

# Jihoon Chung, WELL AP, LEED GA

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## CONTACT INFORMATION

Center for Architecture Science and Ecology  
Rensselaer Polytechnic Institute  
New York, United States

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<https://j-chung.kr/>

## RESEARCH INTERESTS

*Building Information Modeling / Internet of Things / Ontology*  
digital twin, occupant behavior modeling, co-simulation, indoor environmental quality, building energy simulation, building monitoring system, interoperability, semantic web technology, parametric design, machine learning, computer vision, natural language process

## EDUCATION

### **Rensselaer Polytechnic Institute**, New York, United States

Ph.D., Architectural Science (Built Ecologies), GPA: 4.0/4.0, August 2021 – Current

- Advisor: Dr. Dennis Shelden
- Expected Graduation: May 2025

Graduate Certificates, GPA: 4.0/4.0, May 2024

- Machine Learning & AI / Business Intelligence

M.S., Architecture (Design Technology), GPA: 4.0/4.0, December 2023

- Advisor: Dr. Dennis Shelden

### **Yonsei University**, Seoul, Korea

M.S., Architectural Engineering (Construction IT), GPA: 3.97/4.0, February 2021

- Thesis: “Technical Specification Framework for 3D Concrete Printers”
- Advisor: Dr. Ghang Lee

B.Arch, Architecture (5-year program), February 2019

- Thesis: “Haebang-ro: Relationship between Haebang-chon and Yongsan Park”
- Advisor: Moongyu Choi, AIA & KIRA

### **National University of Singapore**, Singapore

Exchange Program for a year in AY2017

### **Gunmyungwon (건명원)**, Seoul, Korea

Future New School of Humanities, Arts & Science, February 2016

## RESEARCH & WORK EXPERIENCE

### **Lawrence Berkeley National Laboratory**, California

**January 2024 – Current**

#### *Research Affiliate*

- Enhanced standardized occupant behavior schema (obXML v.1.4) as a part of the ASHRAE RP-1815 project
- Updated the obFMU Application Guide and IDF files in the tutorial to enhance the compatibility with the latest version of EnergyPlus (v.24.1.0)
- Exploring development of a web platform for real-time energy simulation using EnergyPlus, occupant behavior simulator (obFMU), and sensor data
- Developing a data-driven occupant behavior simulator by integrating BIM and IoT
- Hosted by Dr. Tianzhen Hong

### **Center for Architecture Science and Ecology**, New York

**August 2021 – Current**

#### *Research Assistant*

- Developed a web-based monitoring system for occupant behavior based on BIM, IoT, building automation system, and semantic web technologies

- Proposed an ontology recommending a viable solution to improve indoor environmental quality for multiple occupants and reduce energy use in a room
- Designed Arduino circuit boards and developed a web server for IoT-based plant modules to automatically manage the plant health and improve indoor air quality as a part of Plant Pixel project sponsored by OBMI

**Autodesk, New York**

**May 2023 – August 2023**

*Intern, Sustainable Active and Passive Mechanical Systems Simulation and Optimization*

- Explored integration of generative design process with natural ventilation simulation for evaluating the performance of the ventilation systems at the early design stage using EnergyPlus
- The internship project was published and introduced on the Autodesk Research blog [URL]
- Volunteered to support AEC Mentor Program for underrepresented-minority teenagers who participated in a paid two-week internship at Autodesk's Boston office

**Saman Corporation, South Korea**

**February 2021 – July 2021**

*Researcher*

- Planned application services using real-time data collected from IoT sensors on construction sites in a national research project 'Development of and digital twin platform for smart construction'
- Assisted to prepare kick-off meetings and presentations in a national research project 'XR Flagship Project (Construction part)'
- Wrote bills of quantities in a pilot design project on a box culvert organized by Korea Expressway Corporation

**Building Informatics Group, Yonsei University**

**February 2018 – January 2021**

*Research Assistant*

- Proposed a technical specification framework for 3D concrete printers through a systematic literature review and a Delphi study
- Developed a multi-dimensional classification algorithm for housing defects text data using BERT-based multitask learning technique (Recurrent Neural Network)
- Explored optimization algorithm for buildability of 3D concrete printing focused on operation planning and concrete properties

**ATEAM Ventures, South Korea**

**May 2015 – August 2015**

*Strategic Planning staff*

- Planned strategies for marketing & sales and held a 3D-printer exhibition at KINTEX, Ilsan
- Installed a factory to assemble 3D-printers and managed mechanical components
- Managed all customer inquiries, wrote customer manuals, and sent thank-you letters to early customer

**XbarX (X\_X), South Korea**

**May 2014 – February 2015**

*Sales Director & Co-founder*

- Launched a beer recommendation app and beer-distribution web platform
- Got partnerships with 218 beer pub, bar, and restaurant in Seoul, South Korea
- Got a shared 3rd award with a \$4,500 cash prize in 'The 3rd Chung Ju-young Start-up Competition' and funding, \$140,000 from a start-up accelerator

TEACHING  
& MENTORING  
EXPERIENCE

**Rensselaer Polytechnic Institute, New York**

**August 2021 – Current**

*Guest Lecturer*

- 'Node-RED 101 for your own Smart IoT-based System' in 'Internetworking of Things (ECSE-4660/ECSE-6660)' course (February 23, 2024)

#### *Project Mentor*

- Taught and led an undergraduate group in a research-oriented class 'Research Investigation (ARCH-4958)' (Fall 2022 & Fall 2023)
- Advised an undergraduate to develop an algorithm evaluating plants' health using a color sensor as a part of the Plant Pixel project sponsored by OBMI (Fall 2023)
- Provided advice to undergraduates in an interdisciplinary project 'Smart Dormitory Devices and Development System (ECSE-4900)' (Fall 2022, Spring 2023 & Fall 2023)
- Participate in *Smart City Hackathon 2023* organized by Tech Valley Center of Gravity as a microcontroller-knowledgeable mentor (October 13-15, 2023)

#### *Workshop Instructor*

- 'Build an IoT Monitoring System for Your Smart Home' at Black Families Technology Awareness Day (February 12, 2022 & February 4, 2023)

#### **Microsoft TEALS, New York**

**August 2023 – Current**

##### *Programming Teaching Assistant*

- AP Computer Science A (Spring 2024) at El Camino High School, San Francisco, CA
- AP Computer Science Principles (Fall 2023) at Franklin D Roosevelt High School, NYC

#### **Lawrence Berkeley National Laboratory, California**

**June 2024 – July 2024**

##### *Teaching Assistant & Project Facilitator*

- Intro to Python & Data Science course in Experiences in Research (EinR) bootcamp 2024 (6-week summer internship)
- Intro to Python & Data Science course in Berkeley Lab Director's Apprenticeship Program (BLDAP) 2024
- Robotics projects in Science Accelerating Girls' Engagement in STEM (SAGE) summer camp 2024

#### **Code Nation, New York**

**August 2022 – June 2024**

##### *Programming Teaching Assistant*

- Intro to Web Development (Spring 2024) course at Collegiate Institute for Math & Science, NYC
- Intro to Web Development (AY2022–2023) & Fellowship I (JavaScript/jQuery, Fall 2023) courses at Achievement First East Brooklyn High School, NYC

#### **Yonsei University, South Korea**

**March 2019 – June 2020**

##### *Teaching Assistant*

- Engineering-Information Processing (Spring 2020)
- Computer Lab Manager (Spring 2019)

#### **PUBLICATIONS**

**(Accepted) Chung, J.** and Shelden, D. (2024) "A Framework of ifcJSON-based Digital Twin Platform for Monitoring Building Environment using BIM, IoT, and Semantic Web Technologies" *Proceedings of the 20th International Society for Computing in Civil and Building Engineering*

**(Accepted) Chung, J.**, Karlicek, B., and Shelden, D. (2024) "Towards Real-Time Occupant Behavior Monitoring System: A Preliminary Study on Integrating BIM, IoT Sensors, and BAS" *Proceedings of ASCE International Conference on Computing in Civil Engineering 2024*

**(Submitted) Chung, J.**, Neo, K., Khan, M., Cruz, E., Zheng, Z., Munasinghe, T., and Wei, J. C. (2024) "Exploring Flooding Fraction Prediction through Machine Learning Models Focusing on Medical Infrastructure in the Southeast U.S. Coastal Areas" *Proceedings of the IEEE BigData 2024*

**Chung, J.**, Shahmansouri, N., Stoddart, J., Goldstein, R., and Locke, J. (2024) "Sustainability through Optimal Design of Buildings for Natural Ventilation using Updated Comfort and Occupancy Models" *Proceedings of International Building Performance Simulation Association – USA and SimBuild 2024*

**Chung, J.**, Hong, T., Karlicek, R., Santos, H., Shelden, D., and Sparks, D. (2024) "Distributed Semantics to Support Built Environment Digital Twins" *Proceedings of NSF Workshop on Sustainable Computing for Sustainability 2024*

**Chung, J.**, Tsamis, A., and Shelden, D. (2023) "A framework for monitoring and identifying indoor air pollutants based on BIM with IoT sensors" *Proceedings of Computer-Aided Architectural Design. INTERCONNECTIONS: Co-computing beyond boundaries: 20th International Conference, CAAD Futures 2023*, pp. 518-531, Delft, Netherlands, 5 Jul., [https://doi.org/10.1007/978-3-031-37189-9\\_34](https://doi.org/10.1007/978-3-031-37189-9_34)

**Chung, J.**, Jacoby-Cooper, G., Rook, K., Henrique, S., Shelden, D., Kendall, E., and McGuinness, D. (2023) "Towards an Indoor Environmental Quality Management Ontology" *Proceedings of First International Workshop on Semantic Web on Constrained Things @ ESWC-23 (SWoCoT-23)*, pp. 16-26, Hersonissos, Greece, 28 May., <https://hdl.handle.net/20.500.13015/6674>

**Chung, J.**, Lee, G., and Kim, J. (2021) " Framework for Technical Specifications of 3D Concrete Printers" *Automation in Construction*, 127, 103732, <https://doi.org/10.1016/j.autcon.2021.103732>

(Submitted) Woo, J., **Chung, J.**, and Koo, H. (2021) " A Study on the Pedestrian Route Choices and Accessibility in the Retail Areas after Acute COVID-19: Focused on the Peak Commercial Activity's Hours in the Mangwon District" *Journal of the Urban Design Institute of Korea*

**Chung, J.**, Lee, G., Kim, J. and Choi, J. (2020) "A Comparative Analysis of the Classification System for Three-Dimensional Concrete Printers" *Korean Journal of Construction Engineering and Management*, 21(2), 3-14, <https://doi.org/10.6106/KJCEM.2020.21.2.003>

**Chung, J.**, Lee, G., and Kim, J. (2020) "A Systematic Review of the Geographic and Chronological Distributions of 3D Concrete Printers from 1997 to 2020", *Proceedings of the 37th International Symposium on Automation and Robotics in Construction (ISARC)*, pp. 84-19, Kitakyushu, Japan, 27-28 Oct., <https://doi.org/10.22260/ISARC2020/0014>

Lee, G., Cho, J., Song, T., Roh, H., Jung, J., **Chung, J.**, Yong, G., and Jeong, D. (2020) "Construction Field Management Using a Popular Text Messenger" *Proceedings of the 18th International Conference on Computing in Civil and Building Engineering*, pp. 971-979, [https://doi.org/10.1007/978-3-030-51295-8\\_67](https://doi.org/10.1007/978-3-030-51295-8_67)

**Chung, J.**, Lee, G., and Kim, J. (2018), "Performance Evaluation Criteria for Building 3D Printing Focused on Concrete Properties", *Proceedings of the 2018 Annual Conference of the Korea Institute of Construction Engineering and Management*, pp. 27-29, South Korea, 9 Nov.

#### PATANT

(Submitted) **Chung, J.**, Stoddart, J., Locke, J., Goldstein, R., and Shahmansouri, N. (2024) "Automated Generation and Analysis of Natural Ventilation Performance Using Tile-based Building Geometry", USA

(Submitted) **Chung, J.**, Stoddart, J., Locke, J., Goldstein, R., and Shahmansouri, N. (2024) "Automated Comparative Analysis of Alternative Comfort and Occupancy Models in Building Energy Analysis", USA

Kim, J., Lee, G., Lee, D., Lee, J., **Chung, J.** (2020), "3D printer for construction with continuous printing on the go and 3D printing system comprising it", Application Serial No. KR20200101482A, South Korea, <https://patents.google.com/patent/KR20200101482A/ko>

ARTICLE	<b>Chung, J.</b> (2024) "Want To Be More Comfortable Indoors? Let Your Building Help" <i>Every Day Matters</i> : RPI Blog, [URL]	
	Lee, G., <b>Chung, J.</b> , and Kim, J. (2021) "On What Basis Should We Buy a 3D Concrete Printer?" <i>Building Construction</i> , 21(4), 31-34, [URL]	
HONORS & AWARDS	<b>DB Dream Master Scholarship Award</b> <i>DB Kim-Jun-Ki Cultural Foundation, South Korea</i>	<b>May 2024</b>
	<b>IBPSA-USA SimBuild Conference Student Scholarship Award</b> <i>IBPSA-USA SimBuild Conference 2024, United States</i>	<b>March 2024</b>
	<b>Graduate Research Symposium (Podium Presentations)</b> , The 3 <sup>rd</sup> Prize <i>Rensselaer Polytechnic Institute, New York</i>	<b>June 2022</b>
	<b>Research Assistantship Award</b> for 2021-2025 academic year <i>Rensselaer Polytechnic Institute, New York</i>	<b>August 2021</b>
	<b>The 17th Outstanding Thesis Competition</b> , Honorable Mention <i>Architectural Institute of Korea, South Korea</i>	<b>April 2021</b>
	<b>2019 Yonsei Startup Lab Contest (\$2,700)</b> , Best Startup Award <i>Yonsei University, South Korea</i>	<b>July 2019</b>
	<b>2018 KICEM Annual Conference</b> , Excellent Paper Award <i>Korea Institute of Construction Engineering and Management, South Korea</i>	<b>November 2018</b>
	<b>Academic Scholarships</b> for four semesters <i>Yonsei University, South Korea</i>	<b>March 2016 – September 2018</b>
	<b>The 12<sup>th</sup> Architectural Engineering Competition</b> , Excellent Award <i>The Korean Structural Engineers Association, South Korea</i>	<b>September 2016</b>
	<b>Volunteer Full-Scholarship</b> for two semesters <i>DB Kim-Jun-Ki Cultural Foundation, South Korea</i>	<b>March &amp; September 2016</b>
RESEARCH PROJECTS	<b>The 3<sup>rd</sup> Chung Ju-yung Startup Competition (\$4,500)</b> , Excellent Startup Award <i>The Asan Nanum Foundation, South Korea</i>	<b>August 2014</b>
	<b>The 18<sup>th</sup> National Boxing Competition for Non-Athlete</b> , The 1 <sup>st</sup> Prize <i>Korea Boxing Institution, South Korea</i>	<b>August 2012</b>
	<b>Chief Superintendent's Award for Leadership</b> <i>Seoul Metropolitan Office of Education, South Korea</i>	<b>May 2011</b>
	<b>Plant Pixel</b> <i>OBM International, United States</i>	<b>August 2023 – December 2023</b>
	<b>Development of Digital Platform and Digital Twin based on Management Technology for Smart Construction</b> <i>Korea Agency for Infrastructure Technology Advancement (KAIA)</i>	<b>February 2021 – July 2021</b>
	<b>XR Flagship Project (Construction part)</b> <i>Ministry of Science and ICT &amp; National IT Industry Promotion Agency, Korea</i>	<b>June 2021 – Jul 2021</b>
	<b>Development of Innovative Design, Material and Equipment for 3D Printing Small Buildings/Freeform Members</b> <i>Korea Agency for Infrastructure Technology Advancement (KAIA)</i>	<b>March 2018 – February 2021</b>

PRESENTATIONS  
& INVITED TALKS

<b>How Programming is Used in Architecture &amp; Building Technology?</b> <i>Computer Science Career Panel, El Camino High School</i>	<b>April 11, 2024</b>
<b>A Daily Flooding Risk Assessment Map for Medical Infrastructures Using Machine Learning Algorithms</b> <i>AGU23 Fall Meeting [Poster]</i>	<b>January 22, 2024</b>
<b>A framework of BIM &amp; IoT-based Building Infrastructure for Monitoring Indoor Air Quality and Occupant Behavior</b> <i>Research Showcase — Reunion &amp; Homecoming 2023, RPI [Poster]</i>	<b>October 13, 2023</b>
<b>Sustainability through Optimal Design of Buildings for NV and Post-Occupancy Using Updated Comfort Models</b> <i>Research Connections — Summer Intern Series, Autodesk [Oral]</i>	<b>August 17, 2023</b>
<b>Daily Flooding Risk Assessment Map for Medical Infrastructures using Machine Learning Algorithm</b> <i>AmeriGEO Week 2023 'Data Driven Solutions for a Sustainable Planet' [Poster]</i>	<b>August 8, 2023</b>
<b>A framework for monitoring and identifying indoor air pollutants based on BIM with IoT sensors</b> <i>20th International Conference of CAAD Futures 2023 [Oral]</i>	<b>July 7, 2023</b>
<b>Towards an Indoor Environmental Quality Management Ontology</b> <i>2023 8<sup>th</sup> Annual Graduate Research Symposium, RPI [Oral]</i>	<b>May 12, 2023</b>
<b>A framework for monitoring and identifying indoor air pollutants based on BIM with IoT sensors</b> <i>2023 8<sup>th</sup> Annual Graduate Research Symposium, RPI [Poster]</i>	<b>May 12, 2023</b>
<b>Air Quality Monitoring System based on BIM &amp; IoT</b> <i>EBESS Industry Workshop 'Well-being &amp; Sustainability in the Built Environment', RPI [Poster]</i>	<b>November 2, 2022</b>
<b>Air Quality Monitoring System based on BIM &amp; IoT</b> <i>2022 Three Minute Thesis, RPI [Oral]</i>	<b>May 13, 2022</b>
<b>Air Quality Monitoring System based on BIM &amp; IoT</b> <i>2022 7<sup>th</sup> Annual Graduate Research Symposium, RPI [Poster, Oral – 3<sup>rd</sup> Place]</i>	<b>May 13, 2022</b>
<b>A Systematic Review of 3D Concrete Printers from 1997 to 2020</b> <i>37th International Symposium on Automation and Robotics in Construction (ISARC) [Oral]</i>	<b>October 28, 2022</b>
<b>Performance Evaluation Criteria for Building 3D Printing</b> <i>2018 Annual Conference of KICEM [Oral]</i>	<b>November 30, 2018</b>

SKILLS

**Programming Languages:** Python, C#, JAVA, C++, JavaScript (Node.js, Three.js, ifc.js, Express.js, Node-RED), P5 Processing, SPARQL, SQL  
**CAD/CAE:** Rhino (+Grasshopper, Ladybug, Honeybee, Butterfly), Revit (+Dynamo, Ladybug, Honeybee, Butterfly), Sketchup, CATIA, AutoCAD, Midas Civil  
**Design tools:** Adobe Photoshop, Illustrator, InDesign, Premiere Pro, Experience Design  
**Machining:** Arduino, Raspberry Pi, 3D printer, Laser Cutter  
**Others:** OpenStudio (+EnergyPlus), Functional Mockup Unit (+obFMU, EnergyPlusFMU), Tensorflow (+Keras), Pytorch, SPSS, Protégé

CERTIFICATIONS

<b>WELL AP</b> <i>International WELL Building Institute (IWBI)</i>	<b>February 6, 2023</b>
<b>LEED Green Associate</b> <i>U.S. Green Building Council</i>	<b>August 13, 2022</b>

<b>2020 AI Technical Development Workshop (Image/Video Recognition)</b> <i>Korea Electric Power Corporation (KEPCO)</i>	<b>August 7, 2020</b>
<b>The 9<sup>th</sup> Image Recognition Application Workshop</b> <i>Fast Campus ( 패스트캠퍼스 )</i>	<b>October 19, 2019</b>
<b>The 3<sup>rd</sup> Object Detection Application Workshop</b> <i>Fast Campus ( 패스트캠퍼스 )</i>	<b>September 7, 2019</b>
<b>DA BIM Specialist Intermediate Workshop</b> <i>DAGROUP Urban Design &amp; Architecture Co., Ltd</i>	<b>July 14, 2019</b>
<b>2018 BIGDATA X CAMPUS (Python-based Big Data Analysis)</b> <i>Korea Data Agency</i>	<b>June 14, 2018</b>

## ACADEMIC SERVICE

### Scientific Article Reviewer

- IBPSA-USA SimBuild 2024

### Invited Juror

- Architectural Drawing & Representation at GSAPP, Columbia University (Fall 2023)

### Judge

- Green Scholars Program Science Fair 2024
- Contra Costa County Science & Engineering Fair 2024
- Alameda County Science & Engineering Fair 2024

### Application Reviewer

- Science en Accion 2024 at Berkeley Lab (9 applications)
- Science Accelerating Girls' Engagement in STEM (SAGE) 2024 at Berkeley Lab (19 applications)
- Quantum, Computing, Mathematics & Physics (QCaMP) 2024 at Berkeley Lab (19 applications)
- Berkeley Lab Director's Apprenticeship Program (BLDAP) 2024 (17 applications)

### Session Chair

- IBPSA-USA SimBuild 2024

### Committee Member

- IBPSA-USA, Emerging Professionals and Students organizing committee, International Building Performance Simulation Association
- ASHRAE, Technical Committee, The American Society of Heating, Refrigerating and Air-conditioning Engineers

## LEADERSHIP EXPERIENCE

<b>Project leader</b> , Rensselaer Polytechnic Institute	<b>January 2023 – May 2024</b>
<ul style="list-style-type: none"> <li>• Led a class project with six computer-science students in <i>Xinformatics</i> and <i>Data Science</i> courses aiming to develop machine learning models for predicting flood using big data from NASA, FEMA, and HIFLD</li> <li>• Had poster presentations at <i>AGU23 Fall Meeting</i> and <i>AmeriGEO Week 2023</i></li> <li>• Collaborated with Dr. Jennifer Wei, NASA Lead Scientist, and Thilanka Munasinghe, RPI Lecturer for publication</li> </ul>	
<b>Project leader</b> , Social Algorithm 7.0 Workshop	<b>August 2020</b>
<ul style="list-style-type: none"> <li>• Led a team project in an international online-workshop organized by Social Algorithm Research Group</li> <li>• Analyzed spatial network using Rhino + Grasshopper with Python, and conducted on-site surveys for the validation</li> </ul>	

- Based on the analysis result, submitted a journal article to *Journal of the Urban Design Institute of Korea*

**Casting Director & Co-founder, We Ask, Korea** **January 2013 – September 2014**

- Co-founded a conference-planning organization called '젊음이 묻습니다', gathering 100+ NGO-interested students
- Invited 30+ celebrities to have talks with students, such as Im Kwon-taek, Ko Un, Kim Jung-man, and so on
- Got sponsorships from publishers, theatres, and student councils to implement marketing plans

**The 9<sup>th</sup> Chief Representative, Global Intelligence, Korea** **January 2012 – July 2013**

- Directed a volunteer group consisting of 69 college students to organize mentoring programs for teenagers

**VOLUNTEER  
EXPERIENCE**

**Lawrence Berkeley National Laboratory, California** **January 2024 – Current**  
*Application Review Board / Mentor / STEM Activity Supporter*

**Y-Zone Project in STEM Alliance, New York** **October 2021 – September 2022**  
*Bilingual (Korean/English) Volunteer Translator*

**Major Mentoring Program in Yonsei University, Korea** **March 2019 – May 2021**  
*Architecture-Major Mentor*

**Architecture School in Junglim Foundation, Korea** **August 2018 – October 2018**  
*Architecture Tutor*

**Global Volunteering Program in Dongbu Foundation, Vietnam** **January 2017**  
*Student Volunteer*

**Student Volunteer Group in Dongbu Foundation, Korea** **February 2016 – February 2017**  
*Volunteer & Scholarship Holder*

**Global Engineering Program in Yonsei University, Indonesia** **August 2016**  
*Student Volunteer & Assistant Manager*

**Seoul Junghwa Secondary School, Korea** **September 2012 – December 2012**  
*Speech Tutor*

**Seoul Soongduck Primary School, Korea** **March 2012 – July 2013**  
*Speech Tutor*

**Kyoto International School, Japan** **August 2012**  
*Korean Tutor*

**REFERENCES**

Available upon request.