# Joshua R. New, Ph.D., C.E.M., PMP, CMVP, CSM, IREE

Senior R&D Staff, Oak Ridge National Laboratory
Energy Science and Technology Directorate
Electrification and Energy Infrastructure Division
Grid-Interactive Controls Group
P.O. Box 2008, MS-6324
Oak Ridge, TN 37831-6324
Phone: (865) 241-8783
newjr@ornl.gov

## Education

THE UNIVERSITY OF TENNESSEE, KNOXVILLE                2004-2009                Knoxville, TN
Ph.D., Computer Science with specialization in Graphics and Visualization
Thesis: *"Visual Analytics for Relationships in Scientific Data"*
GPA: 3.9/4.0; Ph.D. Adviser: Dr. Jian Huang

JACKSONVILLE STATE UNIVERSITY                2001-2004                Jacksonville, AL
M.S., Computer Systems and Software Design with specializations in Human-Computer
Interaction, Machine Learning, Automation, Graphics, and Robotics
Thesis: "*An Advanced User Interface for Pattern Recognition in Medical Imagery:
Interactive Learning, Contextual Zooming, and Gesture Recognition*"
GPA: 4.0/4.0; Outstanding MCIS Graduate Award; M.S. Adviser: Dr. Mario Aguilar

JACKSONVILLE STATE UNIVERSITY                1997-2001                Jacksonville, AL
B.S., Computer Science & Mathematics with Physics minor; GPA: 3.5/4.0

## Experience

SENIOR RESEARCH AND DEVELOPMENT STAFF
UT-Battelle, Oak Ridge National Laboratory        2009-Present                Oak Ridge, TN
- Maintain US DOE Q clearance
- Serve as sub-program manager for "Software Tools & Models" in the ~75-person Building Technologies Research & Integration Center (BTRIC) for 9 years. Responsible for sponsor relations, securing funding, high-impact publications, and ensuring timely completion of all deliverables for projects including but not limited to: websites, web services, databases, software tools, simulation engine development, supercomputing, image processing, artificial intelligence for deep learning, and big data mining applications.
- People – responsible for multi-disciplinary team communication and development with up to 26 individuals responsible for at least 1 deliverable to the U.S. Dept. of Energy.
- Funding – led a 5-year average of 9.2 funded projects per year (35% success rate), personal budget authority of $1.6 million per year, and total award amount of $9.0 million per year.
- Deliverables – successfully led ORNL teams to complete 4-year average of 52 deliverables per year, 100% on-budget, 93% on-time.
- Publications – 5-year average co-authorship of 12.4 accepted publications per year with 86% acceptance rate; h-index 13; i10-index 19
- Lead 1 of 3 core national lab teams for the development of the DOE's flagship whole-building simulation products EnergyPlus and OpenStudio.
- Achievements – development of the world's #1:
  - fastest building simulator for 524,288 annual building simulations using 131,072 processors and writing 45TB of data to disk in 68 minutes on ORNL's Titan (at the

time it was the world's #1 fastest HPC); 1,799,160 annual simulations in 2 hours using 224,896 cores (80%) of ANL's Theta supercomputer (#28 fastest HPC)

- o largest building simulation dataset totaling over 300TB; used for big data mining
- o fastest building creator on a (4-core) laptop with 155,793 buildings requiring 35GB written to disk in 2.6 minutes
- o calibration algorithm for changing simulation inputs such that output matches measured data: measured in terms of CV(RMSE) and NMBE output error metrics used by ASHRAE Guideline 14 as well as the new, co-developed input-side error

- Primary contributor to the 2016 R&D 100 Award winning Roof Savings Calculator (RSC); a web-based, industry-consensus energy audit tool for residential and commercial buildings using DOE-2.1E simulations integrated with AtticSim for modeling advanced roof and attic systems averaging 64 visits/day since April 2010.

- Managing the development of an integrated suite of open source, proprietary, custom, and commercial machine learning tools (MLsuite) for big data mining 200+ TB of building simulation data using High Performance Computing and lab computers simultaneously.

- Operational R&D systems for ORNL's Flexible Research Platforms including robotically-emulated occupancy, data acquisition systems, server hardware, sensor analytics, wiki, sensor analytics, dashboards, websites, and web services.

- Developing visual analytics tools to assist information gathering and knowledge discovery through demonstration home dashboards, linked parallel coordinate plots, and data mining for millions of simulations and capable of running on 35+ megapixel powerwall displays.

- Responsible for access, maintenance, backup, and cybersecurity compliance of BTRIC's server room, software systems, and visualization wall.

### MANAGEMENT & OPERATING CONTRACTOR
U.S. Department of Energy, Building Technologies Office       2020-2021       Oak Ridge, TN
- 80% full-time equivalent on-loan to support activities of DOE's Building Technologies Office (BTO) including transition information for the incoming Biden Administration.

- Portfolio management of 36 projects, project coordination/execution, and multi-lab strategy for the $9.9 million/year Building Energy Modeling (BEM) subprogram under Amir Roth.

- Lead development of a multi-program "Artificial Intelligence Initiative" for Buildings.

- Support Sensors & Controls (S&C) program activities including contribution to Research & Development Opportunities (RDO) documents and associated workshops under Erika Gupta.

- Assist backfill of $16.5 million/year Equipment program involving HVAC, refrigeration, and water heating projects under Antonio Bouza's transition.

### JOINT FACULTY, ELEC. ENG. & COMPUTER SCIENCE (EECS) DEPARTMENT
The University of Tennessee                    2012-Present                    Knoxville, TN
- Serve as research staff participating in several departmental institutes and research proposals.

### FOUNDER & CEO
Tunation, LLC                                  2015-2020                    Knoxville, TN
- Startup company founder commercializing Autotune software developed by and licensed from Oak Ridge National Laboratory for the Department of Energy. Lead sustained compound annual growth rate of 50% for 5 years prior to sale.

- Tunation enables customers to create an accurate virtual representation of a building with unequaled zero-touch quality and accuracy resulting in significant savings of modeling expenses, significantly reduced risks, financing of larger projects, and an expanded market for cost-effectively making America's buildings more energy efficient.

GRADUATE RESEARCH ASSISTANT

The University of Tennessee, Knoxville            2005-2009            Knoxville, TN

- Developed SeeShader, a glut-based framework for easily implementing General Purpose computation on Graphical Processing Units (GPGPU) applications

- Developed SeeBrain, an application which leverages OpenGL's shading language for performing many computations on the GPU. This allows mapping of quantitative hypotheses for volumetric, multivariate datasets directly to the graphics pipeline. The demonstrated results have involved diffusion-tensor MRI (DT-MRI) and the computation of tensor-based features from neural fiber streamline extraction for the purposes of real-time, query-based visualization.

RESEARCH INTERN

Oak Ridge National Laboratory            Summer 2008            Oak Ridge, TN

- Extended SeeGraph to meet the visual analytics needs of the ORNL systems genetics group leader in performing complex analysis and trait mapping of microarray data across mouse genomes including automatic karyotyping.

- Part of Computational Sciences Initiative project to leverage supercomputers for model generation routines to predict variables based on 100 years of data and a comprehensive visualization framework for all model results. Tasks included parallel k-means clustering for ecoregion classification, visualization using GIS tools, experimentation with parallel coordinates for directing the analysis process, and maintenance/administration of parallel R-servers for model fitting.

RESEARCH INTERN

Oak Ridge National Laboratory            Summer 2007            Oak Ridge, TN

- Extended SeeGraph using general graph algorithms and statistical techniques and applied these techniques to bioinformatics data. Worked hand in hand with domain scientists to increase the usability of the program and position it for web deployment in combination with other pre-existing, web-based tools.

GENERAL TOOLS INTERN

Vital Images, Inc.            Summer 2006            Minnetonka, MN

- Part of the general tools team responsible for enhancing usability of Vitrea, a workstation product used by radiologists worldwide to inspect and diagnose 3D medical imagery. Changes made for tools including 3D angiography, vessel probe and measurements, brain perfusion, cardiac, colonography, and lung analysis.

- Primarily tasked with disambiguating click-and-drag for tool mode versus rotation mode. Developed several bypass modes including one-shot, tool over rotation, temporal threshold, and click-drag-click. Several layouts were created which load the active mode from an XML file on a per-tool basis; usability testing of these layouts was conducted. Integrated 5-button mouse support into Qt and Vitrea, used for switching modes and more advanced interaction.

RESEARCH INTERN

Oak Ridge National Laboratory            Summer 2005            Oak Ridge, TN

- Part of the ORNL/UTK collaboration for the Computational Sciences Initiative. Security clearance granted for the "Large Scale Cluster-Driven Visualization of SciDAC Datasets" project to develop a suite of new visualization tools for high volume simulation datasets that can be used by visualization practitioners and application scientists alike on arbitrarily-sized clusters driving any tiled display.

- Developed SeeGraph, a 3D spring-embedded layout and graph visualization package which allows interactive viewing, selection, and manipulation of several graph-theoretic constructs

and neural network filtering. This system has been applied and showcased for visualization of phenotype correlation of RI mice by ORNL biologists.

GRADUATE TEACHING ASSISTANT
The University of Tennessee, Knoxville      2004-2005      Knoxville, TN
- Developed, provided, organized, and graded course material for UTK's graduate level CS552 - Software Engineering under the guidance of Dr. Stacy Prowell. This course covered the intricacies of the incremental development model from the requirements document to maintenance of the final product. The support work for this course involved developing grading rubrics for exam material, review and guidance of deliverables for the semester-long project, and lectured 10+ times in the professor's absence.

GRADUATE RESEARCH ASSISTANT
Jacksonville State University      2001-2004      Jacksonville, AL
- Awarded a competitive research assistantship with Dr. Aguilar's Knowledge Systems Laboratory three years running. Primary languages used were C, VC6, C++.NET, and Matlab. Toolkits used include the Visualization ToolKit (VTK), Intel Image Processing Libraries (IPL), Open-source Computer Vision library (OpenCV), system-independent GUI-building toolkit (Qt), Open-source Graphics Library (OpenGL), and others.
- Development of a machine vision system completed for use in gesture recognition. This system has been applied to real-time processing of live camera feed for allowing the direct manipulation of a 3D virtual object via spatial and temporal hand gestures.
- Developed a medical system, known as Med-LIFE, to visualize MRI data. This system allows the fusion of multiple image modalities into colored images, creation of intelligent agents for robust segmentation of diseases in MRIs through interactive training, contextual zoom of medical imagery, and intuitive exploration including 3D techniques.

COMPUTER SPECIALIST
Ft. McClellan      1997-2001      Anniston, AL
- Primary contributor to the creation, update, and finalization of the "Automated Installation Property System" inventory tracking software used by the Transition Force to close the military post. This system was responsible for the successful transfer of 11,200,000 tons of material in 215 separate shipments amounting to a total value of approximately $104,314,000. This system was also installed and customized for use by the Department of Justice (now Department of Homeland Security), Wastren Inc., and the Joint Powers Authority.
- Expert knowledge and application in Microsoft Access database capabilities with Visual Basic.
- Network administrator, responsible for maintaining proper operation and communication of all computers in the personal property section.
- Software/hardware troubleshooter, responsible for up-to-date operation and functionality of all computers.

## Awards

- Certification: Investor Ready Energy Efficiency Professional (IREE, 2020)
- Copyright: "AutoGen" (2019) – Automatic EnergyPlus file modifier/generator – world's fastest building energy model creator utilizing text replacement for variable in EnergyPlus files. U.S. Copyright Office (Registration Number TXu 2-159-000), UT-Battelle (80000055).
- Certification: Certified Scrum Master (CSM, 2019, 2021)
- Copyright: "AutoSim" Automatic Simulator (2018) – world's fastest buildings simulator for scalably distributing EnergyPlus files on High Performance Computing devices, simulating on virtual disk, and returning results for storage and analysis. U.S. Copyright Office (Registration Number TXu 2-141-960).
- ASHRAE Distinguished Service Award (2018)

- Certification: Certified Measurement and Verification Professional (CMVP, 2018)
- Certification: Project Management Professional (PMP, 2017, 2021)
- Certification: Certified Energy Manager (CEM, 2017, 2021)
- IEEE Senior Member, bestowed on less than 8% of IEEE's more than 429,000 members (2017)
- Copyright: "EnergyPlus" (2017). UT-Battelle (OS17-00113).
- R&D 100 (2016). "Roof Savings Calculator Suite" in Software/Services. "Oscars of Innovation" award as one of the nation's top 100 most significant new products of the year.
- Copyright: "Linked-View Parallel Coordinate Plot Renderer" (2016). U.S. Copyright Office (Registration Number TXu 1-999-905), UT-Battelle (90000020).
- Copyright: "Roof Savings Calculator Suite" (2016). U.S. Copyright Office (Registration Number TXu 2-022-059), UT-Battelle (50000108).
- Lab-Corps, Cohort #1 (2015). 1 of 14 nationally-selected teams for participation in a 6-week entrepreneurial bootcamp for commercializing technologies from a national lab.

## Professional Service and Development

- ASHRAE Technical Committee (TC) 1.5 – Computer Applications, Secretary (2017-), Emerging Applications subcommittee chair (2016-2017), voting member (2015-)
- ASHRAE TC 4.2 – Climatic Information, Chair (2019-), Vice Chair (2017-2019), Secretary (2015-17), voting member (2014-2018)
- ASHRAE TC 4.7 – Energy Calculations, voting member (2015-), Webmaster (2015-)
- ASHRAE Standing Standard Project Committee (SSPC) 169 – Weather Data for Building Design Standards, voting member (2015-), Secretary (2017-2019), Vice Chair (2019-); created 24% of Amercia's building codes defined by ASHRAE Standard 90.1-2016 "Energy Standard for Buildings Except Low-Rise Residential Buildings."
- Co.Starters (2016). 9-week business development program for development of the full, 26-page business plan for Tunation, LLC.

## Publications

**2022**

Berres, Andy S., Sanyal, Jibonananda, Kurte, Kuldeep R., Dumas, Melissa R., Bass, Brett C., New, Joshua R., Im, Piljae, Urban, Marie L., and Thakur, Gautam (2022). "Traffic-based analyses of buildings advance smart city capabilities." ORNL science article, March 3, 2022. [Article]

Savage, Neil (2022). "Virtual Duplicates." Communications of the ACM, volume 65(2), pages 14-16, doi:10.1145/3503798, February 2022. [PDF]

Webb, Sarah (2022). "Sustainable Cities: Oak Ridge researchers harness Argonne's Theta supercomputer to build energy-efficiency models for all U.S. buildings." ASCR Discovery, January 2022. [Article]

1. Bass, Brett and New, Joshua R. (2022). "AutoBEM - Dynamic Archetypes." Generates representative models and floor space multipliers for any area of interest, with example data for Las Vegas, doi:10.5281/zenodo.5838465. January 11, 2022. [code]

**2021**

2. McCorkle, Morgan L. and Burke, J.J. (2021). "ORNL's simulation tool creates digital twin of buildings from coast to coast." Top 10 ORNL science article of 2021. [Top 10 list] [Article]

3. Berres, Andy, Bass, Brett, Adams, Mark, Garrison, Eric, and New, Joshua R. (2021). "A Data-Driven Approach to Nation-Scale Building Energy Modeling." 2021 IEEE International Conference on Big Data, Orlando, FL, December 15-18, 2021. [PDF] [PPT] [MOV]

4.  Bass, Brett, Curtis, Leland, and New, Joshua R. (2021). "Design Space Data: Informing Common Design Decisions with Pre-Simulated Data." ORNL internal report ORNL/TM-2021/170499, November 19, 2021, 17 pages.

    New, Joshua R. (2021). "Model America - a model of every U.S. building." CalBEM 2021 virtual conference, November 18-19, 2021. [PDF] [MOV]

    Brett Bass, Leland Curtis, and Peter McNally (2021). "Universal Design Space Building Energy Simulation." Kaggle, Oct. 25, 2021, doi: 10.34740/KAGGLE/DSV/2741357. [Data]

5.  Bass, Brett, New, Joshua R., Ezell, Evan, Im, Piljae, Garrison, Eric, and Copeland, William (2021). "Utility-scale Building Type Assignment Using Smart Meter Data." Building Simulation 2021 Conference, Bruges, Belgium, September 1-3, 2021. [PDF] [PPT] [MOV]

6.  New, Joshua R., Bass, Brett, Berres, Anne S. (2021). "Distribution of potential savings from urban-scale energy modeling of a utility." Building Simulation 2021 Conference, Bruges, Belgium, September 1-3, 2021. [PDF] [PPT] [MOV]

7.  Berres, Anne S. Bass, Brett, New, Joshua R., Im, Piljae, Urban, Marie, and Sanyal, Jibonananda (2021). "Generating traffic-based building occupancy schedules in Chattanooga, Tennessee from a grid of traffic sensors." Building Simulation 2021 Conference, Bruges, Belgium, September 1-3, 2021. [PDF] [PPT] [MOV]

    Allen-Dumas, Melissa, Brelsford, Christa, New, Joshua R., Berres, Anne, Kurte, Kuldeep, Sanyal, Jibonananda, Sweet, Levi (2021). "Sustainable Cities: Socioeconomics, Building Types, and Urban Morphology." Smoky Mountain Computational Science Data Challenge (SMCD21). Virtual Conference, August 24-August 26, 2021. [Challenge]

    New, Joshua R. (2021). "Nation-scale building energy modeling, climate change, and potential grid impacts." IEEE Power & Energy Society General Meeting (PES GM) panel session titled "Emerging applications of data-driven intelligence as an enabler for demand response in wholesale and local markets." Virtual Conference, July 28, 2021.

8.  New, Joshua R., Bass, Brett, Adams, Mark, Berres, Anne, and Luo, Xuan (2021). "Los Angeles County Archetypes in Weather Research and Forecasting (WRF) Region from ORNL's AutoBEM [Data set]." Zenodo, doi.org/10.5281/zenodo.4726136, Apr. 28, 2021. [Zenodo]

9.  New, Joshua R., Adams, Mark, Bass, Brett, Berres, Anne, and Clinton, Nicholas (2021). "Model America - data and models of every U.S. building. [Data set]." Constellation, doi.ccs.ornl.gov/ui/doi/339, April 14, 2021. [DOI]

10. New, Joshua R., Bass, Brett, Adams, Mark, and Berres, Anne (2021). "Clark County (Vegas) Archetypes from ORNL's AutoBEM [Data set]." Zenodo, doi.org/10.5281/zenodo.4552901, Mar. 21, 2021. [Zenodo]

11. New, Joshua R., Bass, Brett, Adams, Mark, and Berres, Anne (2021). "Model America - Clark County (Vegas) extract from ORNL's AutoBEM (Version 1.1) [Data set]." Zenodo, doi.org/10.5281/zenodo.4552901, Feb. 16, 2021. [Zenodo]

12. Wang, Jing, Ye, Yunyang, Zuo, Wangda, New, Joshua R., and Rose, Amy (2021). "City-scale Building Occupancy Prediction using Geographic Information System Data." engrXiv journal, doi.org/10.31224/osf.io/658yb, Feb. 9, 2021. [engrXiv] [PDF]

13. Garrison, Eric and New, Joshua R. (2021). "Quality Control Methods for Advanced Metering Infrastructure Data." Smart Cities journal, Special Issue "Applied Artificial Intelligence in Energy Systems," volume 4(1), pages 195-203, doi.org/10.3390/smartcities4010012, Jan. 28, 2021. [SmartCities] [PDF]

14. Bass, Brett, New, Joshua R., and Copeland, William (2020). "Potential Energy, Demand, Emissions, and Cost Savings Distributions for Buildings in a Utility's Service Area." *Energies* journal, Special Issue "Designing, Modeling and Optimizing Energy and Environmental Systems for Buildings," volume 14(1), issue 132, doi.org/10.3390/en14010132, Dec. 29, 2020. [Energies] [PDF]

**2020**

15. Bass, Brett, New, Joshua R., and Copeland, William (2020). "Potential Energy, Demand, Emissions, and Cost Savings Distributions for Buildings in a Utility's Service Area." *Energies* journal, Special Issue "Designing, Modeling and Optimizing Energy and Environmental Systems for Buildings," volume 14(1), issue 132, doi.org/10.3390/en14010132, Dec. 29, 2020. [Energies] [PDF]

16. Allen-Dumas, Melissa R., Rose, Amy N., New, Joshua R., Omitaomu, Olufemi A., Yuan, Jiangye, Branstetter, Marcia L., Sylvester, Linda M., Seals, Matthew B., Carvalhaes, Thomaz M., Adams, Mark B., Bhandari, Mahabir S., Shrestha, Som S., Sanyal, Jibonananda, Berres, Anne S., Kolosna, Carl P., Fu, Katherine S., and Kahl, Alexander C. (2020). "Impacts of the Morphology of New Neighborhoods on Microclimate and Building Energy Use." *Renewable & Sustainable Energy Reviews*, volume 133, 110030, ISSN 1364-0321, doi.org/10.1016/j.rser.2020.110030, November 2020. [RSER] [PDF]

    Sanyal, Jibonananda, Comstock, Kevin, Copeland, William A., Sartipi, Mina, Rodriguez, Marissa M., New, Joshua R., Gaertner, Michael, and Berres, Anne (2020). "Chattanooga - The Smart City - How a National Laboratory and a City heralded a digital transformation." *Invited Speaker* to the Global Smart Cities Council Plenary Session, Oct. 8, 2020. [PPT] [MP4]

17. New, Joshua R., Adams, Mark, Garrison, Eric, Bass, Brett and Guo, Tianjing. (2020). "Scaling Beyond Tax Assessor Data." ASHRAE/IBPSA-USA 2020 *Building Performance Analysis Conference & SimBuild* (BPACS), Chicago, IL, Sept. 29 - Oct. 1, 2020. [PDF] [PPT] [MP4]

18. Bass, Brett and New, Joshua R. (2020). "Future Meteorological Year weather data from IPCC Scenarios." ASHRAE/IBPSA-USA 2020 *Building Performance Analysis Conference & SimBuild* (BPACS), Chicago, IL, Sept. 29 - Oct. 1, 2020. [PDF] [PPT] [MP4]

19. Liu, Xiaobing, Spitler, Jeffrey D., DeGraw, Jason, Cook, Jack C., Guo, Tianjing, Adams, Mark, New, Joshua R., and Holladay, Seth (2020). "FY20 Third Milestone Report for Advanced Techno-Economic Modeling for Geothermal Heat Pump Applications in Residential, Commercial, and Industry Buildings." ORNL Internal report ORNL/SPR-2020/1619, June 30, 2020. [OSTI]

    New, Joshua R. (2020). "Digital Twin of a Utility: Beyond Urban-Scale Building Energy Modeling." *Invited Speaker* to ORNL's monthly Energy Talks, Oak Ridge, TN, July 11, 2020. [PPT]

20. New, Joshua R. (2020). "Creating a Virtual Utility: Energy and Demand Opportunities via Automatic Building Energy Modeling (AutoBEM)." *DistribuTech International*, San Antonio, TX, January 28-30, 2020. [PPT]

21. Im, Piljae, Bae, Yeonjin, Joe, Jaewan, and New, Joshua R. (2019). "Empirical Validation of Building Energy Modeling for Commercial Buildings." Journal of *Applied Energy*, volume 261, issue 114374, March 2020. [APEN] [PDF]

**2019**

    Allen-Dumas, Melissa R., New, Joshua R., and Brelsford, Christa M. (2019). "Poster: Impacts of Urban Densification on Neighborhood Heat Wave Resilience." Proceedings of the AGU Fall Meeting, San Francisco, CA, Dec. 9-13, 2019. [Poster]

22. New, Joshua R., Miller, William A., Huang, Yu (Joe), and Levinson, Ronnen (2019). "Comparison of different simulation programs in modeling the energy savings of cool roofs." In *Proceedings of the International Conference on Countermeasures to Urban Heat Island (IC2UHI)*, IIIT Hyderabad, Hyderabad, India, December 2-4, 2019. <!--[PDF]-->

23. Bass, Brett and New, Joshua R. (2019). "Potential Demand Reduction from Buildings in a Simulated Utility." Invited speaker to the *ACM BuildSys conference UrbSys workshop*, Columbia University New York City, NY, November 10, 2019. [ACM] [PDF] [PPT]

24. Malhotra, Mini, Im, Piljae, and New, Joshua R. (2019). "A Process for Defining Prototype Building Models: Courthouse Case Study for U.S. Commercial Energy." Journal *Energies*, volume 12, issue 4020, doi:10.3390/en12204020, October 22, 2019. [MDPI] [PDF]

    New, Joshua R. (2019). "Buildings-related research: simulation, validation, and beyond urban-scale energy modeling." Invited speaker, Syracuse University graduate seminar, Syracuse, New York, Oct. 11, 2019. [PPT]

    Hong, Tianzhen, Jain, Rishee, New, Joshua R., Reinhart, Christoph, Polly, Ben, Luo, Xuan (2019). "Panel - Urban Information and Energy Modeling." *Proceedings of the IBPSA Building Simulation Conference*, Rome, Italy, Sept. 2-4, 2019. [PPT]

25. New, Joshua R., Adams, Mark, Garrison, Eric, Copeland, William, Smith, Brian, and Campbell, Andy (2019). "Nailing the Peak: City-Scale, Building-Specific Load Factor and Contribution to a Utility's Hour of Critical Generation." *Proceedings of the IBPSA Building Simulation Conference*, Rome, Italy, Sept. 2-4, 2019. [PDF] [PPT]

26. Im, Piljae and New, Joshua R. (2019). "Empirical Validation of Building Energy Modeling using Flexible Research Platform." *Proceedings of the IBPSA Building Simulation Conference*, Rome, Italy, Sept. 2-4, 2019. [PDF] [PPT]

27. Im, Piljae and New, Joshua R. (2019). "Updated OpenStudio Small and Medium Office Prototype Models." *Proceedings of the IBPSA Building Simulation Conference*, Rome, Italy, Sept. 2-4, 2019. [PDF] [PPT]

28. New, Joshua R. (2019). "Automatic Building detection and Energy Model creation (AutoBEM) technologies for remote audit of individual buildings at urban scales." Invited speaker to the *EnergyExchange*, presented as part of a seminar titled "Energy and Water Assessments: Virtual and Conventional", Denver, CO, August 20-22, 2019. [PDF]

29. Im, Piljae, Bhandari, Mahabir, and New, Joshua R. (2019). "Building Energy Model Input Specifications for the Flexible Research Platform." ORNL Internal Report ORNL/SPR-2018/947, August 2019, 28 pages.

30. Hussein, Ahmed, Eicker, Ursula, and New, Joshua R. (2019). "A Comparison Between Two Urban-Scale Methods for The Assessment of Heat Energy Demand and Photovoltaic Potential in New York City, USA." Proceedings of the *European International Conference on Transforming Urban Systems (EICTUS)*, University of Strasbourg, France, June 26-28, 2019. [PPT]

31. Copeland, William, New, Joshua R., and Vogel, Matthew. (2019). "Digital Twin of a City Utility: Issues, science, implementation, and results." "Data of the Future: Digital Cities" seminar of the *Better Buildings Summit*, Arlington, VA, July 11, 2019. [PPT]

32. Shen, Bo, New, Joshua R., Ally, Moonis (2019) "Energy and Economics Analyses of Condenser Evaporative Precooling for Various Climates, Buildings and Refrigerants." In journal *Energies*, Special issue: Energy Performance and Indoor Climate Anallysis in Buildings volume 12, issue 11, May 31, 2019. [Energies]

New, Joshua, Copeland, William, and Ingraham, James (2018). "Poster: Virtual Electric Power Board of Chattanooga, TN (EPB)." ORNL BTO Peer Review, April 15, 2019. [Poster]

Ruyssevelt, Paul. (2019). "Modelling Building Stocks and Their Energy Use." Presented at the Urban Dynamics Institute (UDI) at Oak Ridge National Laboratory, Oak Ridge, TN, Jan. 18, 2019. [PPT]

33. Garrison, Eric, New, Joshua R., and Adams, Mark (2019). "Accuracy of a Crude Approach to Urban Multi-Scale Building Energy Models Compared to 15-min Electricity Use." Best PhD Student Paper award. In *Proceedings of the ASHRAE Winter Conference*, Atlanta, GA, Jan. 12-16, 2019. [PDF] [PPT]

34. Luo, Xuan, Macumber, Dan, New, Joshua R., and Judkoff, Ron *(Seminar Chair)* (2018). "Seminar - Multiscale Building Energy Modeling, Part 10." In *Proceedings of the ASHRAE Winter Conference*, Atlanta, GA, Jan. 12-16, 2019. [LBNL] [NREL] [ORNL]

35. Ruyssevelt, Paul, Shipley, David, Ellis, Peter, and New, Joshua R. *(Seminar Chair)* (2019). "Seminar - Multiscale Building Energy Modeling, Part 9." In *Proceedings of the ASHRAE Winter Conference*, Atlanta, GA, Jan. 12-16, 2019. [UK] [CA] [BL]

**2018**

New, Joshua R. (2018). "Automatic Building detection and Energy Modeling (AutoBEM)." Presented at the International Energy Agency (IEA) Energy in Buildings and Communities Programme (EBC) Annex 70 - Building Energy Epidemiology Workshop, Washington D.C., Nov. 8-9, 2018. [PDF]

New, Joshua R. (2018). "DOE's Roof Savings Calculator." Presented at Roofing Industry Committee on Weather Issues, Inc. (RICOWI) Fall Meeting, Chicago, IL, Oct. 3, 2018. [PDF]

36. New, Joshua R. (2018). "TEDergy Talk: Automatic Building Energy Modeling (AutoBEM)." To appear in *Proceedings of the Building Performance Analysis Conference and SimBuild (BPACS)* co-organized by ASHRAE and IBPSA-USA, Chicago, IL, Sept. 26-28, 2018. [PDF] [PPT]

37. Adams, Mark and New, Joshua R. (2018). "EnergyPlus Interior Radiant Heat Exchange Runtime Performance Improvements." To appear in *Proceedings of the Building Performance Analysis Conference and SimBuild (BPACS)* co-organized by ASHRAE and IBPSA-USA, Chicago, IL, Sept. 26-28, 2018. [PDF]

38. Adams, Mark and New, Joshua R. (2018). "EnergyPlus Performance Improvements via JSON Input Refactoring." In *Proceedings of the Building Performance Analysis Conference and SimBuild (BPACS)* co-organized by ASHRAE and IBPSA-USA, Chicago, IL, Sept. 26-28, 2018. [PDF] [PPT]

New, Joshua R. (2018). "Creating a Digital Twin of an Electric Utility: Reimagining building energy modeling in a world of high performance computing, big data, imagery, and advanced metering infrastructure." Presented at Argonne National Laboratory, Sept. 25, 2018. [PDF]

39. Im, Piljae, Fricke, Brian, New, Joshua R. and Adams, Mark (2018). "Development of a Supermarket Prototype Building Model." To appear in *Proceedings of the International Building Physics Conference* Syracuse, NY, Sept. 23-26, 2018.

40. Villa, Daniel, New, Joshua R., Adams, Mark and Garrett, Aaron (2018). "Feedback between Building Automation Systems, Building Energy Models, and Auto-Calibration." To appear in *Proceedings of the Building Performance Analysis Conference and SimBuild (BPACS)* co-organized by ASHRAE and IBPSA-USA, Chicago, IL, Sept. 26-28, 2018. [PDF]

41. New, Joshua R., Garrett, Aaron, Sanyal, Jibonananda, Slattery, Bob, Gehl, Anthony, and Miller, William A. (2019) "Big Data Mining for Assessing Calibration of Building Energy Models." In

*International Journal of Computer & Software Engineering (IJCSE)*, volume 3, issue 136, Sept. 8, 2018. [PDF]

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**2012**

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**2010**

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**2005-2009 (PhD)**

137.    New, Joshua R. (2009). **PhD thesis:** "Visual Analytics for Relationships in Scientific Data" In *Archives of the UTK Library*, Knoxville, TN. [PDF] [deliverables]

138.    New, Joshua R., Kendall, Wesley, Huang, Jian, and Chesler, Elissa (2008). "Dynamic Visualization of Co-expression in Systems Genetics Data" In *Journal of IEEE Transactions on Visualization and Computer Graphics (TVCG)*, volume 14, issue 5, pp. 1081-94, 2008. [PDF]

139.    Jian Huang and Markus Glatter and Wesley Kendall and Brandon Langley and Joshua New and Roberto Sisneros and Forrest Hoffman and David Erickson (2008). "Time-Varying Multivariate Visualization for Understanding the Climate Science of the Terrestrial Biosphere." In *Proceedings of the 13th Annual Community Climate System Model Workshop*, Breckenridge, Colorado, June 2008. [PDF]

140.    New, Joshua R. (2008). "SeeGraph: A Visual Analytics System for Correlation Data." In *Proceedings of the 2nd annual Gaggle Workshop*, Institute for Systems Biology, Seattle, WA.

New, Joshua R. (2007). "SeeShader: A System for General Purpose Computation on the GPU." Presented as part of a special edition of the UTK Computer Graphics Course, Knoxville, TN.

New, Joshua R. (2006). "SeeBrain: A System for Comparative Visualization of Brain Nerve Fiber Tracts." Presented as the East Tennessee chapter of the Association for Computing Machinery (ACM), Knoxville, TN.

New, Joshua R. (2006). "Fiber Renderer: A System for Visualizing Queries of DT-MRI tracts." Presented at the Vanderbilt University's Institute of Imaging Science, Nashville, TN.

New, Joshua R. (2005). "SeeGraph: A System for Visualizing Weighted-Edge Graphs." Presented at the Oak Ridge National Laboratory, Oak Ridge, TN.

**2001-2004 (MS)**

141.    New, Joshua R. (2004). **Master's Thesis:** "An Advanced User Interface for Pattern Recognition in Medical Imagery: Interactive Learning, Contextual Zooming, and Gesture Recognition." In *Archives of the JSU and MCIS Libraries*, Jacksonville, AL. [PDF] [PPT] [deliverables]

142.    New, Joshua R., Hasanbelliu, E., and Aguilar, M. (2004). "Med-LIFE: A Diagnostic Aid for Medical Imagery." In *Proceedings of the International Conference on Mathematics and Engineering Techniques in Medicine and Biological Sciences*, Las Vegas, Nevada. [PDF]

143.    New, Joshua R. (2004). "Heterogeneous ARTMAPs for Image Segmentation." In *Proceedings of the JSU Graduate Research Colloquium*, Jacksonville, AL. [PDF] [PPT]

144.    New, Joshua R. (2004). "A Method for Temporal Hand Gesture Recognition." In *MCIS Technical Report*, Jacksonville, AL. [PDF] [PPT]

145.	Aguilar, M., New, Joshua R., and Hasanbelliu, E. (2003). "Advances in the Use of Neurophysiologically-based Fusion for Visualization and Pattern Recognition of Medical Imagery." In *Proceedings of the 6th International Conf. on Information Fusion*, Cairns, Australia. [PDF] [PPT]

146.	New, Joshua R. and Aguilar, M. (2003). "The Sword: A Role Playing Game for Demonstrating Computer Graphics Techniques." In *Proceedings of the JSU Graduate Research Symposium*, Jacksonville, AL. [PPT]

147.	New, Joshua R. and Aguilar, M. (2003). "Pliable Display Technology: Contextual Zoom as a Learning System Interface." In *Proceedings of the JSU Graduate Research Symposium*, Jacksonville, AL. [PPT]

148.	New, Joshua R., Hasanbelliu, E., and Aguilar, M. (2003). "Facilitating User Interaction with Complex Systems via Hand Gesture Recognition." In *Proceedings of the 2003 ACM Southeast Conference*, Savannah, GA. [PDF] [PPT]

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**1999**

152.	New, Joshua R. (1999). "Sonoluminescence." In *Proceedings of the College of Arts and Sciences 3rd Annual Undergraduate Research Symposium*, Jacksonville State University, Jacksonville, AL.


## Memberships

- ASHRAE (Amer. Society of Heating, Refrigeration, and A/C Engineers)	2010-Present
- IEEE (Institute of Electrical and Electronics Engineers)	2004-Present
- AEE (Association of Energy Engineers)	2017-Present
- PMI (Project Management Institute)	2017-Present
- ACM (Association for Computing Machinery) and UTK local chapter	2004-2012
- JSU Math Club and MAA (Mathematical Association of America)	1997-2002
- President of the JSU Math Club	1998-2001
- JSU Computer Science Club	1997-2003
- AITP (Association of Information Technology Professionals)	1997-2002
- AIP (American Institute of Physicists)	1998-2002
- Phi Eta Sigma (Freshman Honor Society); Omicron Delta Kappa (Senior Honor Society); Mu Alpha Theta (Math Honor Society); National Honor Society; and other honor societies.


## Relevant Courses

**The University of Tennessee, Knoxville:**

| | |
|---|---|
| Recent Visualization Literature | Fall 2008 |
| Recent Visualization Literature | Spring 2008 |
| Recent Visualization Literature | Fall 2007 |
| Microarray Technology and Database Applications | Fall 2007 |
| Journal Club on Modern Genetics | Fall 2007 |
| Interactive Computational Simulation | Fall 2006 |
| Recent Visualization Literature | Fall 2006 |
| Independent Study – Large Data Visualization | Spring 2006 |

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|---|---|
| Machine Learning | Spring 2006 |
| Algorithm Complexity | Spring 2006 |
| Independent Study – Feature Tracking | Fall 2005 |
| Graphical User Interface Design | Fall 2005 |
| Image Analysis | Spring 2005 |
| Operating and Software Systems | Spring 2005 |
| Independent Study – Diffusion Tensor MRI | Fall 2004 |
| Scripts and Utilities | Fall 2004 |
| Computer Systems Organization | Fall 2004 |
| Artificial Intelligence | Fall 2004 |

**Jacksonville State University:**

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|---|---|
| Computer Special Topics - Gesture Recognition | Fall 2003 |
| Modern Analysis | Fall 2003 |
| Computer Special Topics - Contextual Zoom | Spring 2003 |
| Computer Graphics | Spring 2003 |
| Software Architectures and Methodologies | Fall 2002 |
| Software Cost Estimation and Metrics | Spring 2002 |
| Fundamentals of Human-Computer Interaction | Spring 2002 |
| Applied Software Engineering 2 | Spring 2002 |
| Applied Software Engineering | Fall 2001 |
| Applied Artificial Intelligence | Fall 2001 |
| Database & DBMS | Fall 2001 |
| Programming Languages | Spring 2001 |
| Electrodynamics | Spring 2001 |
| Physics Special Topics - General Relativity | Spring 2001 |
| Computer Networking | Fall 2000 |
| Artificial Intelligence | Fall 2000 |
| Survey of Geometries | Fall 2000 |
| Algorithm Design & Analysis | Fall 2000 |
| Introduction to Abstract Algebra | Fall 2000 |
| Modern Physics | Fall 2000 |
| Database and DBMS | Spring 2000 |
| Mathematical Statistics | Spring 2000 |
| Differential Equations | Spring 2000 |
| Astronomy | Spring 2000 |
| Operating Systems | Fall 1999 |
| Mathematical Statistics I | Fall 1999 |
| Numerical Analysis | Fall 1999 |
| Advanced Calculus | Fall 1999 |
| Elements of Linear Algebra | Spring 1999 |
| Data Structures | Spring 1999 |
| Discrete Structures | Spring 1999 |
| Digital Logic and Architecture | Spring 1999 |
| Physics for Scientists and Engineers | Fall 1998 - Spring 1999 |
| Advanced Mathematics and proofs | Spring 1998 |
| Calculus I – IV | Fall 1997 - Fall 1998 |

## Community Service

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|---|---|
| Church audio-visual director | 2005-2021 |
| IEEE VisWeek Conference Student Volunteer Chair | 2008-2010 |
| IEEE Visualization Conference Student Volunteer | 2005-2007 |
| Assistant, Alabama Statewide Mathematics Tournament, Jacksonville State University | 2002 |
| Event Judge, Science Olympiad, Jacksonville State University | 1999 |
| Assistant, Alabama Statewide Mathematics Tournament | 1998 |
| Church technical lead - puppeteer, technical trainer, sound and light conductor | 1990-2003 |

References provided upon request.