

# JINYOUNG KO

✉ jinyoung.ko@mail.utoronto.ca 🌐 website: <https://jinyoungko96.github.io>

## EDUCATION

- 
- |   |   |
|---|---|
| <b>University of Toronto</b><br><i>Ph.D. in Civil Engineering - Building Science</i><br>· Advisor: Professor Seungjae Lee   | Toronto, ON, Canada<br>Sept. 2022 - Present   |
| <b>Hanyang University</b><br><i>M.S. in Architectural Engineering - Architectural Environment System</i><br>· Thesis: Power generation performance of novel photovoltaic system integrated with thermoelectric generator and phase change material for building application<br>· Advisor: Professor Jae-Weon Jeong; GPA: 4.40/4.5 | Seoul, South Korea<br>Sept. 2019 - Aug. 2021<br><i>Best Graduate Thesis Award</i>                             |
| <b>Hanyang University</b><br><i>B.S. in Architectural Engineering</i><br>· <i>Summa cum laude</i> , Class rank: 1/44, GPA: 4.20/4.5   | Seoul, South Korea<br>Mar. 2014 - Feb. 2017<br><i>Early Graduation in 6 semesters &amp; Best Thesis Award</i> |

## ACADEMIC EXPERIENCE

- 
- |   |   |
|---|---|
| <b>University of Toronto</b><br>· Research Assistant, at Intelligent and Interactive Buildings (IIB) Laboratory   | Toronto, ON, Canada<br>Sept. 2022 - Present   |
| <b>Hanyang University</b><br>· Researcher, at Building Mechanical and Environmental Systems (BMES) Laboratory<br>· Teaching Assistant, in Building Energy, ARE4031 & Introduction to Building Equipment, ARE2007<br>· Research Assistant, at Building Mechanical and Environmental Systems (BMES) Laboratory<br>· Undergraduate Research Assistant, at Architectural Acoustics Laboratory (AAL) | Seoul, South Korea<br>Oct. 2021 - Dec. 2021<br>Mar. 2020 - Aug. 2021<br>Sept. 2019 - Aug. 2021<br>Apr. 2016 - Jun. 2016 |

## PUBLICATIONS

### Journal Papers

1. **J. Ko**, S.-Y. Cheon, Y.-K. Kang, J.-W. Jeong. "Design of a thermoelectric generator-assisted energy harvesting block considering melting temperature of phase change materials." *Renewable Energy*, Vol. 193, page 89-112. <https://doi.org/10.1016/j.renene.2022.05.023>
2. **J. Ko**, J.-W. Jeong (2021). "Annual performance evaluation of thermoelectric generator-assisted building-integrated photovoltaic system with phase change material." *Renewable and Sustainable Energy Reviews*, Vol. 145, 111085. <https://doi.org/10.1016/j.rser.2021.111085>
3. **J. Ko**, J. Park, J.-W. Jeong (2021). "Energy saving potential of a model-predicted frost prevention method for energy recovery ventilators." *Applied Thermal Engineering*, Vol. 185, 116450. <https://doi.org/10.1016/j.applthermaleng.2020.116450>
4. J.-H. Lee, **J.-Y. Ko**, J.-W. Jeong (2021). "Design of heat pump-driven liquid desiccant air conditioning systems for residential building." *Applied Thermal Engineering*, Vol. 183, 116207. <https://doi.org/10.1016/j.applthermaleng.2020.116207>

### Conference Proceedings in English

1. S.-J. Lee, **J. Ko**, M. Kim, J.-W. Jeong (2021). "Performance enhancement of the liquid desiccant dehumidifier with an ultrasonic atomization." *ISHVAC 2021*.
2. J.-H. Lee, K.-B. Lee, **J. Ko**, J.-W. Jeong (2021). "Bioaerosol inactivation effect of a heat pump-driven liquid desiccant air-conditioning system." *ISHVAC 2021*.
3. **J. Ko**, S.-Y. Cheon, J.-W. Jeong (2021). "Phase-change material design for thermoelectric generator assisted building integrated photovoltaic." *2021 ASHRAE annual conference*.
4. S.-Y. Cheon, H.-J. Cho, **J. Ko**, J.-W. Jeong (2021). "Empirical analysis of dehumidification performance of a hollow fiber membrane dehumidifier." *Heat Pump Conference 2020*.

5. S.-Y. Cheon, H. Lim, H.-W. Dong, **J. Ko**, J.-W. Jeong (2021). "Applicability of vacuum-based membrane dehumidifier in dedicated outdoor air system." *ROOMVENT 2020*.
6. **J. Ko**, H. Lim, J.-H. Lee, J.-W. Jeong (2020). "Development of frost threshold temperature model in energy recovery ventilator regarding indoor and outdoor air conditions." *INDOOR AIR 2020*.

### Conference Proceedings in Korean

1. Y.-K. Kang, M. Kim, **J. Ko**, J.-W. Jeong (2021). "Experimental performance of a phase change material and thermoelectric generator-assisted building-integrated photovoltaic system." Winter Conference of the *Society of Air-Conditioning and Refrigerating Engineers of Korea*.
2. Y.-K. Kang, M. Kim, **J. Ko**, J.-W. Jeong (2021). "Design of a phase change material and thermoelectric generator-assisted building-integrated photovoltaic system." Summer Conference of the *Society of Air-Conditioning and Refrigerating Engineers of Korea*.
3. **J. Ko**, J.-W. Jeong (2021). "Applicability of a thermoelectric heat-pump for pre-heating in winter operation of an energy exchange ventilator." Spring Conference of the *Korea Institute of Ecological Architecture and Environment*.
4. **J. Ko**, S.-Y. Cheon, Y.-K. Kang, J.-W. Jeong (2020). "Generation performance of thermoelectric generator and phase change material assisted building integrated photovoltaic module." Fall Conference of *Korean Institute of Architectural Sustainable Environment and Building Systems*.
5. H.-J. Cho, S.-Y. Cheon, J.-H. Lee, **J. Ko**, L.-H. Lin, J.-W. Jeong (2020). "Experimental study for dehumidification operation of hollow fiber membrane dehumidifier in summer." Winter Conference of the *Society of Air-Conditioning and Refrigerating Engineers of Korea*.
6. Y.-K. Kang, B.-J. Kim, Y.-J. Hwang, **J. Ko**, J.-W. Jeong (2020). "Experiment analysis and system design of PCM assisted thermoelectric radiant cooling panel." Fall Conference of the *Korea Institute of Ecological Architecture and Environment*.
7. **J. Ko**, S.-Y. Cheon, J.-H. Lee, J.-W. Jeong (2020). "Energy savings of a liquid desiccant-assisted dedicated outdoor air system." Summer Conference of the *Society of Air-Conditioning and Refrigerating Engineers of Korea*.
8. J.-H. Lee, H.-Y. Dong, **J. Ko**, S.-J. Lee, J.-W. Jeong (2020). "Energy performance of a heat pump-driven liquid desiccant System in an Apartment Building." Summer Conference of the *Society of Air-Conditioning and Refrigerating Engineers of Korea*.
9. **J. Ko**, J.-W. Jeong (2019). "Development of pre-heat temperature prediction model for condensation prevention regarding effectiveness of energy recovery ventilator." Fall Conference of the *Korea Institute of Ecological Architecture and Environment*.
10. Y.-K. Kang, S. Liu, **J. Ko**, J.-W. Jeong (2019). "Experimental performance analysis of PCM radiant system based on thermoelectric module." Fall Conference of *Korean Institute of Architectural Sustainable Environment and Building Systems*.

## RESEARCH PROJECTS

### Development of Thermoelectric Radiant Cooling/Heating Panels and Envelop Power Generator for High Performance Zero Energy Buildings (KAIA, No.21CTAP-C163749-01)

Researcher; Principal Investigator: Professor Jae-Weon Jeong

Seoul, South Korea  
Apr. 2021 - Dec. 2021

- Developed energy harvesting blocks to produce electricity from waste heat for building envelopes.
  - Modeled 3D-printed energy harvesting blocks based on Fusion 360.
  - Accessed generation performance through experiments based on sol-air temperature profiles.
  - Published Journal paper on *Renewable Energy*.

### Design of Smart Hybrid Envelope Systems for Zero Energy Buildings through Holistic Performance Test and Evaluation Methods and Fields Verifications (KETEP, No.20202020800030)

Research Assistant; Advisor: Professor Jae-Weon Jeong

Seoul, South Korea  
Mar. 2020 - Dec. 2021

- Established novel concept of building-integrated photovoltaic - thermoelectric generator - phase change material (BIPV-TEG-PCM) system to generate additional electricity from longwave radiation (thermal energy) and shortwave radiation.
  - Designed energy simulation with numerical analysis on transient heat transfer through MATLAB.
  - Investigated power generation performance and seasonal characteristics of the proposed system.
  - Published journal paper on *Renewable and Sustainable Energy Reviews*.

**Development of Compact Air Conditioning System based on Energy Efficient Liquid Dehumidification to Improve Air Quality in Apartment Houses (MSS, No.S2782284)**

Research Assistant; Advisor: Professor Jae-Weon Jeong

Seoul, South Korea  
Oct. 2019 - Aug. 2021

- Performed building energy simulations on heat pump-driven liquid desiccant (HPLD) HVAC systems.
  - Assisted in thermodynamic analysis of HPLD air-conditioning systems to evaluate energy consumption.
  - Analyzed energy saving potential of HPLD-assisted dedicated outdoor air systems via building energy simulations.
  - Published journal paper on Applied Thermal Engineering.

**Miscellaneous Research Projects in BMES Laboratory**

Research Assistant; Advisor: Professor Jae-Weon Jeong

Seoul, South Korea  
Sept. 2019 - Aug. 2021

- Presented energy saving approach for outdoor air preheating in energy recovery ventilators.
  - Developed variable target temperature model for preheating and frost prevention via psychrometric equations.
  - Validated the proposed model based on design and analysis of computer experiments (DACE).
  - Published journal paper on Applied Thermal Engineering.
- Invented innovative HVAC systems based on thermoelectric cooling and heating technologies.
  - Created concept of thermoelectric heat pump-assisted outdoor air preheater in Patent Application.
  - Invented CCHP-assisted dedicated outdoor air system in Patent Application.
  - Reported invention of cooling tower-integrated thermoelectric cooling system in Patent Application.

**Miscellaneous Research Projects in AAL**

Undergraduate Research Assistant; Advisor: Professor Jin Yong Jeon

Seoul, South Korea  
Apr. 2016 - Jun. 2016

- Implemented acoustic visualization of floor impact noise in apartments.
  - Conducted on-site experiments and measurements on floor impact noise based on receiving positions.
  - Preprocessed measured signal data for acoustic visualization via Adobe Audition.

## PATENTS

---

1. J.-W. Jeong, **J. Ko** (2021). "Preheater for ventilator: thermoelectric heat pump-assisted outdoor air preheater." Application No.10-2021-0127272, South Korea.
2. J.-W. Jeong, H. Lim, **J. Ko** (2021). "Dedicated outdoor air system: liquid desiccant-assisted dedicated outdoor air system integrated with thermoelectric modules and CCHP." Application No.10-2021-0081446, South Korea.
3. J.-W. Jeong, S.-Y. Cheon, **J. Ko** (2021). "Apparatus for controlling cooling water temperature of cooling tower: design of cooling tower-integrated thermoelectric cooling system." Application No.10-2021-0041683, South Korea.

## TEACHING EXPERIENCE

---

**Building Energy, ARE4031 & Introduction to Building Equipment, ARE2007**

Teaching Assistant

Seoul, South Korea  
Mar. 2020 - Jun. 2021

- Supported professors in implementing curriculum for classes with 28-73 undergraduates.
- Provided one-on-one support to undergraduates for understanding class materials and examples.

**Private Tutoring**

Mathematics Tutor

Seoul, South Korea  
Jan. 2017 - Aug. 2017

- Educated high school freshmen about advanced calculus, conducting a weekly tutoring schedule.
- Designed math curriculum for self-directed learning which helps students continue studying after tutoring.

**Jeonnong Cram School**

Mathematics Teacher

Seoul, South Korea  
Oct. 2016 - Dec. 2016

- Taught middle school students within a small group (3-5 students) about basic algebra and geometry.
- Prepared class structures from fundamentals to advanced contents according to level of students.

## VOLUNTEER EXPERIENCE

---

<b>Vision Training Center</b> <i>Social Service Agent</i>	Seoul, South Korea Oct. 2017 - Aug. 2019
· Served at a homeless shelter as an alternative to compulsory military service of South Korea.	
<b>Seongdong Public Health Center, Geumho Branch</b> <i>Volunteer</i>	Seoul, South Korea Mar. 2014 - Dec. 2015
· Designed and conducted weekly music therapy programs the elderly and people with learning difficulties.	
<b>RAON Community Child Care Center</b> <i>Volunteer</i>	Seoul, South Korea Mar. 2014 - Jun. 2014
· Provided one-to-one mentoring for children using elementary school teaching materials.	
· Assisted in preparing field trips and chaperoning children home.	

## LEADERSHIP EXPERIENCE

---

<b>HX-Corps Program</b> <i>Team Leader</i>	Seoul, South Korea Apr. 2020 - Nov. 2020
· Instructed two undergraduate students to develop numerical modeling of PVT systems with heat-driven generators.	
· Designed experimental setup to evaluate generation performance of the proposed system.	
<b>SOKNA, School Band at Hanyang University</b> <i>President</i>	Seoul, South Korea Jan. 2015 - Dec. 2015
· Managed band club of more than 30 people and performed four times a year.	
· Led weekly meetings and hosted forums for band members to discuss plans for performance preparation.	

## AWARDS AND HONORS

---

### Academic awards

Best Graduate Thesis Award, <i>Hanyang University</i>	Aug. 2021
Graduation Excellence Award - Summa cum laude, <i>Hanyang University</i>	Feb. 2017
Excellence Award in the 2 <sup>nd</sup> semester of 2016, <i>Hanyang University</i>	Dec. 2016
Best Undergraduate Thesis Award, <i>Hanyang University</i>	Nov. 2016
Excellence Award in the 1 <sup>st</sup> semester of 2016, <i>Hanyang University</i>	Jun. 2016
Academic Achievement Excellence Award, <i>Hanyang University</i>	Apr. 2016
Excellence Award in the 2 <sup>nd</sup> semester of 2015, <i>Hanyang University</i>	Dec. 2015
Excellence Award in the 1 <sup>st</sup> semester of 2015, <i>Hanyang University</i>	Jun. 2015
Academic Achievement Excellence Award, <i>Hanyang University</i>	Apr. 2015
Excellence Award in the 2 <sup>nd</sup> semester of 2014, <i>Hanyang University</i>	Dec. 2014
Excellence Award in the 1 <sup>st</sup> semester of 2014, <i>Hanyang University</i>	Jun. 2014

### Conference awards

Best Presentation Award, <i>Korea Institute of Ecological Architecture and Environment</i>	May 2021
Best Presentation Award, <i>Korean Institute of Architectural Sustainable Environment and Building Systems</i>	Nov. 2020
Outstanding Paper Award, <i>The Society of Air-Conditioning and Refrigerating Engineers of Korea</i>	Jun. 2020
Best Presentation Award, <i>Korea Institute of Ecological Architecture and Environment</i>	Nov. 2019

### Miscellaneous awards

Excellence Prize (with \$400 reward), <i>Student Startup Idea Contest for Smart Life</i>	Dec. 2020
Excellence Award (with \$850 reward), <i>HX-Corps Program, Hanyang University</i>	Nov. 2020
Student Achievement Award of 77 <sup>th</sup> Foundation Day, <i>Hanyang University</i>	May 2016
Grand Prize, <i>Digital Virtual Village Modeling Competition</i>	Nov. 2015

## Scholarships

Connaught International Scholarship, <i>University of Toronto</i>	Sept. 2022 - Aug. 2026
Merit-based National Scholarship for Science and Engineering, <i>Korean Government</i>	Mar. 2016 - Feb. 2017
Merit-based Scholarship, <i>Hanyang University</i>	Sept. 2014 - Feb. 2016

## SKILLS

---

<b>Programming Languages</b>	Python, Matlab, HTML
<b>Building / CFD Simulation Tools</b>	TRNSYS, EnergyPlus/Euclid, ANSYS Fluent
<b>Engineering Software</b>	Design-Expert, Engineering Equation Solver (EES)
<b>Architecture / Product Design Tools</b>	Autodesk Fusion 360, Autodesk AutoCAD, Ultimaker Cura, SketchUp, Rhinoceros/Grasshopper
<b>Documentation Software</b>	L <sup>A</sup> T <sub>E</sub> X, Mendeley, Microsoft Office