

# Kinam Kim

## Ph.D. Candidate

School of Civil and Environmental Engineering  
College of Engineering  
Georgia Institute of Technology  
Atlanta, GA, 30332, USA

kkim734@gatech.edu  
<http://ki-nam.github.io>

## Table of contents

<b>I. Introduction</b>	<b>2</b>
<b>II. Earned Degrees</b>	<b>2</b>
<b>III. Employment History</b>	<b>2</b>
<b>IV. Honors and Awards</b>	<b>2</b>
<b>V. Research, Publication, and Creative Activities</b>	<b>3</b>
A. Research Experience . . . . .	3
A.1. Construction Work Zone Safety . . . . .	3
A.2. Construction Worker's Behavior and Productivity Monitoring . . . . .	3
A.3. Real-time Crane Operation Visualization . . . . .	3
A.4. Climate Change Adaptation of Infrastructure . . . . .	3
B. Refereed Publication and Submitted Articles . . . . .	3
B.1. Thesis . . . . .	3
B.2. Published and Submitted Journal Articles . . . . .	4
B.3. Conference Presentation with Proceedings (Referred) . . . . .	4
C. Patents . . . . .	5
D. Presentation (Selected) . . . . .	5
E. Professional/Service Activities . . . . .	6
F. Technical Skills . . . . .	6
<b>VI. Teaching</b>	<b>6</b>

## I. INTRODUCTION

I am a civil engineering Ph.D. candidate at the Georgia Institute of Technology working under Dr. Yong K. Cho (<http://rical.ce.gatech.edu>) and am on track to defend my doctoral thesis in May 2022. My research aims to better understand construction jobsites and to facilitate informative interaction between construction entities and resources. By using emerging technologies such as IoT (Internet of Things) and artificial intelligence, automation of acquiring, processing, interpreting, and sharing useful information can be achieved so that various stakeholders of construction projects can obtain the information effectively and efficiently, and ultimately make a decision. In this context, I have conducted research on IoT-enabled proximity warning systems with different sensing modalities and information delivery methods. I have researched automated recognition of construction worker's behavior and productivity using deep learning approaches as my Ph.D. thesis. I conducted research on visualizing a crane operation on a real time basis to improve its safety in blind lifts.

## II. EARNED DEGREES

<b>Ph.D.</b>	2022(expected)	Georgia Institute of Technology	<i>Civil Engineering</i>
<b>M.S.</b>	2016	Yonsei University	<i>Civil and Environmental Engineering</i>
<b>B.S.</b>	2014	Yonsei University	<i>Civil and Environmental Engineering</i>

## III. EMPLOYMENT HISTORY

<b>Graduate Research Assistant</b>	School of Civil and Environmental Engineering Georgia Institute of Technology, Atlanta, GA	<i>Aug. 2017-present</i>
<b>Research Associate</b>	School of Civil and Environmental Engineering Yonsei University, Seoul, South Korea	<i>Sept. 2016-July 2017</i>
<b>Graduate Research Assistant</b>	School of Civil and Environmental Engineering Yonsei University, Seoul, South Korea	<i>Mar. 2014-Aug.2016</i>
<b>Research Intern</b>	School of Civil and Environmental Engineering Yonsei University, Seoul, South Korea	<i>Sept. 2013-Feb.2014</i>
<b>Research Intern</b>	Korea Railroad Research Institute (KRRI), Uiwang, South Korea	<i>Aug. 2012</i>
<b>Republic of Korea Army</b>	Gyeryong, South Korea	<i>Jan. 2010-Oct.2011</i>

## IV. HONORS AND AWARDS

1. Graduate Research Assistantship (\$70k per year), 2017-present  
School of Civil and Environmental Engineering, Georgia Institute of Technology
2. Best Paper Award at KSCE 2016 Convention, 2016  
Korean Society of Civil Engineers, South Korea
3. Brain Korea 21 Plus Scholarship (\$3,600), 2016  
Creative Human Resources Center for Resilient Infrastructure, Yonsei University, Seoul, South Korea
4. Graduate Teaching Assistantship (\$2,500), 2015  
School of Civil and Environmental Engineering, Yonsei University, Seoul, South Korea
5. Graduate Research Assistantship (\$54k per year), 2014-2017  
School of Civil and Environmental Engineering, Yonsei University, Seoul, South Korea
6. Best Paper Award at Korean Institute of Construction Engineering and Management 2014 Conference, 2014  
Korean Institute of Construction Engineering and Management, South Korea
7. Academic Excellence Scholarship (\$1,500), 2012  
College of Engineering, Yonsei University, Seoul, South Korea

## V. RESEARCH, PUBLICATION, AND CREATIVE ACTIVITIES

### A. RESEARCH EXPERIENCE

#### A.1. CONSTRUCTION WORK ZONE SAFETY

**2014-2017:** Development of an image-based proximity warning system using augmented reality in wearable device

**2017-present:** Development and implementation of an IoT-driven proximity warning system with case studies

**2019-present:** Development of hardware and software for an IoT application in a jobsite

##### Projects

- Intelligent Interactive InfoEcosystem for Automating and Optimizing On-site Safety/Construction, funded by National Research Foundation of Korea (NRF)
- Phase III: Smart Proximity Work Zone Safety Technology Deployment funded by Georgia Department of Transportation
- A Smart IoT Proximity Alert System for Highway Work Zone Safety funded by NCHRP IDEA program
- AwareSite- Smart and Connected Construction Jobsite for Construction Safety and Productivity Improvement funded by Dysruptek

#### A.2. CONSTRUCTION WORKER'S BEHAVIOR AND PRODUCTIVITY MONITORING

**2018-2019:** Evaluation of the effectiveness of locations and quantity of motion sensors for machine learning algorithms

**2019-present:** Automated recognition of construction workers' motions and activities for monitoring their behavior and productivity using deep learning approaches

##### Projects

- PFI-TT: Smart Pose and Position Guidance System for Construction Worker's Safety and Productivity funded by National Science Foundation (NSF)

#### A.3. REAL-TIME CRANE OPERATION VISUALIZATION

**2017-2018:** Visualization of load sway to improve crane safety in blind lifts

##### Projects

- Advanced Blind Lift Safety using Crane Motion Sensors and Real-time Visualization funded by Chevron Energy Technology Company

#### A.4. CLIMATE CHANGE ADAPTATION OF INFRASTRUCTURE

**2014-2015:** Economic assessment of climate change adaptation of infrastructure

##### Projects

- Proactive Adaptation Scenarios for Infrastructure under Climate Change using Probabilistic Life Cycle Cost Analysis funded by National Research Foundation of Korea (NRF)

### B. REFEREED PUBLICATION AND SUBMITTED ARTICLES

#### B.1. THESIS

[1] **Ph.D. Thesis**

Title: *Automated Behavior and Productivity Monitoring for Construction Workers by using a Deep learning algorithm*

Date: May 2022 (expected)

Advisor: Dr. Yong K. Cho

Georgia Institute of Technology

[2] **M.S. Thesis**

Title: *Image-based Construction Hazard Avoidance System using Augmented Reality in a Wearable Device*

Date: June 2016

Advisor: Dr. Hyoungkwan Kim

Yonsei University

**B.2. PUBLISHED AND SUBMITTED JOURNAL ARTICLES**

- [1] Youjin Jang, Kinam Kim, Fernanda Leite, Steven Ayer, and Yong K. Cho, (2021). "Identifying the Perception Differences of Emerging Construction-Related Technologies between Industry and Academia to Enable High Levels of Collaboration" *Journal of Construction Engineering and Management*, [https://doi.org/10.1061/\(ASCE\)CE.1943-7862.0002156](https://doi.org/10.1061/(ASCE)CE.1943-7862.0002156).
- [2] Kinam Kim and Yong K. Cho (2021). "Automatic Recognition of Workers' Motions in Highway Construction by using Motion Sensors and Long Short-Term Memory (LSTM) Networks" *Journal of Construction Engineering and Management*, [https://doi.org/10.1061/\(ASCE\)CE.1943-7862.0002001](https://doi.org/10.1061/(ASCE)CE.1943-7862.0002001).
- [3] Kinam Kim and Yong K. Cho (2020). "Effective Inertial Sensor Quantity and Locations on a Body for Deep Learning-Based Worker's Motion Recognition." *Automation in Construction*, <https://doi.org/10.1016/j.autcon.2020.103126>.
- [4] Yihai Fang, Jingdao Chen, Yong K. Cho, and Kinam Kim (2018). "Vision-Based Load Sway Monitoring to Improve Crane Safety in Blind Lifts." *Journal of Structural Integrity and Maintenance*, <https://doi.org/10.1080/24705314.2018.1531348>.
- [5] Kyoungki Kim, Yong K. Cho, and Kinam Kim. (2018). "BIM-Based Decision-Making Framework for Scaffolding Planning." *Journal of Management in Engineering*, [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000656](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000656).
- [6] Kyoungki Kim, Yong Cho, and Kinam Kim. (2018). "BIM-Driven Automated Decision Support System for Safety Planning of Temporary Structures." *Journal of Construction Engineering and Management*, [https://doi.org/10.1061/\(ASCE\)CE.1943-7862.0001519](https://doi.org/10.1061/(ASCE)CE.1943-7862.0001519).
- [7] Kinam Kim, Hongjo Kim, and Hyoungkwan Kim. (2017). "Image-Based Construction Hazard Avoidance System using Augmented Reality in Wearable Device." *Automation in Construction*, <https://doi.org/10.1016/j.autcon.2017.06.014>.
- [8] Sooji Ha, Kyeongseok Kim, Kinam Kim, Hoyoung Jeong and Hyoungkwan Kim (2017). "Reliability Approach in Economic Assessment of Climate Change Adaptation of Infrastructure: A Debris Flow Barrier Example" *Journal of Management in Engineering*, [https://doi.org/10.1061/\(ASCE\)ME.1943-5479.0000530](https://doi.org/10.1061/(ASCE)ME.1943-5479.0000530)
- [9] Hongjo Kim, Kinam Kim, and Hyoungkwan Kim. (2016). "Data-Driven Scene Parsing Method for Recognizing Construction Site Objects in the Whole Image." *Automation in Construction*, <https://doi.org/10.1016/j.autcon.2016.08.018>.
- [10] Hongjo Kim, Kinam Kim, and Hyoungkwan Kim. (2016). "Vision-Based Object-Centric Safety Assessment Using Fuzzy Inference: Monitoring Struck-By Accidents with Moving Objects." *Journal of Computing in Civil Engineering*, [https://doi.org/10.1061/\(ASCE\)CP.1943-5487.0000562](https://doi.org/10.1061/(ASCE)CP.1943-5487.0000562).
- [11] Hongjo Kim, Changyoon Kim, Hoyoung Jeong, Sooji Ha, Kinam Kim, and Hyoungkwan Kim. (2015). "4D CAM Drawings based on Marker-Based Augmented Reality." *Korean Journal of Construction Engineering and Management*, <https://doi.org/10.6106/KJCEM.2015.16.4.030>.

**B.3. CONFERENCE PRESENTATION WITH PROCEEDINGS (REFERRED)**

- [1] Kinam Kim, Jingdao Chen, and Yong K. Cho (2019). "Evaluation of Machine Learning Algorithms for Worker's Motion Recognition using Motion Sensors." *In Proceedings of the ASCE 2019 International Conference on Computing in Civil Engineering (i3CE)*, Atlanta, GA, USA, June 17-19, <https://doi.org/10.1061/9780784482438.007>.

- [2] Jingdao Chen, Kinam Kim, Yong K. Cho, Joo Sung Lee, Byeol Kim, Yong Han Ahn, and Junsuk Kang (2019). "Nuclear Power Plant Disaster Site Simulation using Rigid Body Physics." *In Proceedings of the ASCE 2019 International Conference on Computing in Civil Engineering (i3CE)*, Atlanta, GA, USA, June, <https://doi.org/10.1061/9780784482421.069>.
- [3] Yong K. Cho, Youjin Jang, Kinam Kim, Fernanda Leite, and Steven Ayer (2019). "Understanding Different Views on Emerging Technology Acceptance between Academia and the AEC/FM Industry." *In Proceedings of the ASCE 2019 International Conference on Computing in Civil Engineering (i3CE)*, Atlanta, GA, USA, June, <https://doi.org/10.1061/9780784482438.077>.
- [4] Yong K. Cho, Kinam Kim, Shaojun Ma, and Jun Ueda. (2018). "A Robotic Wearable Exoskeleton for Construction Worker's Safety and Health." *In Proceedings of ASCE Construction Research Congress (CRC) 2018*, New Orleans, LA, USA, April, <https://doi.org/10.1061/9780784481288.003>.
- [5] Kinam Kim, Hongjo Kim, and Hyoungkwan Kim. (2016). "Hazard Avoidance System using Augmented Reality in Wearable Device." *In Proceedings of the 16th international Conference on Computing in Civil and Building Engineering (ICCCBE) 2016*, Osaka, Japan, July , [http://www.see.eng.osaka-u.ac.jp/seeit/icccbe2016/Proceedings/Full\\_Papers/196-290.pdf](http://www.see.eng.osaka-u.ac.jp/seeit/icccbe2016/Proceedings/Full_Papers/196-290.pdf).
- [6] Sooji Ha, Hoyoung Jeong, Kinam Kim, Hongjo Kim, and Hyoungkwan Kim. (2015). "Valuation of Adaptation Technology to Climate Change Based on Target Classification." *In Proceedings of the 32nd International Symposium on Automation and Robotics in Construction and Mining (ISARC) 2015*, Oulu, Finland, June, <https://doi.org/10.22260/ISARC2015/0124>.
- [7] Kinam Kim, Hoyoung Jeong, Hongjo Kim, Sangseom Jeong, and Hyoungkwan Kim. (2014). "Economic Assessment of Landslide Behavior Simulation Technology under Climate Change." *In Proceedings of the 14th World Conference of Associated Research Centers for Urban Underground Space (ACUUS) 2014*, Seoul, Korea, Sept.
- [8] Hongjo Kim, Kinam Kim, Sungjae Park, Jihoon Kim, and Hyoungkwan Kim. (2014). "An Interactive Progress Monitoring System using Image Processing in Mobile Computing Environment." *In Proceedings of the 31st International Symposium on Automation and Robotics in Construction and Mining (ISARC) 2014*, Sydney, Australia, July, <https://doi.org/10.22260/ISARC2014/0041>.
- [9] Hongjo Kim, Kinam Kim, Seongdeok Bang and Hyoungkwan Kim.(2016) "Reconstruction of Construction Entities from Images using Multi-View Stereo" *In Proceedings of the KSCE 2016 Convention*, Jeju, Korea, Oct.
- [10] Hongjo Kim, Hoyoung Jeong, Kinam Kim, Sungjae Park, Changyoon Kim, and Hyoungkwan Kim. (2014). "A Fuzzy Inference- and Computer Vision- based Safety Assessment System for Construction Site Entities." *In Proceedings of the 14th Korean Institute of Construction Engineering and Management Conference 2014*, Seoul, Korea, Nov.
- [11] Hongjo Kim, Kinam Kim, Sungjae Park, Hoyoung Jeong, and Hyoungkwan Kim. (2014). "Applicability of the Kalman Filter for Multi-object Tracking in Construction Sites." *In Proceedings of the KSCE 2014 Convention*, Daegu, Korea, Oct.

## C. PATENTS

- [1] Hyoungkwan Kim, Kinam Kim, and Hongjo Kim. "Visualization of Safety Assessment System in Construction Site using Wearable Device." Patent number 10-1715001, Mar., 4, 2017.
- [2] Hyoungkwan Kim, Hongjo Kim, Kinam Kim, and Hoyoung Jeong. "System for Assessment of Safety Level at Construction Site based on Computer Vision" Patent number 10-1674266, Nov., 2, 2016.

## D. PRESENTATION (SELECTED)

- [1] **Phase III: Smart Proximity Work Zone Safety Technology Deployment**  
The 8th Annual GDOT/GTI Research Exposition (10/2020)
- [2] **Phase III: Smart Proximity Work Zone Safety Technology Deployment**  
The 7th Annual GDOT/GTI Research Exposition (09/2019)

- [3] **An Integrated Construction Worker Monitoring System for Tracking Locations and Recognizing Motions of the Workers**  
ASCE 2019 International Conference on Computing in Civil Engineering (i3CE) (06/2019)
- [4] **Evaluation of Machine Learning Algorithms for Worker's Motion Recognition using Motion Sensors**  
ASCE 2019 International Conference on Computing in Civil Engineering (i3CE) (06/2019)
- [5] **A Robotic Wearable Exoskeleton for Construction Worker's Safety and Health**  
ASCE Construction Research Congress (CRC) 2018 (04/2018)
- [6] **Hazard Avoidance System using Augmented Reality in Wearable Device**  
The 16th international Conference on Computing in Civil and Building Engineering (ICCCBE) 2016 (07/2016)
- [7] **Economic Assessment of Landslide Behavior Simulation Technology under Climate Change**  
the 14th World Conference of Associated Research Centers for Urban Underground Space (ACUUS) 2014 (09/2014)

## E. PROFESSIONAL/SERVICE ACTIVITIES

- Reviewer for XXX
- Reviewer for YYY
- Chief organizing assistant for ASCE 2019 International Conference on Computing in Civil Engineering (i3CE)

## F. TECHNICAL SKILLS

- Programming: Python, Matlab, Java, C++
- Software frameworks: Tensorflow, Pytorch, Scikit-learn
- Others: Embedded system for IoT application, Android studio, ArcGIS, 3D CAD

## VI. TEACHING

Semester	Course Number	Course Title	Role
Fall 2021	CEE 4803D/8813E	Construction Industry Best Practices	Teaching assistant
Fall 2021	CEE 4803C/8813L	Construction Automation and Robotics	Guest lecturer & Teaching assistant
Spring 2021	CEE 4803F/8813L	Automation in Construction	Guest lecturer & Teaching assistant
Fall 2020	CEE 8813N	Construction Industry Best Practices	Teaching assistant
Fall 2020	CEE 4120A	Construction Operations	Teaching assistant
Fall 2019	CEE 8813I	Automation in Construction	Guest lecturer & Teaching assistant
Fall 2018	CEE 8813C	Automation in Construction	Guest lecturer
Spring 2016	CEE 4408	Construction Management	Teaching assistant
Fall 2015	CEE 4412	Construction Economic Feasibility	Teaching assistant
Fall 2014	CEE 4412	Construction Economic Feasibility	Teaching assistant