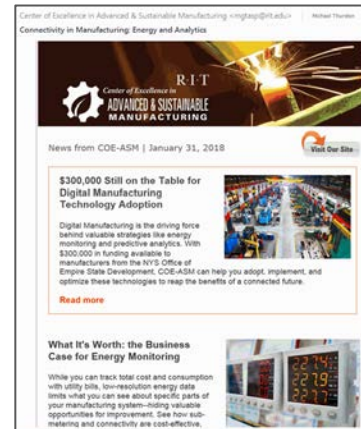
Optipro, Optimax, Harbec – Development of electronic work instructions with augmented reality (funded by Digital Manufacturing Institute)



CONTACT / COLLABORATION



Website: Learn more
www.rit.edu/gis/cesm
- “Contact Us”
- Register for Newsletter



Newsletter:

- Emailed monthly
- Includes: technology articles, news and upcoming events, funding opportunities

Contact Info for Technology/Project Related Discussions:

- COE-ASM Business Manager: Dr. Mark Krystofik, makgis@rit.edu, 585-475-4246
- COE-ASM Director: Dr. Mike Thurston, mgtasp@rit.edu, 585-475-6550

PROJECT EXAMPLES



Q&A

Contact the Presenters



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Weather Research & Development Center
at University at Albany



View the Presentation

This presentation recording and PDF will be available tomorrow at:
www.fuzehub.com/webinar-centersexcellence

Full List of New York State Centers of Excellence

Center of Excellence in Data Science at the University of Rochester

Center of Excellence in Bioinformatics and Life Sciences (CBLS) at the University at Buffalo

Center of Excellence in Materials Informatics (CMI) at the University at Buffalo

Center of Excellence in Nanoelectronics and Nanotechnology (CENN) at SUNY Polytechnic Institute

Advanced Energy Research and Technology Center (AERTC) at Stony Brook University

Center of Excellence in Wireless and Information Technology (CEWIT) at Stony Brook University

Center of Excellence in Precision Medicine and Responses to Bioterrorism and Disasters at New York Medical College

Small Scale Systems Integration and Packaging (S3IP) at Binghamton University

Center of Excellence in Advanced & Sustainable Manufacturing at Rochester Institute of Technology

Syracuse Center of Excellence for Environmental and Energy Systems at Syracuse University

Weather Research & Development Center at University at Albany

Links available at:
esd.ny.gov/centers-excellence



FUZEHUB'S MISSION

To drive New York State competitiveness in manufacturing by helping companies discover, navigate, and leverage the state's extensive innovation ecosystem.

- **FuzeHub is New York's Statewide Manufacturing Extension Partnership (NY MEP) Center**
- **Increase the awareness of expertise and capabilities** available to companies throughout the state
- **Leverage expertise in-house or through partnerships** to assess company needs, then connect them with capable resources and track/monitor follow up.
- **Use a unique mix** of technology, resources, manufacturing expertise and special events to assist manufacturers.
- **Coordinate statewide projects** and other strategic initiatives guided by NYS and the needs of small to medium-sized enterprises.



For assistance visit **www.fuzehub.com** and make a request; one of our specialists will respond to your request in 24 to 48 hours.

Keep the conversation going

FuzeHub is on LinkedIn, Twitter, Google+ , Facebook
info@fuzehub.com

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