JISOO PARK (Ph.D.)

Postdoctoral Fellow at Georgia Tech.

CONTACT INFORMATION

Georgia Institute of Technology
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RESEARCH INTEREST

- Construction Management
- Construction Automation and Robotics
- Machine learning and Computer vision
- Remote Sensing and Surveying

EDUCATION

Georgia Institute of Technology, Atlanta, Georgia 2016 – 2020

- *Doctor of Philosophy - Civil and Environmental Engineering | Minor: Building Construction*
- Area of Concentration: Construction Management and Automation
- Dissertation: PCIM: Deep learning-based point cloud information modeling framework

Hanyang University, South Korea 2008 – 2010

- *Master of Science - Civil and Environmental System Engineering*
- Area of Concentration: Concrete Structure and Material

Hanyang University, South Korea 2004 – 2008

- Bachelor of Science - *Civil and Environmental System Engineering*

EMPLOYMENT HISTORY (INDUSTRY EXPERIENCE)

1) **Georgia Institute of Technology**
   Postdoctoral Fellow 2021 – Present
   a. Research Projects
      i. Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management
      ii. Development of Drone-Assisted Highway Mowing Operations Planning, Monitoring, and Verification Capabilities
      iii. Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network
   b. Lectures
      i. Construction Automation and Robotics – Fall 2021
      ii. Construction Operation – Spring 2022 (Prospective)

2) **Korea Institute of Construction Technology**,
   Visiting Researcher 2021 – 2021
   a. Research Consultation
      - IoT-based Smart Pavement Maintenance System
      - Construction Jobsite Safety using Smart Vision System

3) **Korea Expressway Corporation**

Researcher 2013 – 2014

a. R&D Projects
   - Development of Fire Protection Design and Blast Resistance Methods of Tunnels and Bridges caused by Fire and Explosion of Vehicles
   - Performance Improvement of Concrete Median Barrier using Waste Glass Sludge

b. Services
   - Fire Dynamic Simulation
   - Vehicle Crash Test

4) **EJTech Co., Ltd (South Korea)**,

Field engineer 2010 – 2013

a. Sensor Installation and Construction Quality Control
   - Busan–Geoje Fixed Link
   - Gwangan Bridge
   - Incheon Bridge

Senior Researcher

a. R&D Projects
   - GNSS-based Bridge Health Monitoring System
   - MEMS 3-axis Accelerometer Development

HONORS AND AWARDS

1) **Second Place at 1st Scan-to-BIM Challenge (IEEE-CVPR)** (2021), IEEE *Conference on Computer Vision and Pattern Recognition* (CVPR) – "2D FLOORPLAN RECONSTRUCTION"
2) **CEE Future Faculty Fellow Award** (2021/2022), School of Civil and Environmental Engineering at Georgia Tech, (Awarded $1,000)
3) **CEE Cross-Cutting Research Seed Grant** (2021), School of Civil and Environmental Engineering at Georgia Tech, (Awarded $15,000)
4) **Brain Korea 21 Plus Scholarship** (2008-2009), Hanyang University, South Korea (Awarded $3,600)
5) **Academic Excellence Scholarship** (2005), Hanyang University, South Korea (Awarded $1,500)

TEACHING EXPERIENCE

Classes	***Role***	***Semester***
Construction Operation (Georgia Tech)	Lecturer	Spring 2022
Construction Automation and Robotics (Georgia Tech)	Lecturer	Fall 2021
Construction Automation and Robotics (Georgia Tech)	Substitute Lecturer	Spring 2021
Construction Industry Best Practices (Georgia Tech)	TA	Fall 2019
Construction Operation (Georgia Tech)	TA	Spring 2019
Construction Automation and Robotics (Georgia Tech)	TA	Fall 2018
Concrete Engineering and Lab. Test (Hanyang University)	TA	2008

JOURNAL ARTICLES

Published:

1) **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

2) 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

3) 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)

4) 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)

5) **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

6) **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

7) 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

8) 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:

9) **Park, J.**, Al-Hasani L., Gentry, R., Kurtis, K., Brown, J., and Cho, Y. (Forthcoming). "Multi-Criteria Decision-Making Framework of Thermal Control Methods using Nomogram for Mass Concrete Construction." *Construction and Building Materials* (under review).

10) **Park, J.**, Cho, Y., Kim, S., and Bae, K-H. (Forthcoming). "UAS-derived High-quality Orthomosaic Generation through Deep Learning-based Unwanted Object Removal." *Drones* (under review)

In Progress:

11) **Park, J.**, Yajima, Y., Kim, S., and Cho, Y. (Forthcoming) "3D Benchmark Datasets with Hierarchical Structure Collected from Construction Sites." *Automation in Construction* (expected submission date: January 2022)

12) **Park, J.**, and Cho, Y. (Forthcoming). "Effect of Parameter Combination for Construction Material Segmentation in Point Clouds." *ASCE Journal of Construction Engineering and Management*, (expected submission date: Feburary 2022)

13) Yajima, Y., Kim, S., **Park, J.**, Chen, J., and Cho, Y. (Forthcoming) "Sequential Deep Learning-based 2D Floor Plan Reconstruction from Unordered Point Cloud." *IEEE Conference on Computer Vision and Pattern Recognition* (CVPR 2022), (ongoing)

CONFERENCE PROCEEDINGS (peer-reviewed)

1) **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.

2) 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.

3) 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.

4) **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

5) 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

6) 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

7) **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.

8) **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

9) 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.

10) 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

POSTER PRESENTATION

1) **Park, 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, October 13, 2021 (submitted)

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.,** 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, October 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, September 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, September 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, September 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, October 5, 2017.

RESEARCH PROPOSALS (Awarded)

1) Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network
   - Sponsor: CEE at Georgia Tech — May. 2021 – Present
   - Awarded Amount: $15,000

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
   - Awarded Amount: $920,000 (Total)
   - Collaborative research – Oregon State University

3) Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management
   - Sponsor: Georgia Department of Trasportation (GDOT) — Jul. 2019 – Present
   - Awarded Amount: $385,011

4) 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
   - Awarded Amount: $476,186 (Total)
   - International collaborative research – Seoul National University (South Korea)

5) Assessment of construction points for grade control and reference in 3D
   - Sponsor: Georgia Department of Transportation (GDOT) — Aug. 2016 – Jul. 2018
   - Awarded Amount: $182,412

6) UAV Mobile Mapping System development for as-built structure information modeling
   - Sponsor: C2L GIS Ltd. (South Korea) — Jan. 2016 – Feb. 2017
   - Awarded Amount: $42,537

RESEARCH PROPOSALS (Submitted – under review)

1) Human-in-the-Loop CPS for Non-Contact Facility Maintenance at the post COVID era — 09/25/2021
   - Sponsor: National Science Foundation (NSF) – CPS
   - Budget (requested): $ 201,515
   - Collaborative research – Purdue University – West Lafayette

2) PHASE III: INVESTIGATION AND GUIDELINES FOR BEST PRACTICES OF MASS CONCRETE CONSTRUCTION MANAGEMENT — 09/17/2021
   - Sponsor: Georgia Department of Transportation (GDOT)
   - Budget (requested): TBD

3) Cloud-Enabled Collaborative Robot Team for Reactive Post-Disaster Damage Diagnosis — 09/01/2021
   - Sponsor: National Science Foundation (NSF) – CDS&E
   - Budget (requested): N/A
   - Collaborative research – Stanford University

4) Autonomous Underwater Infrastructure Inspection Robot — 05/03/2021
   - Sponsor: National Science Foundation (NSF) – NRI
   - Budget (requested): $493,595
   - Collaborative research – North Dacota State University

5) Human-Engaged Robot Operation In Construction (HEROIC) — 03/20/2021
   - Sponsor: National Science Foundation (NSF) - FW-HTF
   - Budget (requested): $ 118,535

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 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) 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

7) 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

8) 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

GOVERNMENT REPORTS

1) 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
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

RELATED OUTREACH PROGRAMS

1) ASCE 2019 International Conference on Computing in Civil Engineering (i3CE) – *Volunteer* 2019
2) K-16 outreach research project – *Volunteer Instructor* 2019 – Present
3) Master student research program – *Mentor* 2018 - 2019

PROFESSIONAL ORGANIZATIONS AND SERVICE

Organizations

1) ASCE Visualization, Information Modeling, And Simulation (VIMS) – Member (nominated) 2021
2) American Society of Civil Engineers (ASCE) – Associate Member 2020 – Present
3) American Concrete Institute (ACI) – Student Member 2019 – 2020
4) Korean American Construction Engineering and Project Management Association – Member 2016 – Present

Professional Services

1) 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)
2) Research Consultant:
   - Korea Institute of Construction Technology (KICT), South Korea
   - Korea Expressway Corporation, South Korea

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

Skills:

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

PATENTS

Patents in Korea

1) Outlier removal in GNSS data for bridge health monitoring (2012) (IPC code: G01S 19/01)
2) Equipment for GNSS data accuracy measurement (2012) (IPC code: G01S 19/20)
3) GNSS-based bridge health monitoring with dynamic analysis (2013) (IPC code: G01S 19/53)