HONGSHAN GUO

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WORK EXPERIENCE

Bank of New York Mellon *Mar. 2020 - Now*
Principal Data Scientist (Time Series Predictive Analytics, Recommender System, NLP Analytics)

- Delivered an end-to-end machine learning product that predicts the upcoming day's liquidity level by the end of today with statistical (Markov Regime Switching) regression model, which achieved a 45% improvement in accuracy compared to status-quo business solution;
- Developed and patented technology that generates conservative yet accurate time series predictions through multiple ensembled regression models, relaxing up to 2.5 billion dollars investment potential per day;
- Mentored students in capstone projects by translating real-world business challenges into research collaborations with MIT, NYU and Carnegie Mellon University;
- Led a team of 8 data scientists to investigate the predictive power of web forum scraping, and used natural language processing techniques in feature engineering:

Princeton University *May. 2019 - Mar. 2020*
Postdoctoral Researcher (Architectural Technology and Scalable Sensing)

- Developed and published fast and light meshing algorithms that converts nodal measurements into visualizable three-dimensional mappings on scalable radiant temperature sensors, as featured on international conference *Building Simulation 2019*;
- Built and published analytical models for coaxial borehole heat exchanger in Cython with scipy & pandas through in-situ geothermal response tests results, as shown in journal *Energy*.
- Prototyped scalable biometric platform using real-time physiological signals collected from sensors for feedback control;
- Designed, built and maintained an end-to-end solution of data collection (Rest API), storage (mongoDB), visualization (Grafana) and analysis platform on a linux server with open-source packages as a research platform;

Carnegie Mellon University *Jul. 2012 - Apr. 2013*
Research Assistant (Building Performance Diagnostics)

- Built and maintained an open-source MySQL database parsing incoming Rest-API air quality and indoor environment sensor feeds that deals with on average 1GB of data daily;

EDUCATION

Princeton University *2014 - 2019*
PhD in Architecture (Architectural Technology and Computational Design)
Master of Arts (Architectural Technology and Sciences)
Columbia University *2012 - 2013*
Master of Engineering (Mechanical Engineering)
Harbin Institute of Technology *2008 - 2012*
Bachelor of Engineering (Architectural Engineering)

PROJECTS

Multi-platform-based ticker-specific media watch dog 2022 - now
Senior Data Scientist, Bank of New York Mellon *New York, NY*

· Defined research scope and spearheaded the effort in securing internal funding for the investigation
· Redefined risk metric with a combination of technical indicators, fear/greed index and macroecnomic indicators
· Leading a team of data scientists in creating scalable solution which accurately captures the sentiments off various forms of media (news, social media, developer forums) agnostic to particular tickers
· Mentoring master students working in parallel in resolving the model-specific challenges on training individual/ensemble/specific NLP models for each corpus outlet

Individual sentiment capturing alongside actual market behaviour 2020 - now
Senior Data Scientist/Data Science Manager, Bank of New York Mellon *New York, NY*

- Led the investigation of performance analytics through individual sentiments towards topics
- Identify individual behavioural changes in conjunction with market behavioural changes for connections
- Investigated the phenomenon of retail investors' surging interests as demonstrated through various social media outlets

Conservative time series forecasting 2020 - now
Senior Data Scientist, Bank of New York Mellon *New York, NY*

- Led investigation of generating conservative yet accurate time series prediction based on real-time data
- Proposed novel approach (patent pending) that generates predictions that is biased yet accurate according to business stakeholder demands
- Proposed framework allows adaptation of traditional machine learning and deep learning algorithms to be combined when generating outputs and is extended to other use cases

Occupant Comfort Monitoring Sensor Development 2019 - 2020
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

Thermoheliodome, 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 statisical-based NLP in Python and R

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-ffiliates Partnership ExxonMobil Best Poster Award *2017*
Andlinger Center for Energy and the Environment *Princeton, NJ*

INVITED TALKS

Hongshan Guo, *Bridging real-world problems through ethical AI/ML, a case study in finance*, Invited presentation, Community Bourough of Manhattan Community College, May 17th, 2022, BMCC, New York, NY, United States.

Hongshan Guo, *AI in Architecture Finance, working with AI/ML and crossing domains*, Invited presentation, Fordham University, Apr 26th, 2021, Fordham University, New York, NY, United States.

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.

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 theorertical and techncial support for both coding and thermodynamics-related questions

JOURNAL PUBLICATIONS

Hongshan Guo, Maria Ferrara, James Coleman, Mauricio Loyola, Forrest Meggers,*Simulation and measurement of air temperatures and mean radiant temperatures in a radiantly heated indoor space,* Energy, Volume 193, 2020, 116369, ISSN 0360-5442, https://doi.org/10.1016/j.energy.2019.116369. *2020*

Hongshan Guo, Maria Ferarra, 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

Eric Teitelbaum, Kian Wee Chen, Forrest Meggers, Hongshan Guo, Nicholas Houchois, Jovan Pantelic Adam Rysanek, *Globe thermometer free convection error potentials.* Scientific Reports, 10, 2652. https://doi.org/10.1038/s41598-020-59441-1. *2020*

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

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 7 - 9th, San Francisco, United States. *2017*

Hongshan Guo, Forrest Meggers, Min-gun Kim, *Geothermal District Heating Investigation of Retired Oil/Gas Wells as Higher-temperature Renewable Heat Sources*, Proceedings of theWorld 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*

SKILLS

Programming	**Python**,**R**, **SQL**, C++, JavaScript, PHP
Platforms	H2O, AWS, GCP, Tableau, Rhino, Big Data (Spark, Hadoop), Adobe Photoshop/InDesign
Miscellaneous	Languages: Chinese, Japanese, Korean, German