

BING DONG

Senior Research Scientist
System, Dynamics and Optimization Group
United Technology Research Center, East Hartford, CT.
412-708-5445 (V), bdong@andrew.cmu.edu
Website: www.andrew.cmu.edu/~bdong

EDUCATION

Carnegie Mellon University, Pittsburgh, PA, U.S.A.
Ph.D. in Building Performance and Diagnostics (2005 - 2010)
PhD Thesis: Integrated Building Heating, Cooling and Ventilation Control

National University of Singapore, Singapore
M.S. in Building Science (2003 - 2005)
Master Thesis: Baseline Models Development for Whole Building Energy Consumption In Tropical Region

Nanjing University of Technology, Nanjing, P. R. China
B.E. in Electrical and Mechanical Engineering (1998 - 2002)
Thesis: Electrical and Mechanical Design for a Sustainable Neighborhood in Nanjing, P.R.China.

GRANTS

Regional Energy Innovation Hub, **Proposal Writing** \$122m
With PI, Prof. Khee Poh Lam
DOE, 2010

ERFI SEED, **Proposal Writing**
With CO-PI, Prof. Steve Lee and Khee Poh Lam \$2m
"BUILD- Barriers, Understanding, Integration-Life Cycle Development", NSF, 2010

Sustainable Urban Environment Performance \$2,000
Studies. **PI**
School of Architecture. CMU, 2010

AWARDS	Akram Midani Award	2009
SCHOLARSHIPS	<i>School of Architecture, Carnegie Mellon University</i>	
	Ford Motor Graduate Student Research Award, <i>Carnegie Mellon University</i>	2009
	Graduate Fellowship <i>School of Architecture, Carnegie Mellon University</i>	2005 – present
	Graduate Research Scholarship <i>National University of Singapore</i>	2003 – 2005
	Best Thesis of the Year <i>Nanjing University of Technology, P. R. China</i>	2002
	University Scholarships (Top 1%) for all Years, <i>Nanjing University of Technology, P.R.China</i>	1998 – 2002

**RESEARCH
PROJECTS**

Carnegie Mellon University

Energy and Sustainable Performance Modeling and Analysis for Tianjin Eco-City Residential Development, funded by Energy Foundation, U.S.A.

(September 2009-Present)

- Conduct building energy performance and control modeling (EnergyPlus) for residential houses based on mix-mode ventilation
- Make recommendations for sustainable, code compliance and energy efficient building enclosures and HVAC systems

Building Energy and Comfort Management through Sensor-based Occupancy Behavioral Pattern Recognition within a Solar House test-bed, funded by FORD Motor Company and Carnegie Mellon University, U.S.A.

(January 2009-Present)

- Setup real-time whole house power metering, wireless sensor network for occupancy behavioral monitoring and

indoor environmental monitoring

- Conduct building system simulation and performance verification with PV, solar thermal, radiant heating floor, air heat pump and energy recovery ventilation systems
- Design and implement an integrated control for whole house energy optimization
- Smart grid interaction based on the prediction of solar radiation and PV generation

Energy and Sustainable Performance Modeling and Analysis for a Research Laboratory Building, funded by Koo Foundation, Taiwan

(January 2009-Present)

- Conduct building energy performance and control modeling (EnergyPlus) for Dr. Sun Yat-Sun Cancer Center (28,000 m²) with active and passive chilled beam, underfloor air distribution and energy recovery ventilation system
- Make recommendations for sustainable, code compliance and energy efficient building enclosures and HVAC systems

Building Codes and Standards Website Development, funded by Ministry of Construction, P.R. China

(August 2008-Present)

- Design a bilingual website for *Green Building Evaluation Code of China*
- Design a search engine enabling building and construction code cross referencing

ITEST: Information Technology Enabled Sustainability Test-bed, funded by BOSCH Research and Technology Center, Pittsburgh, U.S.A.

(January 2007 – June 2008)

- Apply machine learning technologies to conduct occupancy detection
- Set up web services and database for sensor data

acquisition

- 3D visualization and user-interaction of sensor network and real-time sensor information

IBECS: Integrated Concurrent Design of High Efficiency Commercial Buildings, funded by NIST/ATP, U.S.A.

(Carnegie Mellon University collaborating with United Technology Research Center, May 2005 – December 2007)

- Study data structures of gbXML and IFC for possible BIM implementation among different simulation tools
- Conduct energy simulations (EnergyPlus) for restaurants and research laboratory buildings
- Design a GUI of automatic code generation for lighting (Radiance) and control (Dymola) simulations

National University of Singapore

Development of a business model for building energy performance services in the ASEAN region, funded by Europe Commission

(February 2005 – August 2005)

- Develop training courses (Building Energy Simulation and Facility Management) and endorsement plan for energy services companies (ESCOs) in Singapore

Baseline Model Development of Commercial Building in Tropical Region, funded by National University of Singapore

(January 2003 – July 2004)

- Conduct energy simulations (EnergyPlus) for 12 commercial buildings in Singapore Central Business District
- Conduct on-site power metering for 12 commercial buildings
- Develop a stochastic model for commercial building energy consumption prediction

**ACADEMIC
APPOINTMENT**

Adjunct Instructor

48721 Building Controls and Diagnostics(Graduate Level, Spring 2010)

Teaching Assistant/Co-Teach

48722 Building performance simulation
(Graduate Level, Fall 2006, 2007, 2008, 2009)

48721 Building controls and diagnostics
(Graduate Level, Spring 2007, 2008, 2009)

Research Assistant

(2005~present)

Center for Building Performance and Diagnostics
School of Architecture, Carnegie Mellon University.

**INDUSTRIAL
EXPERIENCEs**

Senior Research Scientist (*October 2010 ~ present*)

United Technology Research Center, East Hartford, CT

Internship (*May 2009 – August 2009*)

Mitsubishi Electric Research Laboratories, Boston, MA

- Inverse modeling and parameter estimation of building thermal process

Internship (*May 2008 – August 2008*)

Robert BOSCH Research and Technology Center, Pittsburgh, PA

- Sequential pattern recognition for occupancy duration prediction

Assistant Engineer (*April 2002 – January 2003*)

East China Architecture Research and Design Institute (ECADI),
Shanghai, P. R. China

- Design building control and electrical systems
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**LIST OF
PUBLICATIONS**

Referred Journals

1. **Dong, B.**, Andrews, B. Lam, K.P. Höynck, M., Chiou, Y.S. Zhang, R. and Benitez, D. An information technology enabled

sustainability test-bed (ITEST) for occupancy detection through an environmental sensing network. *Journal of Energy and Buildings*. Vol.42 (7), pp.1038-1046. 2010.

2. Jiang X.Q. and **Dong, B.** and Sweeney, L. Temporal Maximum Margin Markov Network. *Lecture Notes in Computer Science*, Vol 6321, pp.587-600. 2010.

3. Abraham Y., **Dong, B.** and Leite, F. An applied artificial intelligence approach towards assessing building performance simulation tools, *Journal of Energy and Buildings*, Vol. 40(4), pp.612-620. 2008.

4. **Dong, B.**, Chen, C. and Lee, S.E. Applying support vector machines to predict building energy consumption in the tropics, *Journal of Energy and Buildings*, Vol 37(5) pp.545-553, 2005. Cited by 28 times (Top 10 citation rate in this journal)

5. **Dong, B.**, Lee, S. E. and Sapar, M.H., A holistic utility bill analysis method for baseline whole commercial building energy consumption in Singapore, *Journal of Energy and Buildings*, Vol. 37 (2), pp.167-172, 2005,

Other Journals

1. **Dong, B.** and Dai, T. Necessary and Feasibility of Intelligent Reconstruction for Built-Quarter ", *City & Building Intelligent System*, Vol.5 No.2, 2002

Peer-reviewed Conferences

1. **Dong, B.** Non-Linear Optimal Controller Design for building HVAC Systems. *IEEE Multi-Conference on Systems and Control*. Yokohama, Japan. September, 2010.

2. Jiang X.Q. and **Dong, B.** and Sweeney, L. Temporal Maximum Margin Markov Network. *Proceedings of ECML-PKDD 2010*. Barcelona, Spain. September, 2010. (Acceptance rate 16%)

3. **Dong, B.**, Y.B. Yu and Y. Hu, Simulation-based Hybrid Ventilation System Design and Evaluation. *Proceedings of 1st International High Performance Building Conference*, Purdue University, July, 2010.
4. Jiang X.Q. and **Dong, B.** Adaptive Gaussian Process for Short-Term Wind Speed. *Forecasting Proceedings of 19th European Conference on Artificial Intelligence - ECAI 2010*. Lisbon, Portugal, September, 2010. (Acceptance rate 20%)
5. **Dong, B.**, Yue B.Y. and Karaguzel. O. 2009. Application of system identification and numerical optimization to a floor radiant heating control in a Solar House. *CLIMA 2010*. Antalya, Turkey.
6. **Dong, B.** and Andrew, B. 2009. Sensor-based Occupancy Behavioral Pattern Recognition for Energy and Comfort Management in Intelligent Buildings. *Proceedings of Building Simulation '2009*, an IBPSA Conference, Glasgow.
7. Lam, K.P., Höynck, M. **Dong, B.**, Andrews, B. Chiou, Y.S. Zhang, R. and Benitez, D. 2009. Occupancy Detection through An Extensive Environmental Sensor Network in an Open-plan Office Building. *Proceedings of Building Simulation '2009*, an IBPSA Conference, Glasgow.
8. Lam, K.P., Höynck, M., Zhang, R., Andrews, B., Chiou, Y.S., **Dong, B.** and Benitez, D. 2009. Information-theoretic Environmental Features Selection for Occupancy Detection in Open Offices. *Proceedings of Building Simulation '2009*, an IBPSA Conference, Glasgow.
9. **Dong, B.**, Lam, K.P., Huang, Y.C. and Dobbs, G M. A comparative study of the IFC and gbXML informational infrastructures for data exchange in computational design support environments. *Proceedings of Building Simulation '2007*, an IBPSA Conference, Beijing, 2007.

10. **Dong, B.**, Lee, S.E. and Sapor, M.H. An overview of utility bills analysis methods for predicting building energy consumption in the tropical region, *World Sustainable Building Conference*, Sept.27-29, 2005, Tokyo, Japan.

11. **Dong, B.**, Lee, S.E., Sapor, M.H. and Sun, H.S. Applying neural networks to predict building energy consumption in Singapore. *Proceedings of international conference on Control, Automation and Systems*, Aug. 27-29, 2004, Bangkok, Thailand.

12. **Dong, B.** and Lee, S.E. Evaluating utility bill analysis method for baselining whole building energy consumption in Singapore, *Proceedings of International conference on energy efficiency buildings*, April 19-21, 2004, Frankfurt, German

Peer-reviewed Workshop

1. Jiang, X.Q., **Dong, B.** and Sweeney, L. From Sensor Network to Social Network- A Study on the Energy Impact in Buildings, *Analyzing Networks and Learning With Graphs*, organized by Edoardo Airoldi, Jure Leskovec, Jon Kleinberg, Josh Tenenbaum. A workshop in conjunction with the 22nd Annual Conference on Neural Information Processing Systems (NIPS), Whistler, BC, Canada, December 11, 2009.

INVITED TALKS “Integrated Heating, Cooling and Ventilation Control”
United Technology Research Center, 06.2010
East Hartford, CT, U.S.A.

“Occupancy-based Building Energy Management ”
Department of Civil, Architectural and Environmental Engineering,
University of Kansas, Lawrence, KS, U.S.A.

“Sensing in the Solar Decathlon House, Advanced Infrastructure”
System Seminar, Fall 2009, Civil and Environmental Engineering,
Carnegie Mellon University, Pittsburgh, U.S.A.

"Baseline Office Building Energy Consumption in Singapore",
Organized by Building and Construction Authority (BCA),
Singapore. April 7th, 2005, Hotel Le Meridien, Singapore.

PROFESSIONAL ACTIVITIES SimBuild 2008, official reviewer
ASME Energy Sustainability 2009, 2010, official reviewer
Journal of Energy and Buildings, official reviewer, since 2008

PROFESSIONAL MEMBERSHIPS Member, American Society of Heating, Refrigerating and Air-
Conditioning Engineers (ASHRAE), since 2006
Member, International Building Simulation Association
(IBPSA), since 2005
Member, IEEE, since 2005

OTHER AWARDS Best Poster of the Class, 10701 Graduate Machine Learning,
Instructor: Carlos Guestrin, Fall 2007.
Conference Travel Grant, IBPSA 2007, SimBuild 2008.

TECHNICAL SKILLS **Energy Related Software:** EnergyPlus (since 2003), eQUEST,
DOE 2.1e, ECOTECT, DesignBuilder. FLUENT, Lightscape,
Radiance.
Control Related Software: LabView, MATLAB, Dymola.
Programming: Java, Java Swing, Java2D/3D, Xj3D, Java
Servlets, JDBC, JSP, JSF, ASP, SOAP, Struts, CSS, HTML4,
XML, XSLT, C. Modelica.
Other Software: MS Office (PowerPoint, Excel, Word,
FrontPage), Dreamweaver MX, Flash MX, AutoDesk Revit MEP
PhotoShop, SPSS

REFERENCES **Khee Poh Lam**, Ph.D. RIBA
Professor of Architecture
Center for Building Performance and Diagnostics
415 Margaret Morrison Carnegie Hall,

Carnegie Mellon University
Pittsburgh PA 15213
412-268-8503 (v)
kplam@cmu.edu

Stephen R. Lee, AIA
Professor & Head, School of Architecture
Center for Building Performance & Diagnostics
Carnegie Mellon University
CFA201, Pittsburgh, PA 15213
412.268.3528 (v)
412.268.7819 (f)
stevelee@cmu.edu

Professor Burcu Akinci, Ph.D.
Professor of CEE
Department of Civil and Environmental Engineering
Carnegie Mellon University
Pittsburgh PA 15213
412-268-2959 (v)
412-268-7813 (f)
bakinci@cmu.edu