

HONGSHAN GUO

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EDUCATION

Princeton University 2014 - 2019

PhD in Architecture (Architectural Technology and Computational Design)

Master of Arts (Architectural Technology and Sciences)

Research areas: thermal comfort, distributed sensing with IoT, exergy analysis, low exergy system

Columbia University 2012 - 2013

Master of Engineering (Mechanical Engineering)

Research Area: Energy systems engineering with an emphasis thermal systems.

Harbin Institute of Technology 2008 - 2012

Bachelor of Engineering (Architectural Engineering)

Research Area: Architectural Engineering and Heat Distribution Engineering

PROJECTS

Occupant Comfort Monitoring Sensor Development 2019 -

Post-Doctoral Research Associate, Andlinger Center for Energy and the Environment Princeton, NJ

- Design and fabricated real-time occupant comfort monitoring 3D prototype

Spherical Motion Average Radiant Temperature Sensor Development 2017

Research Associate, Industrial Institute of Research, Tokyo University Tokyo, Japan

- Prototyped a radiant surface temperature sensor with range-finding capabilities

Campus as a Lab Sensing Project Lead 2015-2017

Research Associate, School of Architecture, Princeton University Princeton, NJ

- Design and fabricated WiFi-enabled iAQ (air temperature, relative humidity, etc.) sensing prototypes with arduino and Particle Photons
- Built and maintained InfluxDB database for data storage & querying that hosts 30GB of data with Grafana visualisation in Python

Outdoor Radiant Environment Sensing 2015 - 2017

Research Associate, School of Architecture, Princeton University Princeton, NJ

- Designed outdoor radiant thermal comfort sensing prototype in AutoCAD
- Used statistical methods to process NOAA weather data for weather projection in R
- Analysed the effect of conditioning on resulting indoor relative humidity across the United States with pandas (**Python**) and GIS (esri, ArcMap)

Geothermal energy from deep borehole heat exchangers 2016 - 2018

Research Associate, School of Architecture, Princeton University Princeton, NJ

- Conducted term-by-term optimisation of CBHE for better heat extraction analytically in Python
- Used statistical methods to process NOAA weather data for weather projection in R

- Analysed the effect of conditioning on resulting indoor relative humidity across the United States with ESRI GIS Suite

Thermoheliadome, Sensing and Construction

2014 - 2015

Student Researcher, School of Architecture, Princeton University

Princeton, NJ

- Designed and built a plumbing system for a radiant cooling pavilion
- Programmed robotic arms to pick up styrofoam block for precision cutting in Grasshopper
- Collected and analysed data collected from radiant sensor against FLIR imagery in Python and Matlab

Post-Occupancy Evaluation Studies

2013 - 2014

Student Researcher, School of Architecture, Carnegie Mellon University

Pittsburgh, PA

- Analysed occupant responses from excel surveys and sensing results from NEAT cart with rule-based and statistical-based NLP in Python and R

TEACHING

Designing Sustainable Systems: Understanding our environment with IoT

2017 - 2018

Adjunct Instructor, School of Architecture, Princeton University

Princeton, NJ

- Prepared and taught IoT-enabled prototyping during mini-lectures (30 minutes each) at office hours
- Overseeing and advising students on creating their individual end-of-course sensing project
- Conducted mid-term and end-of-term reviews on individual projects

Introduction to Thermodynamics in Labs

2015 - 2016

Adjunct Instructor, School of Engineering and Applied Sciences, Princeton University *Princeton, NJ*

- Prepared manuals for hands-on thermodynamics entry-level labs
- Provided crash-course level introduction to Python and javascript object-oriented programming
- Provide theoretical and technical support for both coding and thermodynamics-related questions

JOURNAL PUBLICATIONS

Hongshan Guo, Maria Ferrara, Mauricio Loyola, James Coleman, Forrest Meggers. *Simulation and measurement of air temperatures and mean radiant temperatures in a radiantly heated indoor space.* Energy, Accepted Proof, October 15th. 2019
<https://doi.org/10.1016/j.energy.2019.116369>

Hongshan Guo, Dorit Aviv, Mauricio Loyola, Eric Teitelbaum, Nicholas Houchois, Forrest Meggers. *On the understanding of the mean radiant temperature within both the indoor and outdoor environment, a critical review.* Renewable and Sustainable Energy Reviews, Corrected Proof, October 22nd. 2019
<https://doi.org/10.1016/j.rser.2019.06.014>

Hongshan Guo, Yongqiang Luo, Forrest Meggers, Marco Simonetti, *Human body exergy consumption evaluation methods evaluation and their sensitivities towards different environmental conditions,* Energy, Vol. 183, September 15th, Pages 1075-1088. 2019
<https://doi.org/10.1016/j.energy.2019.05.045>

Hongshan Guo, Eric Teitelbaum, Nicholas Houschois, Michael Bozlar, Forrest Meggers. *Revisiting the use of globe thermometers to estimate radiant temperature in studies of heating and ventilation.* Energy and Buildings, Vol. 180, Pages 83-94. 2018

<https://doi.org/10.1016/j.enbuild.2018.08.029>

Forrest Meggers, Hongshan Guo, Eric Teitelbaum, Gideon Aschwanden, Jake Read, Nicholas Houchois, Jovan Pantelic, and Emanuele Calabrò. “*The Thermoheliodome - Air Conditioning’ without Conditioning the Air, Using Radiant Cooling and Indirect Evaporation.*” *Energy and Buildings*, June. 2017
<https://doi.org/10.1016/j.enbuild.2017.06.033>

Yongqiang Luo, Hongshan Guo, Forrest Meggers, Ling Zhang, *Deep coaxial borehole heat exchanger: Analytical modeling and thermal analysis.* *Energy*, Vol 185, Oct 15th, Pages 1298-1313. 2019
<https://doi.org/10.1016/j.energy.2019.05.228>

Yongqiang Luo, Ling Zhang, Michael Bozlar, Zhongbing Liu, Hongshan Guo, Forrest Meggers, *Active building envelope systems toward renewable and sustainable energy.* *Renewable and sustainable energy reviews*, Vol. 104, Pages 470-491, April 1st. 2019
<https://doi.org/10.1016/j.rser.2019.01.005>

INVITED TALKS

Hongshan Guo, *Is it Time to Make People Instead of Rooms Comfortable?*, Invited presentation at Princeton Research Day, Featured Princeton Research Day (PRD) Talk, May 9th, 2019, Princeton University, Princeton, NJ, United States.

Hongshan Guo, *Existing and ongoing research advances in thermal comfort and radiant sensing*, Invited presentation at PRISM (Princeton Institute for the Science and Technology of Materials) Summer School, May 20th, 2018, Erlangen, Germany.

Hongshan Guo, *Non-contact sensing of thermal comfort, a primer of individual thermal comfort.*, Invited talk at Institute of Industrial Sciences, Tokyo University, Jun 18th, 2017, Tokyo, Japan.

CONFERENCE PUBLICATIONS

Hongshan Guo, Forrest Meggers, Eric Teitelbaum, *Humidifying Without Adding Humidity: Psychrometric Shifts in Humidity from Air Temperature Setbacks Enabled by Radiant Heating or Cooling*, Proceedings of Building Simulation 2019: 16th Conference of IBPSA, September 2-4th, Rome, Italy. 2019

Hongshan Guo, Forrest Meggers, *Charging and Discharging a Coaxial Borehole Heat Exchanger as a battery*, Proceedings of Building Simulation 2019: 16th Conference of IBPSA, September 2-4th, Rome, Italy. 2019

Hongshan Guo, Forrest Meggers, Nicholas Houschois, *Sensing and Mapping to Characterize the Long-Wave and Short-Wave Infrared Urban Environment*, Proceedings of the 10th International Conference on Urban Climate/14th Symposium on the Urban Environment, August 8th, 2018, New York, NY, United States. 2018

Hongshan Guo, Forrest Meggers, *Visualizing the exergy destructed in exergy delivery chain in relation to human thermal comfort with ExFlow*, Proceedings of the 7th International Building Physics Conference, IBPC 2018, June 14-17th, Syracuse, NY, United States. 2018

Hongshan Guo, Eric Teitelbaum, Nicholas Houschois, Jake Read, Forrest Meggers. *Mapping Comfort with the SMART Sensor.* Proceedings of the 15th IBPSA Conference, Building Simulation 2017, August

Hongshan Guo, Forrest Meggers, Min-gun Kim, *Geothermal District Heating Investigation of Retired Oil/Gas Wells as Higher-temperature Renewable Heat Sources*, Proceedings of the World Sustainable Built Environment Conference 2017 Hong Kong, June 5-7th, Hong Kong, China. 2017

Hongshan Guo, Forrest Meggers, *Impact of Control Availability on Perceived Comfort*, Proceedings of the 6th International Building Physics Conference, IBPC 2015, June 14-17th, Torino, Italy. 2015
<https://doi.org/10.1016/j.egypro.2015.11.254>

Emanuele Calabrò, Forrest Meggers, Eric Teitelbaum, Hongshan Guo, Claire Gmachl, Germano Maioli Penello. *Thermoheliodome testing: Evaluation methods for testing directed radiant heat reflection*, Proceedings of the 6th International Building Physics Conference, IBPC 2015, Torino, Italy. 2015

HONORS & AWARDS

Lowry Methodology Award	2018
International Conference on Urban Climate	New York, NY
Maeder Fellowship	2018
Andlinger Center for Energy and the Environment	Princeton, NJ
Princeton E-affiliates Partnership ExxonMobil Best Poster Award	2017
Andlinger Center for Energy and the Environment	Princeton, NJ

TECHNICAL CAPABILITIES

Programming	Python, R, LaTeX, Arduino, Processing, JavaScript, PHP, C++, Github
Softwares	ArcGIS (ESRI), FLUENT(ANSYS), EnergyPlus, TRNSYS, Rhino, Tableau
Other Languages	Chinese, Japanese (Fluent), Korean(Intermediate), German(Limited)