

# 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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## RESEARCH INTERESTS

*Building Information Modeling / Internet of Things / Ontology*  
occupant behavior modeling, indoor environmental quality, building energy simulation, building monitoring system, interoperability, semantic web, parametric design, machine learning, computer vision (object detection, facial recognition), natural language process (text classification)

## 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: June 2025

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

- Advisor: Dr. Dennis Shelden

Graduate Certificates, GPA: 4.0/4.0, May 2024

- Machine Learning & AI and Business Intelligence

### **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*

- 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

TEACHING & MENTORING EXPERIENCE	<b>Autodesk, New York</b> <i>Intern, Sustainable Active and Passive Mechanical Systems Simulation and Optimization</i>	<b>May 2023 – August 2023</b>
	<ul style="list-style-type: none"> <li>• 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</li> <li>• The internship project was published and introduced on the Autodesk Research blog [URL]</li> <li>• Volunteered to support AEC Mentor Program for underrepresented-minority teenagers who participated in a paid two-week internship at Autodesk's Boston office</li> </ul>	
	<b>Saman Corporation, South Korea</b> <i>Researcher</i>	<b>February 2021 – July 2021</b>
	<ul style="list-style-type: none"> <li>• 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'</li> <li>• Assisted to prepare kick-off meetings and presentations in a national research project 'XR Flagship Project (Construction part)'</li> <li>• Wrote bills of quantities in a pilot design project on a box culvert organized by Korea Expressway Corporation</li> </ul>	
	<b>Building Informatics Group, Yonsei University</b> <i>Research Assistant</i>	<b>February 2018 – January 2021</b>
	<ul style="list-style-type: none"> <li>• Proposed a technical specification framework for 3D concrete printers through a systematic literature review and a Delphi study</li> <li>• Developed a multi-dimensional classification algorithm for housing defects text data using BERT-based multitask learning technique (Recurrent Neural Network)</li> <li>• Explored optimization algorithm for buildability of 3D concrete printing focused on operation planning and concrete properties</li> </ul>	
	<b>ATEAM Ventures, South Korea</b> <i>Strategic Planning staff</i>	<b>May 2015 – August 2015</b>
	<ul style="list-style-type: none"> <li>• Planned strategies for marketing &amp; sales and held a 3D-printer exhibition at KINTEX, Ilсан</li> <li>• Installed a factory to assemble 3D-printers and managed mechanical components</li> <li>• Managed all customer inquiries, wrote customer manuals, and sent thank-you letters to early customer</li> </ul>	
	<b>XbarX (X_X), South Korea</b> <i>Sales Director &amp; Co-founder</i>	<b>May 2014 – February 2015</b>
	<ul style="list-style-type: none"> <li>• Launched a beer recommendation app and beer-distribution web platform</li> <li>• Got partnership with 218 beer pub, bar, and restaurant in Seoul, South Korea</li> <li>• 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</li> </ul>	
	<b>Rensselaer Polytechnic Institute, New York</b> <i>Guest Lecturer</i>	<b>August 2021 – Current</b>
	<ul style="list-style-type: none"> <li>• 'Node-RED 101 for your own Smart IoT-based System' in 'Internetworking of Things (ECSE-4660/ECSE-6660)' course (February 23, 2024)</li> </ul>	
	<i>Project Mentor</i>	
	<ul style="list-style-type: none"> <li>• Taught and led an undergraduate group in a research-oriented class 'Research Investigation (ARCH-4958)' (Fall 2022 &amp; Fall 2023)</li> <li>• 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)</li> <li>• Provided advice to undergraduates in an interdisciplinary project 'Smart Dormitory Devices and Development System (ECSE-4900)' (Fall 2022, Spring 2023 &amp; Fall 2023)</li> </ul>	

- 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

**Code Nation**, New York

**August 2022 – Current**

*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.**, 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*

**(Accepted) Chung, J.** and Shelden, D. (2024) "A Framework of ifcJSON-based Web 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.**, 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*

**(Submitted) Chung, J.**, Karlicek, B., and Shelden, D. (2024) "A Framework of Occupant-Behavior Monitoring System using BIM, IoT, and BAS" *Proceedings of ASCE International Conference on Computing in Civil Engineering 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

**Chung, J.** (2024) "Want To Be More Comfortable Indoors? Let Your Building Help" *Every Day Matters: RPI Blog*, [URL]

Lee, G., **Chung, J.**, and Kim, J. (2021) "On What Basis Should We Buy a 3D Concrete Printer?" *Building Construction*, 21(4), 31-34, [URL]

#### HONORS & AWARDS

**IBPSA-USA SimBuild Conference Student Scholarship** **March 2024**  
*IBPSA-USA SimBuild Conference 2024, United States*

**Graduate Research Symposium (Podium Presentations)**, The 3<sup>rd</sup> Prize **June 2022**  
*Rensselaer Polytechnic Institute, New York*

**Research Assistantship Award** for 2021-2024 academic year **August 2021**  
*Rensselaer Polytechnic Institute, New York*

**The 17th Outstanding Thesis Competition**, Honorable Mention **April 2021**  
*Architectural Institute of Korea, South Korea*

**2019 Yonsei Startup Lab Contest (\$2,700)**, Best Startup Award **July 2019**  
*Yonsei University, South Korea*

**2018 KICEM Annual Conference**, Excellent Paper Award **November 2018**  
*Korea Institute of Construction Engineering and Management, South Korea*

**Academic Scholarships** for four semesters **March 2016 – September 2018**  
*Yonsei University, South Korea*

	<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>Dongbu Foundation, South Korea</i>	<b>March &amp; September 2016</b>
	<b>The 3<sup>rd</sup> Chung Juyung 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>
RESEARCH PROJECTS	<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>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>

**Air Quality Monitoring System based on BIM & IoT** **May 13, 2022**  
*2022 7<sup>th</sup> Annual Graduate Research Symposium, RPI [Poster, Oral – 3<sup>rd</sup> Place]*

**A Systematic Review of 3D Concrete Printers from 1997 to 2020** **October 28, 2022**  
*37th International Symposium on Automation and Robotics in Construction (ISARC) [Oral]*

**Performance Evaluation Criteria for Building 3D Printing** **November 30, 2018**  
*2018 Annual Conference of KICEM [Oral]*

**CERTIFICATIONS**

**WELL AP** **February 6, 2023**  
*International WELL Building Institute (IWBI)*

**LEED Green Associate** **August 13, 2022**  
*U.S. Green Building Council*

**2020 AI Technical Development Workshop (Image/Video Recognition)** **August 7, 2020**  
*Korea Electric Power Corporation (KEPCO)*

**The 9<sup>th</sup> Image Recognition Application Workshop** **October 19, 2019**  
*Fast Campus ( 펍스트캠퍼스 )*

**The 3<sup>rd</sup> Object Detection Application Workshop** **September 7, 2019**  
*Fast Campus ( 펍스트캠퍼스 )*

**DA BIM Specialist Intermediate Workshop** **July 14, 2019**  
*DAGROUP Urban Design & Architecture Co., Ltd*

**2018 BIGDATA X CAMPUS (Python-based Big Data Analysis)** **June 14, 2018**  
*Korea Data Agency*

**ACADEMIC SERVICE**

**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

**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), Tensorflow(+Keras), Pytorch, SPSS, Protégé

**LEADERSHIP EXPERIENCE**

**Project leader, Rensselaer Polytechnic Institute** **January 2023 – Current**

- Led a class project with six computer-science students in *Xinformatics* and *Data Science* courses aiming to develop machine learning models for predicting flood using big data from NASA, FEMA, and HIFLD
- Had poster presentations at *AGU23 Fall Meeting* and *AmeriGEO Week 2023*

- Currently working on publication with Dr. Jennifer Wei, NASA Lead Scientist, and Thilanka Munasinghe, RPI Lecturer

- Project leader**, Social Algorithm 7.0 Workshop **August 2020**
- Led a team project in an international online-workshop organized by Social Algorithm Research Group
  - Analyzed spatial network using Rhino + Grasshopper with Python, and conducted on-site surveys for the validation
  - 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 '젊음이문습니다', 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.