

### CONTACT INFORMATION

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### RESEARCH INTEREST

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- Construction Management
- Construction Automation and Robotics
- Machine learning and Computer vision
- Remote Sensing and Surveying
- Building Information Modeling (BIM)

### EDUCATION

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#### 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 (PROFESSIONAL EXPERIENCE)

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#### 1) Georgia Institute of Technology

*Postdoctoral Fellow*

2021 – Present

- a. Research
  - Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management
  - Development of Drone-Assisted Highway Mowing Operations Planning, Monitoring, and Verification
  - Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network
- b. Lectures
  - Construction Operation – Spring 2022
  - Construction Automation and Robotics – Fall 2021

#### 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. Research

- Fire Dynamic Simulation
- Vehicle Crash Test for Concrete Median Strip
- Improvement of Concrete Durability using Glass Powder

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

*Field engineer*

2010 – 2013

a. Construction Quality Control and Surveying

- Busan-Geoje Fixed Link Construction
- Incheon Bridge Construction
- Pyeongtaek-Jecheon Expressway Construction

b. Bridge Health Monitoring

- GPS-based Gwangan Bridge Health Monitoring
- Seohae Bridge Health Monitoring

## HONORS AND AWARDS

- 1) **Second Place at 1<sup>st</sup> 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

<u>Classes</u>	<u>Role</u>	<u>Semester</u>	<u>Student Evaluation</u>
Construction Operation (Georgia Tech)	<i>Lecturer</i>	Spring 2022	4.6/5.0
Construction Automation and Robotics (Georgia Tech)	<i>Lecturer</i>	Fall 2021	4.9/5.0
Construction Automation and Robotics (Georgia Tech)	<i>Substitute Lecturer</i>	Spring 2021	4.7/5.0
Construction Industry Best Practices (Georgia Tech)	<i>TA</i>	Fall 2019	
Construction Operation (Georgia Tech)	<i>TA</i>	Spring 2019	
Construction Automation and Robotics (Georgia Tech)	<i>TA</i>	Fall 2018	
Concrete Engineering and Lab. Test (Hanyang University)	<i>TA</i>	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](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](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>
- 9) Lee, J., Huh, Y., and **Park, J.** (Accepted) "Geospatial Simulation System of Mountain Area Black Ice Accident." *Applied Science*, 12(11), DOI: <https://doi.org/10.3390/app12115709>

### Under Review:

- 10) Al-Hasani, L., **Park, J.**, Perez, G., Herndon, H., Brown, J., Cho, Y., Gentry, R., and Kurtis, K. (Forthcoming). "Quantifying concrete adiabatic temperature rise based on temperature-dependent isothermal calorimetry; modeling and validation." *Materials and Structures* (2<sup>nd</sup> review phase).
- 11) **Park, J.**, Cho, Y., and Kim, S.(Forthcoming). "Deep Learning-based UAS Image Segmentation and Inpainting for Generating Vehicle-Free Orthomosaic." *International Journal of Applied Earth Observation and Geoinformation* (under review)
- 12) Lee, J., Huh, Y., and **Park, J.** (Forthcoming) "Detecting Unauthorized Buildings and Facilities on the Public Land with High-Resolution Satellite Images." *Applied Science* (under review)

### In Prep.:

- 1) Brown, J., **Park, J.**, Al-Hasani L., Gentry, R., Kurtis, K., and Cho, Y. (Forthcoming). "A Family of Thermal Nomograms." *Construction and Building Materials* (In prep).
- 2) **Park, J.**, Yajima, Y., and Cho, Y. (Forthcoming) "3D Benchmark Datasets with Hierarchical Structure Collected from Construction Sites." *Automation in Construction* (In prep)
- 3) **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)

## CONFERENCE PROCEEDINGS (Peer Reviewed)

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- 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., DOI: <https://doi.org/10.1061/9780784483893.001>
- 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., DOI: <https://doi.org/10.1061/9780784483893.110>
- 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., DOI: <https://doi.org/10.1061/9780784483893.109>
- 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 18th International 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

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- 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.

## TECHNICAL REPORTS

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- 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>

## RESEARCH PROPOSALS (**Awarded**)

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- 1) PHASE III: INVESTIGATION AND GUIDELINES FOR BEST PRACTICES OF MASS CONCRETE CONSTRUCTION MANAGEMENT Accepted
  - Sponsor: Georgia Department of Transportation (GDOT)
  - Awarded Amount: TBD
- 2) Non-target Vision-based Structural Vibration Measurement using Connected Multi-drone Network May. 2021 – Present
  - Sponsor: CEE at Georgia Tech
  - Awarded Amount: \$15,000
- 3) NSF Convergence Accelerator Track D: Rapid Development of Intelligent, Built Environment Geo-Databases Using AI and Data-Driven Models Sep. 2020 – Present
  - Sponsor: National Science Foundation (NSF)
  - Awarded Amount: \$920,000 (Total)
  - Collaborative research – Oregon State University
- 4) Phase II Investigation and Guidelines for Best Practices of Mass Concrete Construction Management Jul. 2019 – Present
  - Sponsor: Georgia Department of Transportation (GDOT)
  - Awarded Amount: \$385,011
- 5) Rapid damage assessment and situation mapping system to support disaster response and recovery Apr. 2018 – Dec. 2020
  - Sponsor: Korea Agency for Infrastructure Technology Advancement (KAIA)
  - Awarded Amount: \$476,186 (Total)
  - 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
  - Awarded Amount: \$182,412
- 7) 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 (Under review or In Prep.)

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- 1) Guidelines for Digital Technologies and Systems for Remote Construction Inspection for Highway Infrastructure Projects (NCHRP 10-112) 05/20/2022
  - Sponsor: National Cooperative Highway Research Program (NCHRP)
  - Budget (requested): \$ 500,000
- 2) CPS-based Unmanned Safety Monitoring System for Unconventional Oil Plant 02/14/2022
  - Sponsor: Korea Agency for Infrastructure Technology Advancement (KAIA)
  - Budget (requested): \$ 449,050
  - International Collaborative research – Dankook University
- 3) 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
- 4) Autonomous Underwater Infrastructure Inspection Robot In Prep.
  - Sponsor: National Science Foundation (NSF) – NRI
  - Budget (requested): TBD
  - Collaborative research – North Dakota State University

## RESEARCH PROJECTS

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- 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 Sep. 2020 – Present
  - Sponsor: National Science Foundation (NSF)
  - 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 Aug. 2020 – Present
  - Sponsor: Georgia Dept. of Transportation (GDOT)
  - 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) Jul. 2019 – Present
  - Sponsor: Georgia Dept. of Transportation (GDOT)
  - 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

## OUTREACH AND MENTORING PROGRAMS

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- 1) *Volunteer Instructor*, K-16 Outreach Program for Future Female STEM Engineers 2019 – Present
- 2) *Mentor*, Undergraduate Research Program 2019 – 2019
- 3) *Mentor*, Graduate Student Independent Research Program 2018 - 2019

## LEADERSHIP AND PROFESSIONAL SERVICE

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### Reviewer

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

### Conference Organization

- 1) *Student Volunteer*, ASCE 2019 International Conference on Computing in Civil Engineering (i3CE) 2019

### University Committees

- 1) *Judging panel*, Tech Blitz (Graduate Students Competition) at Georgia Tech 2021

### Student Organizations

- 1) *Vice President*, Korean Graduate Association at Georgia Tech 2018 – 2019

## PROFESSIONAL AFFILIATIONS

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- |   |                |
|---|----------------|
| 1) ASCE Visualization, Information Modeling, And Simulation (VIMS) – Member (nominated) | 2022           |
| 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 CERTIFICATIONS AND SKILLS

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### 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) 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

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### 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)