YOUNGSIK CHOI

Texas A&M University, College Station, TX, USA
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*Dedicated to **advancing energy efficiency and resilience in the built environment and promoting occupants' well-being** through rigorous modeling, simulation, and intelligent control. Aiming to **bridge the gap between research, practice, and policy** through collaborative efforts to develop scalable and impactful methods that promote **sustainable and resilient built environments and smart cities**.*

EDUCATION

Texas A&M University **College Station, TX**
Ph.D. Candidate in Mechanical Engineering May 2026 (Expected)
Dissertation: *Optimizing Dedicated Outdoor Air Systems and Exploring Synergies with Heat Pumps for Energy-Efficient Buildings*
Advisor: Prof. Zheng O'Neill, PhD, PE, FASHRAE, FIBPSA
Committee Members: Prof. David Claridge, PhD; Prof. Michael Pate, PhD; Prof. Charles Culp, PhD
GPA: 3.84/4.0
Key Courses: Energy Management in Commercial Buildings, Multidisciplinary System Analysis and Design Optimization, Thermodynamics, Statistical Analysis

Seoul National University **Seoul, South Korea**
M.S. in Architectural Engineering (Mechanical Option) Feb. 2022
Thesis: *Stochastic Setpoint Temperature Learning for Occupant Behavior-based Control*
Advisor: Prof. Cheol-Soo Park, PhD, FIBPSA
Committee Members: Prof. Myoung-Souk Yeo, PhD; Sun Sook Kim, PhD
GPA: 3.97/4.3
Key Courses: Building Thermal & Energy Analysis, Building Mechanical System Design, Linear and Nonlinear Optimization, Machine Learning, Data Science

Seoul National University **Seoul, South Korea**
B.S. in Architectural Engineering (Mechanical Option) Feb. 2020
Graduated with honors *Cum Laude*
GPA: 3.88/4.3
Key Courses: Thermal Energy Fundamentals & Fluid System in Buildings, Electrical & Lighting Theory, Construction Engineering, Construction Materials, Structural Systems (Steel, Reinforced Concrete), Computing in Architectural Engineering, Internet of Things (IoT), Artificial Intelligence (AI)

Peking University **Beijing, China**
Undergraduate Exchange Student Jul. 2016

FIELDS OF INTEREST

- Building energy efficiency, resilience, and decarbonization
- Building energy modeling and simulation for energy performance analysis
- Smart and connected communities and cities

- Intelligent HVAC control strategies for improved energy efficiency and occupant comfort
- Application of data-driven methods, including machine learning, to optimize building design and control

RESEARCH EXPERIENCE

Graduate Research Assistant May 2022 – Present
Building Energy and HVAC&R Research Group, Texas A&M University
Advisor: Dr. Zheng O'Neill

- Smart Meter Data Analysis Jun. 2024 – Present

  - Assisted in analyzing **real-world smart meter electricity data** from over 1.93 million residential buildings in Harris County, Texas, with a focus on demand flexibility and building energy resilience. **[J2]**
  - Investigating methods for developing representative simulation models using NREL's *ResStock* to replicate smart meter data and enable resilience studies, including scenarios involving photovoltaic (PV) systems and thermal energy storage.

- High-performance Whole Building Design 3D-printed Carbon–Absorbing Funicular Structures

  Funded by ARPA-E *HESTIA* Program: Lead Graduate Researcher Jan. 2023 – Jun. 2025

  - Developed *EnergyPlus* models for **radiant systems coupled** with **ground-source heat pumps**, modeled using *GLHEPro*, in buildings with carbon-absorbing funicular structures.
  - Demonstrated the effectiveness of **mixed-mode ventilation** by integrating natural ventilation with a dedicated outdoor air system. **[W5]**
  - Conducted **long-term** analyses of **operational energy use and carbon emissions** using future weather files (*fTMY*) and carbon emission factors from the NREL *Cambium* dataset. **[W3]**
  - Participated in and showcased research at the *2024 ARPA-E Energy Innovation Summit*.

- Optimizing Supply Air Temperature Control for Dedicated Outdoor Air Systems

  Funded by ASHRAE RP-1865: Lead Graduate Researcher May 2022 – Mar. 2025

  - Developed *EnergyPlus* models for **Dedicated Outdoor Air System (DOAS)** coupled in parallel with heat pumps, fan coil units, and chilled beams. **[C5]**
  - Performed **large-scale optimizations** using *genetic algorithms* on the Texas A&M **High Performance Research Computing** (HPRC) system. **[J3, C2-3]**
  - Designed *machine learning*-based **optimization-informed supply air temperature reset strategy** for DOAS configurations to support updates to ASHRAE Guideline 36. **[J4, C1, W2]**
  - Presented project progress at six ASHRAE meetings.
  - **Collaborate with industry partners** to integrate practical insights into research.

- Proposal Development

  - *Impact of Residential Mid-Efficiency Inverter AC/HPs on Texas Electric Grid* funded by Daikin
    - Participated in drafting. **(In preparation)**
  - *Low-Cost, Durable, and Resistant Radiative Cooling Roof for Enhanced Energy Efficiency of Low- and Medium-Income Houses* funded by DOE
    - Performed energy simulations to assess cooling roof applications in residential buildings.

ORISE Graduate Intern Jun. 2025 – Aug. 2025
Oak Ridge National Laboratory
Mentors: Drs. Piljae Im and Yeobeom Yoon

- Development and Calibration of Building Energy Models

  - Developed a **building energy model** for a city-owned commercial building using architectural and mechanical drawings. Created building geometry in *SketchUp* with the *Euclid* plug-in and implemented HVAC systems in EnergyPlus. Conducted the **model calibration** using measured hourly electricity and gas consumption data. **[W6]**

- Fault Detection and Diagnosis of Refrigerant Charge Faults in Residential HVAC Systems

  - Contributed to the development of **Automated Fault Detection and Diagnosis (AFDD)** models using data from a real-world testbed.
  - Conducted a literature review on AFDD in residential buildings. **[W7]**

PhD Intern Jul. 2023 – Aug. 2023
Pacific Northwest National Laboratory
Mentors: Drs. Yan Chen and Xuechen (Jerry) Lei

- Conducted a literature review on construction weights and bottom-up building energy modeling methodologies as part of the **Construction Weight Analysis** project.

Graduate Research Assistant Jan. 2020 – Present
Building Simulation Lab, Seoul National University
Advisor: Dr. Cheol-Soo Park

- Development of Real-time Diagnosis Technology of Home Energy Usage and Smart & Autonomous Control/Management System

  Funded by Korean Energy Technology Evaluation and Planning (KETEP) Jan. 2020 – Feb. 2022

  - Assisted in developing *EnergyPlus* models and conducting **sensitivity analysis** to identify critical input parameters before sensor installation. **[C13-15]**
  - Performed *Relux*-based **artificial lighting simulations** to size and determine appropriate dimmable lighting for target residential apartments.
  - **Installed Internet of Things (IoT) sensors** and collected data on indoor environmental conditions, occupant behavior, and energy use in existing residential buildings. Assisted in **querying** real-time data using Python.

- Development of Building Energy Management System (BEMS) Energy Saving Algorithms

  Funded by Hyundai Development Company (HDC) I-Controls Jun. 2020 – Feb. 2021

  - Developed a *machine learning-based* **electricity peak prediction** model using real-world data for a **Building Energy Management System (BEMS)** in a high-rise office building.
  - Explored the potential of virtual-to-real *transfer learning* for indoor air temperature prediction by leveraging *EnergyPlus* simulation outputs as the source model and adapting it with real-world data. **[C11]**

TEACHING EXPERIENCE

Academy for Future Faculty, Texas A&M University Fall 2025
Mentor: Dr. Sungmin Lee

- Participating in a university-level professional development program aimed at equipping graduate students and postdoctoral scholars with teaching skills.

Design Project Mentor, Texas A&M University Fall 2023

- MEEN 489: ASHRAE 2024 Design Competition

- Provided mentorship and technical guidance to an undergraduate Capstone team competing in the *ASHRAE 2024 Design Competition*. Supported team in building energy modeling using *SketchUp* and *EnergyPlus*.

Graduate Teaching Assistant, Seoul National University Fall 2020

- Creative Engineering Design

- Supported instruction in the course covering the IoT technologies and their integration from an architectural standpoint, including *Arduino* and environmental sensors.
- Assisted students with Arduino coding and sensor implementation, providing hands-on guidance during labs and project work. Helped the instructor with grading.

Peer Tutor, Seoul National University *via Work-Study Scholarship* Fall 2019

- Selected based on academic performance to provide tutoring support to fellow undergraduate students. Offered one-on-one academic assistance in major courses, including *Fluid Systems in Buildings* and *Design and Construction of Steel Structures.*

PEER-REVIEWED JOURNAL PAPERS

[J1] **Choi, Y.**, Lu, X., and O'Neill, Z. Adopting Ground Source Heat Pumps in Commercial Buildings: Nationwide Analysis of Energy-saving and Decarbonization Potentials. *Energy Conversion and Management* **(Accepted for publication.)**

[J2] Guo, M., **Choi, Y**., Cheong, S. M., and O'Neill, Z. (2025). Current and Future Residential Electricity Demand Using Large-Scale Smart Meter Data in a Changing Climate. *Sustainable Cities and Society*, 106623.

[J3] **Choi, Y.**, Lu, X., Feng, F., and O'Neill, Z. (2024). Large-scale energy cost optimization and performance analysis for dedicated outdoor air system: simulation results from ASHRAE RP-1865. *Science and Technology for the Built Environment, 30(10)*, 1217-1235.

[J4] **Choi, Y.**, Lu, X., O'Neill, Z., Feng, F., and Yang, T. (2023). Optimization-informed rule extraction for HVAC system: A case study of dedicated outdoor air system control in a mixed-humid climate zone. *Energy and Buildings*, 113295.

CONFERENCE PAPERS

[C1] **Choi, Y.**, O'Neill, Z., and Zhou, X. (2025), Optimization-informed Dedicated Outdoor Air System Supply Air Temperature Reset Strategy, In Proceedings of *2025 ASHRAE Annual Conference*.

[C2] **Choi, Y.**, Lu, X., Feng, F., and O'Neill, Z. (2024), Energy Saving Potential Analysis for Primary Schools with Optimal Dedicated Outdoor Air System Control in Different Climate Zones. In Proceedings of *2024 ASHRAE Winter Conference*.

[C3] **Choi, Y.**, Lu, X., O'Neill, Z., and Feng, F. (2023), Optimal Supply Air Temperature Control for Dedicated Outdoor Air System Under Varying Climate Zones. In Proceedings of *Building Simulation Conference 2023*.

[C4] **Choi, Y.**, O'Neill, Z., and Yang, S. (2023), Potentials of Direct Air Capture (DAC) of CO_2 in a Dedicated Outside Air System (DOAS). In Proceedings of *2023 ASHRAE Annual Conference*.

[C5] **Choi, Y.**, Lu, X., O'Neill, Z., and Pang, Z. (2023), Modeling and Simulation of Dedicated Outdoor Air System (DOAS) with a Passive Desiccant Wheel: A Case Study using EnergyPlus. In Proceedings of *2023 ASHRAE Annual Conference*.

[C6] **Choi, Y.**, Shin, H.S., Cho, S., Ko, Y.D., and Park, C.S. (2020), Predictive Uncertainty of Residential Building Energy Model, In Proceedings of *2020 Winter Simulation Conference*. ***(Best Poster Award)***

[C7] Cho S., Shin. H.S., **Choi, Y.**, Ko, Y.D., and Park, C.S. (2020), Occupant-adaptive indoor environmental controller using DQN, In Proceedings of *2020 Winter Simulation Conference*.

[C8] Cho, S., **Choi, Y.**, Kim, J.H., and Park, C.S. (2022), Integrated control of radiant floor heating system in residential buildings, In Proceedings of *2022 Spring Annual Conference of the Architectural Institute of Korea* [In Korean] ***(Outstanding Paper Award)***

[C9] Cho, S., Kim, J.H., **Choi, Y.**, and Park, C.S. (2022), Uncertainty analysis of cooling energy in residential building, In Proceedings of *2022 Spring Annual Conference of the Architectural Institute of Korea* [In Korean]

[C10] Ko, Y.D., Shin, H., Cho, S., **Choi, Y.**, and Park, C.S. (2021), Identification of occupant behavior patterns from aggregated household energy data using deep learning, In Proceedings of *2021 Winter Conference of the Korean Institute of Communications and Information Sciences* [In Korean]

[C11] **Choi, Y.**, Yi, D.H., Shin, H., Chu, H.G., Yoo, S., and Park, C.S. (2020), Application of transfer learning to a simulation model for room air temperature, In Proceedings of *2020 Autumn Annual Conference of the Architectural Institute of Korea* [In Korean]

[C12] **Choi, Y.**, Shin, H., Ko, Y., Cho, S., and Park, C.S. (2020), Predictive uncertainty of energy simulation model using Deep Ensembles, In Proceedings of *2020 Spring Annual Conference of the Architectural Institute of Korea*, Vol. 40-1, pp. 290-291 [In Korean]

[C13] Ko, Y.D., Shin, H., Cho, S., Choi, Y., and Park, C.S. (2020), Uncertainty in dynamic sensitivity analysis of occupant behavior for cooling energy in residential buildings, In Proceedings of *2020 Spring Annual Conference of the Architectural Institute of Korea* [In Korean]

[C14] Cho S., Shin. H.S., Ko, Y.D., **Choi, Y.**, and Park, C.S. (2020), Static vs. dynamic sensitivity analysis of occupant behavior for energy consumption of cooling season in residential buildings, In

Proceedings of *2020 Spring Annual Conference of the Architectural Institute of Korea* [In Korean]

[C15] Shin, H., Ko, Y.D., Cho, S., **Choi, Y.,** and Park, C.S. (2020), Quantifying the relevance of occupant behavior to building energy use, In Proceedings of *2020 Spring Annual Conference of the Architectural Institute of Korea* [In Korean]

TECHNICAL REPORTS

[TR1] O'Neill, Z., Zhou, X., and **Choi, Y.**, ASHRAE Research Project Report 1865-RP: Optimizing Supply Air Temperature Control for Dedicated Outdoor Air System. Submitted to *ASHRAE*

PRESENTATIONS AND TALKS

1. "Model Predictive Control-Informed Rule-Based Strategy for Enhancing Pre-Cooling Operations in Residential Buildings during Heat Waves: Simulation and Field Testing", **Seminar talk** at *2025 ASHRAE Annual Conference*, Phoenix, AZ, USA, Jun. 25, 2025.
2. "Optimization-informed Dedicated Outdoor Air System Supply Air Temperature Reset Strategy", **Oral presentation** at *2025 ASHRAE Annual Conference*, Phoenix, AZ, USA, Jun. 25, 2025.
3. "Modeling and Control of Smart HVAC Systems: Insights from Research on Dedicated Outdoor Air Systems", **Invited talk** at Pukyong National University, Busan, South Korea (Virtual Seminar), Apr. 29, 2025.
4. "Energy Saving Potential Analysis for Primary Schools with Optimal Dedicated Outdoor Air System Control in Different Climate Zones", **Oral presentation** at *2024 ASHRAE Winter Conference*, Chicago, IL, USA, Jan. 21, 2024.
5. "Model predictive control of radiant heating system under varying thermal mass scenarios in a mixed-humid climate zone", **Oral presentation** at *2024 Texas A&M Conference on Energy***,** College Station, TX, USA, Sep. 13, 2024.
6. "Large-scale Energy Performance Analysis for Optimal Control for Dedicated Outdoor Air System", **Poster presentation** at *the 1st International Workshop on Building and Simulation (BAS 2024)***,** Syracuse, NY, USA, May 13, 2024.
7. "A Collage of ASHRAE Research Projects at Building Energy & HVAC Research Group at the Texas A&M University", **Invited talk** at *Austin ASHRAE 2024 Expo*, Norris Conference Center - Austin, Austin, TX, Apr. 4, 2024.
8. "Optimal Supply Air Temperature Control for Dedicated Outdoor Air System Under Varying Climate Zones", **Oral presentation** at *Building Simulation Conference 2023*, Shanghai, China, Sep. 4, 2023.
9. "Modeling and Simulation of Dedicated Outdoor Air System (DOAS) with a Passive Desiccant Wheel: A Case Study using EnergyPlus", **Oral presentation** at *2023 ASHRAE Annual Conference*, Tampa, FL, USA, Jun. 25, 2023.
10. "Potentials of Direct Air Capture (DAC) of CO_2 in a Dedicated Outside Air System (DOAS)", **Poster presentation** at *2023 ASHRAE Annual Conference*, Tampa, FL, USA, Jun. 25, 2023.
11. "Predictive Uncertainty of Residential Building Energy Model". **Poster presentation** at *2020 Winter Simulation Conference*, Orlando, FL, USA (Virtual Conference), Dec. 14-18, 2020. ***(Best Poster Award)***

12. "Application of transfer learning to a simulation model for room air temperature", **Oral presentation** at *2020 Autumn Annual Conference of the Architectural Institute of Korea*, Yeosu, South Korea (Virtual Conference), Oct. 26, 2020.

13. "Predictive uncertainty of energy simulation model using Deep Ensembles", **Oral presentation** at *2020 Spring Annual Conference of the Architectural Institute of Korea*, Gyeongju, South Korea (Virtual Conference), Apr. 24, 2020.

AWARDS, GRANTS, AND FELLOWSHIPS

Melbern G. Glasscock '59 Endowed Graduate Fellowship in Mechanical Engineering 2025
J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University; 3,000 USD

Brenda & Jerry Gray '62 Fellowship 2024
J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University; 1,000 USD

ASHRAE Graduate Grant-In-Aid Scholarship 2024
American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE); 10,000 USD

Graduate Student Research and Presentation Travel Award 2023
Graduate and Professional Studies, Texas A&M University; 750 USD

Graduate Student Travel Award FY 2023, 2024, 2025
J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University; totaling 2,250 USD

An AI for IoT Information (AI3) Prize Competition 2023
Phase 1 winner (the only student team); won 10,000 USD as a team.

Emil Buehler Aerodynamic Analog Fellowship 2022
J. Mike Walker '66 Department of Mechanical Engineering, Texas A&M University; 3,000 USD

Outstanding Paper Award 2022
The 2022 Spring Annual Conference of the Architectural Institute of Korea

Poster Session Award Winner (runner-up) 2020
The 2020 Winter Simulation Conference

Certificate of Appreciation 2018
The 2018 Key Resolve R.O.K & U.S. Joint Exercise

Merit-based Scholarships before 2022 (totaling approximately the equivalent of 20,000 USD**)**

- **Academic Eminence Scholarship** funded by Seoul National University (full tuition; Spring 2016, Fall 2018, Spring 2019, Fall 2019, partial tuition; Spring 2015)
- **Organization scholarships** funded by the Education and Research Foundation of Seoul National University (full tuition for 3 semesters; Fall 2020, Spring 2021, Fall 2021), funded by Brain Korea 21 (monthly stipend; Fall 2020), funded by Moon-Ju Scholarship Foundation (full tuition for 1 semester; Fall 2015)
- **Work-Study Scholarship** funded by Seoul National University (monthly stipend; Fall 2014, Spring 2015, Fall 2019)

SERVICE AND LEADERSHIP

Professional Membership

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

  - Student member (2023 – Present)
  - Texas A&M Student Chapter member (2023 – Present)

- Architectural Institute of Korea (AIK)

  - Student member (2020-2021)

Academic Committee

- ASHRAE Technical Committee (TC) activities (2023 – Present)

  - Corresponding member TC 7.6 (Building Energy Performance),
  - Provisional corresponding member TC 7.5 (Smart Building Systems),
  - Provisional corresponding member TC 8.10 (Mechanical and Desiccant Dehumidification Equipment, Heat Pipes and Components)

Manuscript Reviewer

- ASHRAE Handbook Chapter 43 (2025 – Present)
- *ASME Journal of Engineering for Sustainable Buildings and Cities* (2025 – Present)
- *Journal of Building Performance Simulation* (2025 – Present)
- *Journal of Building Engineering* (2025 – Present)

Seoul National University Buddy Assistants

- Team Leader (2015)

  - Led a team of ~20 members to organize social programs for approximately 400 foreign exchange students at Seoul National University, achieving the highest scores in end-of-term program evaluations.

Mentorship

- Peer Counselor (2018)

  - Received training and served as a peer counselor for ~ 50 personnel during mandatory military service at the R.O.K. Naval Mobile Construction Squadron.

- Mentor *via Seoul National University Dream Consultant program* (2014)

  - Developed and conducted a mentoring program targeting high school students from underprivileged communities.

OTHER EXPERIENCE

Hyundai Engineering and Construction **Gimpo, South Korea**

Worksite manager (undergraduate internship) Dec. 2018 – Feb. 2019

Republic of Korea Navy **Changwon, South Korea**
Translator, construction engineer Aug. 2016 – Jul. 2018

Resident Assistant *via Work-Study Scholarship* **Seoul, South Korea**
SNU Gwanak Residence Halls Fall 2014 – Spring 2015

REFERENCES

Available upon request