JISOO PARK (Ph.D.)

Assistant Professor at Indiana State University

CONTACT INFORMATION

Indiana State University
College of Technology
Department of Built Environment
101 North 6th Street
Terre Haute, IN 47809

Phone: (770) 731-5233
Email: Jisoo.park@indstate.edu
Website: https://youngbrain85.github.io/
Research Gate: [link]
Google scholar: [link]

RESEARCH INTEREST

- Construction Management
- Construction Automation and Robotics
- Machine learning and Computer vision
- Metaverse

EDUCATION

Ph. D., Civil Engineering, Georgia Institute of Technology Dec. 2020
- Area of Concentration: Construction Management and Automation
- Dissertation: PCIM: Deep learning-based point cloud information modeling framework

M.S., Civil Engineering, Hanyang University (South Korea) Feb. 2010
- Area of Concentration: Concrete Structure and Material

B.S., Civil Engineering, Hanyang University (South Korea) Feb. 2008

EMPLOYMENT HISTORY (PROFESSIONAL EXPERIENCE)

2022 – Present **Assistant Professor**, Department of Built Environment, Indiana State University
2021 – 2022 **Postdoctoral Fellow**, School of Civil Engineering, Georgia Institute of Technology
2020 – 2022 **External Research Consultant**, BriconLab Co., Ltd (South Korea)
2021 – 2021 **Visiting Researcher**, Korea Institute of Construction Technology (KICT)
2016 – 2020 **Graduate Research Assistant**, School of Civil Engineering, Georgia Institute of Technology
2013 – 2014 **Researcher**, Korea Expressway Corporation
2010 – 2013 **Field Engineer**, EJTech Co., Ltd (South Korea)

HONORS AND AWARDS

- **Second Place at 1st Scan-to-BIM Challenge (IEEE-CVPR)** (2021), IEEE *Conference on Computer Vision and Pattern Recognition* (CVPR) – "2D FLOORPLAN RECONSTRUCTION"
- **CEE Future Faculty Fellow Award** (2021/2022), School of Civil and Environmental Engineering at Georgia Tech
- **CEE Cross-Cutting Research Seed Grant** (2021), School of Civil and Environmental Engineering at Georgia Tech
- **Brain Korea 21 Plus Scholarship** (2008-2009), Hanyang University, South Korea
- **Sungon Kim Fellowship (2008)**, Hanyang University, South Korea
- **Academic Excellence Scholarship** (2005), Hanyang University, South Korea

TEACHING RESPONSIBILITIES

CNST 330 – Construction Materials, Methods, and Equipment **Indiana State University** **Spring 2023**
This course focuses on what makes construction accounting and financial management different from other business sectors. This includes forecasting cash flow requirements, payment processes, time value of money, and capital equipment depreciation. An analysis of OSHA regulations as they pertain to the construction industry is also included.

CNST 420 – Construction Materials, Methods, and Equipment **Indiana State University** **Spring 2023**
This course introduces the fundamentals of construction surveying. This includes introducing the use of instruments, recording and computing data, site layout, and earthwork. Computer-aided lab activities and hands-on practices are also included. Upon completion of this course, the students are able to understand how the construction topo model is drawn

CNST 111 – Construction Materials, Methods, and Equipment **Indiana State University** **Fall 2022**
This course introduces the fundamentals of building construction, materials, and methods for residential and commercial construction. It is presented from the perspective that the student has little to no construction knowledge or background. Later in the program courses such as estimating and scheduling will rely on knowledge gained in this course to develop solutions using critical thinking that will lead to creating accurate schedules, estimates, and managerial decisions.

CNST 430 – Construction Project Management **Indiana State University** **Fall 2022**
This course looks into the construction project management process. Overview of estimating, scheduling, and administrative function of a project and the collaborative efforts required to complete it successfully. Technological advances, such as Building Information Modeling (BIM), will be introduced with real-world examples of the uses of BIM during the Lifecycle of the Project.

CEE 4120 – Construction Operation **Georgia Institute of Technology** **Spring 2022**
This is a heavy/highway construction course that teaches the basics of major construction equipment and earthwork operations. The topics introduced are site development, earthmoving materials, equipment economics, excavation, the stability of excavations, loading, and hauling, cranes, equipment safety, automated construction, robotics, and field demonstration.

CEE 8813 – Construction Automation and Robotics **Georgia Institute of Technology** **Sp/Fa 2021**
This course covers recent developments in construction automation and robotics. The emphasis is on understanding the capabilities and methods that can be selected for a particular construction automation project. Lectures on automation in construction provide exposure to available state-of-the-art technologies (mobile robots, drones, laser scanning, etc).

CEE 8813 – Construction Industry Best Practices **Georgia Institute of Technology (TA)** **Fall 2019**
This Course offers real-world knowledge of proven construction management practices that you can apply immediately in the workplace. The program addresses current issues in the construction industry, including best practices developed at the Construction Industry Institute and critical issues facing the construction industry.

SCHOLARLY CONTRIBUTIONS

Published and Accepted Journals:

1) **Park, J.**, Cho, Y., and Kim, S. (2022). " Deep Learning-based UAS Image Segmentation and Inpainting for Generating Vehicle-Free Orthomosaic." *International Journal of Applied Earth Observation and Geoinformation*, 115, DOI: https://doi.org/10.1016/j.jag.2022.103111

2) Al-Hasani, L., **Park, J.**, Perez, G., Herndon, H., Brown, J., Cho, Y., Gentry, R., and Kurtis, K. (2022). "Quantifying concrete adiabatic temperature rise based on temperature-dependent isothermal calorimetry; modeling and validation." *Materials and Structures*, 55(7), DOI: http://doi.org/10.1617/s11527-022-02023-6

3) Lee, J., Huh, Y., and **Park, J.** (2022). "Geospatial Simulation System of Mountain Area Black Ice Accident." *Applied Science*, 12(11), DOI: https://doi.org/10.3390/app12115709

4) **Park, J.**, and Cho, Y. (2021). "Point Cloud Information Modeling: Deep Learning-based Automated Information Modeling Framework for Point Cloud Data." *ASCE Journal of Construction Engineering and Management,* 148(2), DOI: https://doi.org/10.1061/(ASCE)CO.1943-7862.0002227

5) Lee, J., Cho, J., and **Park, J.** (2021). "Large-scale Earthwork Progress Digitalization Practices using Series of 3D Models generated from UAV Images." *Drones*, 5(4), DOI: https://doi.org/10.3390/drones5040147

6) Jeong, I., Jang, Y., **Park, J.***, and Cho, Y. (2021) "Motion Planning of Mobile Robots for Autonomous Navigation on Uneven Ground Surfaces." *ASCE Journal of Computing in Civil Engineering*, 35(3), DOI: https://doi.org/10.1061/(ASCE)CP.1943-5487.0000963 (*: Corresponding author)

7) Price, L.C., Chen, J., **Park, J.***, and Cho, Y. (2021) "Multisensor-driven Real-time Crane Monitoring System for Blind Lift Operations: Lessons Learned from a Case Study." *Automation in Construction*, 124, DOI: https://doi.org/10.1016/j.autcon.2021.103552 (*: Corresponding author)

8) **Park, J.**, Chen, J., Cho, Y., Kang, D., and Son, B.(2020). "CNN-Based Person Detection Using Infrared Images for Night-Time Intrusion Warning Systems." *Sensors*, 20(1), 34, DOI: https://doi.org/10.3390/s20010034

9) **Park, J.**, Kim, P., Cho, Y., and Kang, J. (2019). "Framework for Automated Registration of UAV and UGV Point Clouds Using Local Features in Images." *Automation in Construction*, 98, DOI: https://doi.org/10.1016/j.autcon.2018.11.024

10) Kim, P., **Park, J.**, Cho, Y., and Kang, J. (2019). "UAV-assisted autonomous mobile robot navigation for as-is 3D data collection and registration in cluttered environments." *Automation in Construction*, 106, DOI: https://doi.org/10.1016/j.autcon.2019.102918

11) Lee, J., **Park, J.**, Kim, I., and Kang, D.Y.(2019). "Application of Vision-based Safety Warning System to Haeundae Beach, Korea." *Journal of Coastal Research*, 91(SI), DOI: https://doi.org/10.2112/SI91-044.1

Under Review Journals:

12) Al-Hasani, L., Perez, G., Herndon, H., **Park, J.**, Poole, J., Tien, I., Washburn, N., Cho, Y., Gentry, R., and Kurtis, K. (Forthcoming). " Prediction of heat of hydration of cementitious systems using Gaussian Process Regression enables mass concrete thermal modeling." *Materials and Structures* (2nd review).

13) Brown, J., **Park, J.**, Al-Hasani L., Gentry, R., Kurtis, K., and Cho, Y. (Forthcoming). "A Family of Thermal Nomograms for Mass Concrete." *Construction and Building Materials* (1st review).

In Prep.:

14) **Park, J.**, Yajima, Y., and Cho, Y. (Forthcoming) "3D Benchmark Datasets with Hierarchical Structure Collected from Construction Sites." *Automation in Construction* (To be submitted in November)

15) **Park, J.**, and Cho, Y. (Forthcoming). "Effect of Parameter Combination for Construction Material Segmentation in Point Clouds." *ASCE Journal of Construction Engineering and Management* (In prep)

16) **Park, J.**, Chang, Y., and Kim, S. (Forthcoming). "Con-Metaverse Review: Core Technologies, Applications, and Challenges." *ASCE Journal of Construction Engineering and Management* (In prep)

Conference Proceedings (Peer Reviewed)

1) **Park, J.** Chang, S., and Cho Y. (2022). "Inspection Data Exchange and Visualization for Building Maintenance using AR-enabled BIM" 2022 Proceedings of the International Symposium on Automation and Robotics in Construction (ISARC), Bogotá, Colombia, July 13-15., DOI: https://doi.org/10.22260/ISARC2022/0066

2) Kim, S., Yajima, Y., Park, J., Chen, J., and Cho, Y. (2022). "A Hybrid Semantic-Geometric Approach for Clutter-Resistant Floorplan Generation from Building Point Clouds." Proceedings of the 9th International Conference on Construction Engineering and Project Management (ICCEPM), Las Vegas, NV, USA, June 20-23.

3) **Park, J.** and Cho Y. (2021). "Laser Intensity-assisted Construction Material Classification in Point Cloud Data using Deep Learning" ASCE International Conference on Computing in Civil Engineering (i3CE 2021), Orlando, FL, USA, September 12-14., DOI: https://doi.org/10.1061/9780784483893.001

4) Yajima, Y., Kahoush, M., Chen, J., **Park, J.**, Kangisser, S., Irizarry, J., and Cho, Y. (2021) "AI-driven 3D Point Cloud-Based Highway Infrastructure Monitoring System using UAV" ASCE International Conference on Computing in Civil Engineering (i3CE 2021), Orlando, FL, USA, September 12-14., DOI: https://doi.org/10.1061/9780784483893.110

5) Kahoush, M., Yajima, Y., Chen, J., **Park, J.**, Kangisser, S., Irizarry, J., and Cho, Y. (2021) "Analysis of Flight Parameters on UAV Semantic Segmentation Performance for Highway Infrastructure Monitoring" ASCE International Conference on

Computing in Civil Engineering (i3CE 2021), Orlando, FL, USA, September 12-14., DOI: https://doi.org/10.1061/9780784483893.109

6) **Park, J.**, Chen, J., and Cho Y. (2020). "Point Cloud Information Modeling (PCIM): an Innovative Framework for as-is Information Modeling of Construction Sites." ASCE Construction Research Congress (CRC) 2020, Tempe, AZ, USA, March 9-10, DOI: https://doi.org/10.1061/9780784482865.139

7) Kim, P., Price, L., **Park, J.**, and Cho, Y. (2019). "UAV-UGV cooperative 3D environmental mapping." Proceedings of the ASCE 2019 International Conference on Computing in Civil Engineering (i3CE), Atlanta, GA, USA, June 17-19, DOI: https://doi.org/10.1061/9780784482438.049

8) Kim, P., **Park, J.**, and Cho, Y. (2019). "As-is Geometric Data Collection and 3D Visualization through the Collaboration between UAV and UGV." Proceedings of the 36th International Symposium on Automation and Robotics in Construction (ISARC), Banff, AB, Canada, May 21-24 DOI: https://doi.org/10.22260/ISARC2019/0073

9) **Park, J.**, Kim, P., Cho, Y., and Fang, Y. (2018)." Automated Collaboration Framework of UAV and UGV for 3D Visualization of Construction Sites." Proceedings of the 18thInternational Conference on Construction Applications of Virtual Reality (CONVR2018), Auckland, New Zealand, Nov 22-23.

10) **Park, J.**, Cho, Y., and Shim, J. (2018). "Resilient Fire Prevention and Management Strategies for Structures and Materials Stored under Bridges." Construction Research Congress 2018, ASCE, New Orleans, LA, 584 - 593. DOI: https://doi.org/10.1061/9780784481288.057

11) Lee, J., **Park, J.**, Roberts, G.W., Oluropo, O., and Moon, D.J. (2011). "Study on Issues of Tilt-meters and Utilization of GPS in Bridge Monitoring System (BMS)." Proceedings of Joint International Symposium on Deformation Monitoring, Hong Kong, Nov 2-4.

12) Sim, J., Moon, D.Y., Kang, T., and **Park, J.** (2009). "Bond Performance of Ribbed Type of GFRP Rebar to Concrete at High Temperature." In Proceedings of IABSE Symposium 2009. Bangkok, Thailand

Technical Report

1) Cho, Y., Gentry, R., Kurtis, K., Brown, J., **Park, J.**, and L, Al-Hasani (2022). "Phase II–Investigation and Guidelines for Best Practices of Mass Concrete Construction Management." Georgia Department of Transportation (GDOT), FHWA-GA-22-1904, https://rosap.ntl.bts.gov/view/dot/64459

2) Cho, Y., Gentry, R., Brown, J., Kahn, L., and **Park, J.** (2019). "Investigation and guidelines for mass concrete construction management", Georgia Department of Transportation (GDOT), FHWA-GA-19-1625, pp. 1-46. https://rosap.ntl.bts.gov/view/dot/40282

3) Cho, Y., and **Park, J.** (2018). "Assessment of construction points for grade control and reference in 3D", Georgia Department of Transportation (GDOT), FHWA-GA-19-1618, pp. 1-50. https://rosap.ntl.bts.gov/view/dot/40280

Poster Presentation

1) **Park, J.**, Hasani, L.A., Brown, J., Cho, Y., Gentry, R., and Kurtis, K. (2021). " Phase II - Investigation and Guidelines for Best Practices of Mass Concrete Construction Management." The 9th GDOT-GTI Research Expo, Atlanta, GA, Oct 13, 2021

2) Yajima, Y., Chen, J., **Park, J.**, Kangisser, S., Irizarry, J., and Cho, Y. (2021) "Development of Highway Mowing Operations, Monitoring, and Verification using UAVs" The 57th ASC Annual International Conference, Virtual, CA, April 5-8, 2021.

3) **Park, J.**, Hasani, L.A., Brown, J., Cho, Y., Gentry, R., and Kurtis, K. (2020). " Phase II - Investigation and Guidelines for Best Practices of Mass Concrete Construction Management." The 8th GDOT-GTI Research Expo, Atlanta, GA, Oct 23, 2020.

4) **Park, J.**, Cho, Y., Gentry, R., and Kurtis, K. (2019). " Phase II - Investigation and Guidelines for Best Practices of Mass Concrete Construction Management." The 7th GDOT-GTI Research Expo, Atlanta, GA, Sep 13, 2019.

5) **Park, J.**, Zhou, Y., Cho, Y., Gentry, R., Brown, J., and Kahn, L. (2018). "Investigation and Guidelines for Mass Concrete Construction Management." The 6th GDOT-GTI Research Expo, Atlanta, GA, Sep 6, 2018.

6) Cho, Y., and **Park, J**. (2018). "Assessment of Construction Points for Grade Control and Reference in 3D." The 6th GDOT-GTI Research Expo, Atlanta, GA, Sep 6, 2018.

7) Cho, Y., and **Park, J.** (2018). "A Low-Cost Mobile Proximity Warning System in Highway Work Zone Safety." Transportation Research Board (TRB) 97th Annual Meeting, Washington, DC, January 7-11, 2018.

8) Cho, Y., Gentry, R., Brown, J., Kahn, L., **Park, J.,** and Yang, X. (2017). "Investigation and Guidelines for Mass Concrete Construction Management." The 5th Annual UTC Conference for the Southeastern Region, Gainesville, FL, November 16-17, 2017.

9) **Park, J.,** and Cho, Y. (2017). "Analysis of the causes of discrepancies between the as-designed and as-built layout of grade in road construction." The 5th Annual UTC Conference for the Southeastern Region, Gainesville, FL, November 16-17, 2017.

10) Cho, Y., and **Park, J.** (2017). "Assessment of Construction Points for Grade Control and Reference in 3D." The 5th GDOT-GTI Research Expo, Atlanta, GA, Oct 5, 2017.

Funded Grants and Contracts

1) PHASE III: INVESTIGATION AND GUIDELINES FOR BEST PRACTICES OF MASS CONCRETE CONSTRUCTION MANAGEMENT — Aug. 2022 – Present
   - Sponsor: Georgia Department of Transportation (GDOT)
   - Role: Research Assistant

2) Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network
   - Sponsor: CEE at Georgia Tech — May. 2021 – Aug. 2022
   - Role: Research Assistant

3) NSF Convergence Accelerator Track D: Rapid Development of Intelligent, Built Environment Geo-Databases Using AI and Data-Driven Models
   - Sponsor: National Science Foundation (NSF) — Sep. 2020 – Aug. 2022
   - Role: Research Assistant
   - Collaborative research – Oregon State University

4) Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management
   - Sponsor: Georgia Department of Transportation (GDOT) — Jul. 2019 – Jul. 2022
   - Role: Research Assistant

5) Rapid damage assessment and situation mapping system to support disaster response and recovery
   - Sponsor: Korea Agency for Infrastructure Technology Advancement (KAIA) — Apr. 2018 – Dec. 2020
   - Role: Research Assistant
   - International collaborative research – Seoul National University (South Korea)

6) Assessment of construction points for grade control and reference in 3D
   - Sponsor: Georgia Department of Transportation (GDOT) — Aug. 2016 – Jul. 2018
   - Role: Research Assistant

7) UAV Mobile Mapping System development for as-built structure information modeling
   - Sponsor: C2L GIS Ltd. (South Korea) — Jan. 2016 – Feb. 2017
   - Role: Research Consultant

Research Projects

1) Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network
   - Sponsor: CEE at Georgia Tech — Apr. 2021 – Present
   - Objective: To implement a non-target vision-based bridge vibration measurement using a multi-drone network
   - Keywords: UAV, Facility Management, Image processing

2) NSF Convergence Accelerator Track D: Rapid Development of Intelligent, Built Environment Geo-Databases Using AI and Data-Driven Models

- Sponsor: National Science Foundation (NSF) Sep. 2020 – Present
- Objective: To develop an AI-driven automated Scan-to-BIM framework
- Keywords: Scan-to-BIM, Point Cloud, Deep learning, As-built Modeling

3) Development of Drone-Assisted Highway Mowing Operations Planning, Monitoring, and Verification Capabilities

- Sponsor: Georgia Dept. of Transportation (GDOT) Aug. 2020 – Present
- Objective: To develop a guideline for highway mowing operation and verification using UAVs and AI
- Keywords: UAV, Deep learning, Image Processing, Facility management

4) Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management (GDOT RP 19-04)

- Sponsor: Georgia Dept. of Transportation (GDOT) Jul. 2019 – Present
- Objective: To improve and validate the mass concrete thermal management methods and decision-making tools
- Keywords: Construction material, Construction method, Concrete engineering

5) Rapid damage assessment and situation mapping system to support disaster response and recovery

- Sponsor: Korea Agency for Infrastructure Technology Advancement (KAIA) Apr. 2018 – Dec. 2020
- Objective: To develop deep learning-based rapid disaster response using UAVs.
- Keywords: Machine learning, UAV, Disaster response

6) Advanced blind lift safety using crane motion sensors and real-time visualization

- Sponsor: Chevron Energy Technology Dec. 2015 – Jun. 2019
- Objective: To provide visual aids for the blind operation of cranes by using CPS
- Keywords: Crane, Safety, AI, Digital Twin, CPS

7) Assessment of construction points for grade control and reference in 3D (FHWA-GA-19-1618)

- Sponsor: Georgia Dept. of Transportation (GDOT) Aug. 2016 – Jul. 2018
- Objective: To reduce the discrepancy between the as-design and the as-built model in roadway construction.
- Keywords: Earthmoving, UAV, UGV, TLS, IoT
- https://rosap.ntl.bts.gov/view/dot/40280

8) Investigation and Guidelines for Mass Concrete Construction Thermal Management (FHWA-GA-19-1625)

- Sponsor: Georgia Dept. of Transportation (GDOT) Jul. 2016 – Apr. 2019
- Objective: To investigate the mass concrete thermal behavior and provide a construction management guideline
- Keywords: Construction material, Economic analysis, Construction method, Decision-making
- https://rosap.ntl.bts.gov/view/dot/40282

9) UAV Mobile Mapping System development for as-built structure information modeling

- Sponsor: C2L GIS Ltd., (South Korea) Jan. 2016 – Feb. 2017
- Objective: To develop a UAV-based mobile mapping system for as-built bridge modeling
- Keywords: UAV, MMS, As-built Modeling, Survey

INSTITUTIONAL SERVICE ACTIVITIES

College Committee

2022 – Present **Secretary**, Curriculum Committee, College of Technology, Indiana State University

2022 – Present **Committee Member**, External Affairs Committee , College of Technology, Indiana State University

Departmental Committee

2022 – Present **Committee Member**, Curriculum Committee (Dept.), Dept. of Built Environment, Indiana State University

2021 – 2021 **Judging panel**, Tech Blitz, School of Civil and Environmental Engineering, Georgia Tech

PROFESSIONAL SOCIETY MEMBERSHIP & SERVICE

Journal Reviewer

- Journal of Construction Engineering and Management (ASCE)
- Journal of Computing in Civil Engineering (ASCE)
- Automation in Construction (Elsevier)
- International Journal of Applied Earth Observation and Geoinformation (Elsevier)
- Remote Sensing (MDPI)

American Society of Civil Engineers (ASCE)

- Associate Member (2020 – Present)
- Member, Visualization, Information Modeling, And Simulation (VIMS) – Nominated
- Volunteer, ASCE 2019 International Conference on Computing in Civil Engineering (i3CE)

Mechanical Contractors Association of America (MCAA)

- Faculty Advisor (2022 – Present)
- Members (2022- Present)

PROFESSIONAL CERTIFICATIONS AND SKILLS

Certificates:

1) Construction Industry Institute (CII), Construction Best Practices Course taught by University of Texas at Austin, 12 Professional Development Hours, Learning Certificate
2) Intensity English Program Course Certificate, Georgia Institute of Technology Language Institute
3) Remote Pilot for Small Unmanned Aircraft Systems (sUAS) Certificate, FAA
4) Certificate of Completion for Procore Fundamentals, Procore

Skills:

1) Deep Learning: Tensorflow and Keras
2) Point Cloud Processing: CloudCompare, MeshLab, and Recap
3) UAV Image Processing: Pix4D, Photoscan, and VisualSFM
4) Building Information Modeling: AutoCAD, Civil 3D, Revit, and Dynamo

PATENTS

Patents in Korea

1) A Method For Bridge Monitoring Based On The Global Navigation Satellite System including postprocessing and dynamic characteristic analysis module (Feb 19, 2014) (KR 10-1367167-0000)
2) An exaggerated error processing method in monitoring a bridge based on the Global Navigation Satellite System (Dec 27, 2012) (KR 10-1218354-0000)
3) APPARATUS FOR MEASURING GNSS DATA ACCURACY (Sep 18, 2012) (KR 10-1185432-0000)