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CERTIFICATIONS

US Green Building Council

- Leadership in Energy and Environment Design Accredited Professional (LEED AP)

American Society of Heating, Refrigeration, and Air-Conditioning Engineers

- High-Performance Building Design Professional (ASHRAE HBDP)

PROFESSIONAL SOCIETY ACTIVITIES

American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE)

- Technical Committee 5.5, Air-to-Air Energy Recovery (voting/vice chair) & liaison to SPC 90.1 Standard for Minimum Energy Standard for Buildings
- Developer of and instructor for Professional Development Seminar on Facility and HVAC Terrorism Threat Assessment and Vulnerability Reduction
- GPC10 Committee for Guidance Document on Establishing Adequate Indoor Environmental Committee (voting)
- SSPC-129 Standards Committee for Measuring Air Change Effectiveness (voting)
- BSSPD Committee for Building Safety and Security Position Document (voting)\
- UTC observer to SPC189.1 Minimum Standard for High Performance Green Buildings until a Carrier employee gained voting membership

ADVISORY BOARDS / BOARD OF DIRECTORS

U.S. Green Building Council – Connecticut Chapter

- Member, Board of Directors & CT Representative to USGBC Upper Northeast Regional Council (2008-2011) Represented CT at last USGBC Chapter Leader Retreat, organized first UNERC-wide meeting at UTRC, organized CHP in green schools event

International Building Performance Simulation Association (IBPSA-USA)

- Board of Directors (2009-2011) Organizing SimBuild 2010 conference, developing potential certified energy modeler credential and associated educational material.

Advanced Building Systems Integration Consortium (ABSIC), Center for Building Performance and Diagnostics, Architecture Department, Carnegie Mellon University

- UTC representative/adviser, technology conduit of consortium technology to UTRC and Carrier during prior UTC membership

Center for the Built Environment (University of California, Berkeley)

- UTC representative/adviser, technology conduit of consortium technology to UTRC and Carrier during prior UTC membership

NASA Connecticut Space Grant College Consortium

- Former Industrial Advisory Board member representing UTC, advisor/grant evaluator

EXPERIENCE

United Technologies Research Center - 1976 to Present.

Principal Engineer/Scientist, Physical Sciences, 2002 to Current.

- Responsibilities: Innovation of new products in the green buildings and systems, and environmental control areas. Building vulnerability assessment, energy recovery and indoor air and environmental quality. Distributed generation with waste heat utilization. Humidity control. Project leader and external resource development.

Recent Nonproprietary Examples

- DOE Building America – Used CFD to model airflows obtained with prototype equipment in an existing test home
- South Arsenal Neighborhood Development Corp. – Used energy modeling such as NREL BEOpt and HAP/Trace to assist a local architect with the design of a proposed urban infill net zero energy house for Hartford
- WBCSD/UTC – provided modeling support for a three year study of residential and commercial buildings in six world areas to help understand barriers to returning the building stock to 2002 emission levels by 2050.
- DOD TSWG – PI on program with Penn State to enhance a software tool for government architects for building airflow protection. Third contract in a series.
- Carrier – Wrote DOE proposal for and conducted experimental and modeling program as PI to create and demonstrate an enhanced membrane energy recovery ventilator for small buildings. Resulted in patents. Possible future Carrier product. UTRC outstanding achievement award and patents.
- Carrier/NIST – Co-authored four year \$10M research proposal and conducted program on assisting the architectural charrette process with early design analysis software. Managed subcontractors that developed design alternatives part of Green Building Studio website, computing cluster version of EnergyPlus, and rapid Radiance analysis of LEED lighting points using gbXML building description from CAD. Designed an instrumentation plan for short wireless sensor survey of a customer building and development of design options after diagnosis.
- Carrier -- Team development of new technology for humidity control. Modeled physics of components, use in various building types and climates, economic paybacks for users and directed experiments on prototypes. Current DOD and DOE proposals for maturation and field test. Patents pending.
- Otis – Assisted the remediation of a customer 55 story building by modeling airflows throughout a customer building after a lobby door incident. UTRC outstanding achievement award. Patent pending.

Senior Consulting Scientist, Chemical Sciences 1993-2001.

- Technology consulting and application, particularly in the environmental restoration and control areas. Project leader and external resource development. Through modeling and technology development saved millions of dollars per year in site remediation costs.

Manager, Laser Diagnostics. 1996-1993.

- Group leader for research group of about 12 Ph.D's and technicians performing fundamental experimental and theoretical programs in the field of advanced laser diagnostics for applications to propulsion science and combustion and emissions.

Senior Research Scientist. 1982-1986.

- Projects involved CARS studies of soot formation and flame structure, optical diagnostics for diesel engine applications, rapid two-dimensional imaging of gas flows. Increased responsibilities for research program formulation and proposal preparation.

Research Scientist, 1979-1981.

- Projects involved new chemical laser systems and chemical pump technology, laser diagnostic analyses of sooting flames using CARS and Mie scattering, data acquisition and analysis of temperature in jet engine exhaust, laboratory automation.

Associate Research Scientist, 1976-1979.

- Projects involved developing diagnostics for chemical lasers and optimization of chemical laser performance.

Hartford Graduate Center, Rensselaer Polytechnic Institute - 1979 to 1987.

Adjunct Lecturer in Computer and Information Science Master's Degree Program.

- Teach courses on computer engineering, systems programming, assembly language programming, and real-time programming.

Massachusetts Institute of Technology - 1974-1976.

Postdoctoral Research Associate, Department of Chemistry.

- Performed research on time-resolved infrared-microwave double-resonance spectroscopy and molecular energy transfer in gases with Professor Jeffrey I. Steinfeld.

E. I. DuPont de Nemours and Company, Inc. – 1969.

Resident Research Fellow, Central Research Department, Experimental Station.

- Performed projects on electronic spectroscopy and energy transfer in organic solids.

Kiewit Computation Center, Dartmouth College - 1966-1969

Systems Programmer.

- Member of team that invented BASIC and wrote the operating system and higher-level language compilers for the first educational time-sharing system under the direction of Profs. John Kemeny and Thomas Kurtz.

EDUCATION

Dartmouth College - A.B. in Chemistry - 1969 - (summa cum laude)

Princeton University - M.A. in Physical Chemistry - 1971

Princeton University - Ph.D. in Physical Chemistry - 1975

RECENT PUBLICATIONS, REPORTS & PRESENTATIONS

Economics of Energy Recovery in a Hot and Humid Climate, Seminar 34, ASHRAE Winter Meeting, Orlando, FL, January 25, 2010.

Economics of Energy Recovery in a Hot and Humid Climate, Seminar 34, ASHRAE Winter Meeting, Orlando, FL, January 25, 2010.

IAQ, Ventilation and Energy Tradeoffs in Building Retrofits, Seminar11, ASHRAE Annual Meeting, Louisville, KY, June 21, 2009.

Energy Optimal Green Building Controls: R&D, Seminar 58, ASHRAE Annual Meeting, Louisville, KY, June 24, 2009.

Bracketing Residential Net-Zeroneess during Design Stage. SimBuild 2008, University of Calif., Berkeley, CA, July 30-Aug. 1, 2008. (co-author)

A Scalable Lighting Simulation Tool for Integrated Building Design. SimBuild 2008, University of Calif., Berkeley, CA, July 30-Aug. 1, 2008. (co-author)

Enriching a Building Information Model to Support Building Control Design—A Case Study.. SimBuild 2008, University of Calif., Berkeley, CA, July 30-Aug. 1, 2008. (Co-author)

Development of a Lighting Simulation Tool for Integrated Building Design. The First International Conference on Building Energy and Environment (COBEE 2008), Dalian, China, July. 13-16, 2008. (Co-author)

An Integrated Modeling Tool for Simultaneous Analysis of Thermal Performance and Indoor Air Quality in Buildings. Building and Environment, Vol. 43 [3] 287-293 (2008). (co-author)

A New Approach on Zonal Modeling of Indoor Environment with Mechanical Ventilation. Building and Environment, Vol. 43 [3] 278-286 (2008). (Co-author)

Saving Energy when Ventilating at Rates Higher than ASHRAE 62.2 Minimum Rates in Green Buildidngs Using Energy Recovery Ventilation, IAQ 2007 Healthy and Sustainable Buildings Conference, Baltimore, MD, Oct.. 15-17, 2007. (co-author)

Systems Studies of Ventilation Configurations Involving Air Purification and Energy Recovery - - Energy Efficiency and Indoor Air Quality Characteristcs, 5th International Symposium on Heating, Ventilation and Air Conditioning (ISHVAC 2007), Tsinghua University, Beijing September 7~8, 2007. (co-author)

A Comparative Study of the IFC and gbXML Informational Infrastructures for Data Exchange in Computational Design Support Environments, 10th International. Building Performance Simulation Association. Conference. Building Simulation 2007, Tsinghua University, Beijing, China, September 3-6, 2007. (co-author).

Ventilation Strategies for Low Energy Buildings Involving Air Purification and Energy Recovery - Climate, Energy, Comfort and Indoor Air Quality Aspects, CLIMA2007: Well Being Indoors, Helsinki, Finland, June 10-14, 2007. (Co-author)

Special Situations in Energy Recovery Ventilation, ASHRAE 2007 Winter Meeting, Dallas, TX, January 27-31, 2007.

Cost-Effective IEQ through Integrated Building System Design, Sixth Annual Syracuse Symposium on Environmental and Energy Systems: Innovative Built Environments, Syracuse University, Syracuse, NY, October 30-31, 2006. (Co-author)

Cost-Effective IEQ through Integrated Building System Design, Indoor Environmental Quality: Problems, Research, and Solutions, A&WMA/EPA Conference, Durham, NC, Jul 17-19, 2006. (Co-author)

Energy Benefits and Improved IEQ with an Enhanced Energy Recovery Ventilator, Indoor Environmental Quality: Problems, Research, and Solutions, A&WMA/EPA Conference, Durham, NC, Jul 17-19, 2006. (Co-author)

Development of a High Latent Effectiveness Energy Recovery Ventilator with Integration into Rooftop Package Equipment, Final Report, DOE Cooperative Agreement DE-FC26-01NT41254, UTRC Report R2006-6.400.0005-F-FR01, March, 2006. (Co-author)

Facility Protection from Natural and Intentional Events, ASHRAE 2006 Winter Meeting, Chicago, IL, January 21-25, 2006.

Simulation of the effect of an energy recovery ventilator on indoor thermal condition and system performance, Proceedings of the Ninth International Building Performance Simulation Association Conference, Montreal, CA, August 15-18, 2005. (Co-author)

Recent Advancements in High Latent Recovery Effectiveness Membrane Flat Plate Heat Exchangers for Air-to-Air Energy Recovery from Ventilation Air, Seminar 44, ASHRAE Annual Meeting, Denver, CO, June 29, 2005.

IEQ and energy benefits with an Enhanced Energy Recovery Ventilator, 2004 Syracuse Symposium on Environmental and Energy Systems, October 25-26, 2004. (Co-author)

PATENTS

Method for energy recovery ventilator reliability improvement and life extension (pending)

Flat plate heat exchanger with asymmetric interplate gap or spacer design (pending)

Method for seasonal adjustment of energy recovery ventilator performance (pending)

Thermoelectric Device Based Refrigerant Subcooling (pending)

Energy efficient HVAC system with low pressure drop, regenerable gas filtration (pending)

20080086954, Minimizing the stack effect in tall buildings having vertical shafts (pending)

US7399331, Gas contaminant removal with low pressure drop

US7152670, Plate-type heat exchanger

US6684943, Plate-type heat exchanger

US6474908, Chemical oxidation of volatile organic compounds

US6387276, Immobilization of inorganic arsenic species using iron

US6233824, Cylindrical heat exchanger

US6132623, Immobilization of inorganic arsenic species using iron

US6019548, Chemical oxidation of volatile organic compounds

US4517676, Multi-species, CW combustion driven laser employing hydrogen bromide