Hyunwoong Ko, Ph.D.

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RESEARCH INTERESTS

- Additive Manufacturing
- AI, Machine Learning, and Data Analytics in Manufacturing and Design
- Data Fusion, Integration, Management, and Processing
- Digital Twin and Cyber-Physical Manufacturing Systems
- Physics-Based Data-Driven Hybrid Modeling
- Process-Structure-Property Causal Analytics

PROFESSIONAL EXPERIENCE

• Assistant Professor, School of Manufacturing Systems and Networks, Ira A. Fulton Schools of Engineering, Arizona State University, USA	Jan. 2022 – Present
• Graduate Faculty, Ph.D. Program in Manufacturing Engineering, Arizona State University, USA	Jan. 2023 – Present
• Graduate Faculty, Ph.D. Program in Data Science, Analytics, and Engineering, Arizona State University, USA	Jan. 2022 – Present
• Graduate Faculty, Ph.D. Program in Systems Engineering, Arizona State University, USA	Jan. 2022 – Present
• Postdoctoral Research Associate, Systems Integration Division, Engineering Laboratory, National Institute of Standards and Technology, USA	Oct. 2019 – Sep. 2021
• Research Associate, Systems Integration Division, Engineering Laboratory, National Institute of Standards and Technology, USA	Oct. 2017 – Sep. 2019
• Research and Teaching Assistant, Design Science Laboratory & Singapore Centre for 3D Printing, School of Mechanical and Aerospace, Nanyang Technological University, Singapore	Aug. 2013 – Sep. 2017
• Research Associate, Complex Systems Interaction Laboratory, Department of Industrial and Management Engineering, Hanyang University, South Korea	Mar. 2012 – Feb. 2013
• Research and Teaching Assistant, Complex Systems Interaction Laboratory, Department of Industrial and Management Engineering, Hanyang University, South Korea	Mar. 2010 – Feb. 2012

EDUCATION

Ph.D., Mechanical and Aerospace Engineering
Nanyang Technological University (NTU), Singapore   Sep. 2019

- Agency for Science Technology and Research (A*STAR) scholar
- Research associate at National Institute of Standards and Technology (NIST), USA

M.S., Industrial and Management Engineering
Hanyang University, South Korea   Feb. 2012

B.S., Industrial Engineering Feb. 2010
Hanyang University (ERICA), South Korea
- 1st ranked in the graduating class
- Accreditation Board for Engineering Education of Korea (ABEEK)

HONORS AND AWARDS

• Faculty of Impact Award, ASU	May 2023
• 2020, Best Paper Award, KSME Fall/Spring Online Conference, Korean Society of Mechanical Engineers	Dec. 2020
• 2019 IEEE CASE Student Travel Award	Jun. 2019
• 2017 IJPEM Highly Commended Paper Award	Dec. 2017
• 2nd place, 2013 1st Singapore International 3D Printing Competition	Dec. 2013
• Singapore International Graduate Award (SINGA), Agency for Science Technology and Research (A*STAR)	Aug. 2013 – Aug. 2017
• Scholarship (Excellent & Honor), Hanyang University	Mar. 2010 – Dec. 2011
• Graduated summa cum laude (1st ranked in the graduating class), Hanyang University	Feb. 2010
• 3rd place, 2009 Paper Competition in Applied Science and Technology, College of Science and Technology, Hanyang University	Nov. 2009
• Scholarship (Honor), Hanyang University	Fall 2009
• Scholarship (Excellent), Hanyang University	Spring 2009
• National Science & Technology Scholarship, Korea Student Aid Foundation	Fall 208
• Scholarship (Honor), Hanyang University	Spring 2008
• Scholarship (Top), Hanyang University	Fall 2007
• The Army Achievement Medal, US Army	Oct. 2006

PUBLICATIONS

*: Corresponding Author

Work in Progress
1. **Ko, H.***, Kim, J., Yan, L., Shin, D., Yang, Z., Oh., Y., "**Spatial-temporal Modeling Using Deep Learning for Real-time Monitoring of Additive Manufacturing**," Journal of Manufacturing Science and Engineering, Under development.
2. Fonseca, N., Thummalapalli, S. V., Jambhulkar, S., Ravichandran, D., Zhu, Y., Patil, D., Thippanna, V., Ramanathan, A., Xu, W., Guo, S., **Ko, H.**, Kannan, A. M., Nian, Q., Asadi, A., Guillaume, M., Anna, D., Hassan, M. K., AliAl-Maadeee, M. A., El-Dessouky, H. M., Stan, F., Song, K.*, "3D Printing-enabled Design and Manufacturing Strategies for Batteries: A Review", Small, Under revision.
3. Safdar, M., Xie, J., **Ko, H.**, Lu, Y., Lamouche, G., Zhao, Y. F.*, "**Transferability Analysis of Data-driven Additive Manufacturing Knowledge: A Case Study Between Powder Bed Fusion and Directed Energy Deposition**," Journal of Computing and Information Science in Engineering. Under development.
4. Yang*, Z., Kim, J., Lu, Y., Jones, A., Witherell, P., Ho, Y., **Ko, H.**, "**Enhancing Part Quality Management Using an Extended Data Fusion Framework in Metal Powder Bed Fusion Additive Manufacturing,**" Journal of Computing and Information Science in Engineering. Under development.

Book Chapter
1. Kitt, A.*, **Ko, H.**, "**Data Analytics and Machine Learning in Metal Additive Manufacturing: Challenges, Segmentations, and Applications**," ASM Handbooks, ASM International: The American Society for Metals, In-press.

Journals
1. Guo, S.*, **Ko, H.**, Wang, A., "**Applications and Prospects of Machine learning for Aerosol Jet Printing: A Review**," IISE Transactions, Under revision.
2. Kim, J., Yang, Z., **Ko, H.**, Choi, J., Cho, H., Lu, Y.* (2023), "**Deep Learning Based Data Registration for Melt Pool Monitoring of Laser Powder Bed Fusion Additive Manufacturing**," Journal of Manufacturing Systems, Vol. 68, pp. 117-129.
3. **Ko, H.***, Yang, Z., Ndiaye, N. Y., Witherell, P., Lu, Y. (2023) "**A Framework Driven by Physics-Guided Machine Learning for Process-Structure-Property Causal Analytics in Additive Manufacturing**," Journal of Manufacturing Systems, Vol. 67, pp. 213-228.
4. Feng, S.*, Moges, T., Park, H., Yakout, M., Jones, A., **Ko, H.**, Witherell, P. (2023), "**Functional Requirements of Software Tools for Laser-based Powder Bed Fusion Additive Manufacturing for Metals**," Journal of Computing and Information Science in Engineering, doi: https://doi.org/10.1115/1.4054933
5. Park, H., **Ko, H.**, Lee, Y.T., Feng, S., Witherell, P., Cho, H.* (2021), "**Collaborative Knowledge Management to Identify Data Analytics Opportunities in Additive Manufacturing**," Journal of Intelligent Manufacturing, https://doi.org/10.1007/s10845-021-01811-1.
6. Oh, Y., **Ko, H.**, Sprock, T., Bernstein, W. Z., Kwon, S.* (2021), "**Part Decomposition and Evaluation Based on Standard Design Guidelines for Additive Manufacturability and Assemblability**," Additive Manufacturing, 37, p.101702.
7. **Ko, H.***, Witherell, P., Lu, Y., Kim, S., Rosen, D. W. (2021), "**Machine Learning and Knowledge Graph based Design Rule Construction for Additive Manufacturing**," Additive Manufacturing, 37, p.101620.
8. Kim, S.*, Rosen, D. W., Witherell, P., **Ko, H.** (2019), "**A Design for Additive Manufacturing Ontology to Support Manufacturability Analysis**," Journal of Computing and Information Science in Engineering, Vol. 19, No. 4, pp. 041014-041014-10.
9. **Ko, H.**, Moon, S. K.*, Otto, N. K. (2015), "**Design Knowledge Representation to Support Personalised Additive Manufacturing**," Virtual and Physical Prototyping, Vol. 10, No. 4, pp.217-226, 2015.
10. **Ko, H.**, Moon, S. K.*, Hwang, J. (2015), "**Design for Additive Manufacturing in Customized Products**," International Journal of Precision Engineering and Manufacturing, Vol. 16, No. 11, pp. 2369-2375, 2015 (**2017 IJPEM Highly Commended Paper Award**).

Conference Proceedings
1. Safdar, M., Xie, J., **Ko, H.**, Lu, Y., Lamouche, G., Zhao, Y. F., "**Transferability Analysis of Data-driven Additive Manufacturing Knowledge: A Case Study Between Powder Bed Fusion and Directed Energy Deposition**," ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Boston MA, USA. August 20 – 23. Accepted.
2. Yang, Z., Kim, J., Lu, Y., Jones, A., Witherell, P., Ho, Y., **Ko, H.**, "**Enhancing Part Quality Management Using an Extended Data Fusion Framework in Metal Powder Bed Fusion Additive Manufacturing**," ASME 2022 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference, Boston MA, USA. August 20 – 23. Accepted.
3. **Ko, H.***, Kim, J, Lu, Y, Shin, D, Yang, Z, & Oh, Y. "**Spatial-temporal Modeling Using Deep Learning for Real-time Monitoring of Additive Manufacturing**." ASME 2022 International

Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 2: 42nd Computers and Information in Engineering Conference, St. Louis, Missouri, USA. August 14–17, 2022. V002T02A019. ASME. https://doi.org/10.1115/DETC2022-91021

4. Monnier, L.*****, **Ko. H.**, "**HDF5 Hierarchies for Additive Manufacturing Digital Representations and Enhanced Analytics**," 33rd Annual International Solid Freeform Fabrication Symposium - An Additive Manufacturing Conference, Austin, Texas, USA, Jul. 25-27, 2022.

5. Gibbons, D. W.*, **Ko, H.**, "**Configuration Control for Additive Manufacturing Digital Twins**," 32nd Annual International Solid Freeform Fabrication Symposium - An Additive Manufacturing Conference, Austin, Texas, USA, Aug. 2-4, 2021.

6. Milaat, F. A.*, Yang, Z., **Ko, H.**, Jones, A. T., "**Prediction of Melt Pool Geometry using Deep Neural Networks**," ASME 2021 International Design Engineering Technical Conferences and Computers and Information in Engineering Conference. Volume 2: 41st Computers and Information in Engineering Conference, Virtual, Online. August 17–19, 2021. V002T02A037. ASME. https://doi.org/10.1115/DETC2021-69259.

7. Oh, J., **Ko, H.**, Kwon, S.*, "**Optimization of Part Decomposition for Efficient 3D Printing**," 2020 Korean Society of Mechanical Engineers (KSME 2020) Fall/Spring Online Conference, Dec. 20, 2020. (In Korean) (**Best Paper Award**).

8. Park, H., **Ko, H.**, Lee, Y. T., Cho, H.*, Witherell, P., "**A Framework for Identifying and Prioritizing Data Analytics Opportunities in Additive Manufacturing**," 2019 IEEE International Conference on Big Data, Los Angeles, California, USA, December 9-12, 2019.

9. **Ko, H.***, Witherell, P., Ndiaye, N. Y., Lu, Y., "**Machine Learning based Continuous Knowledge Engineering for Additive Manufacturing**," 2019 IEEE 15th International Conference on Automation Science and Engineering (CASE), Vancouver, British Columbia, Canada, Aug. 22-26, 2019 (**First-round Nomination for Best Student Paper**).

10. Kim, S.*, Rosen, D. W., Witherell, P., **Ko, H.**, "**A Design for Additive Manufacturing Ontology to Support Manufacturabilty Analysis**," ASME 2018 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Quebec City, Quebec, Canada, Aug. 26-29, 2018.

11. Kim, S.*, Rosen, D. W., Witherell, P., **Ko, H.**, "**Linking Part Design to Process Planning by Design for Additive Manufacturing Ontology**," 3rd International Conference on Progress in Additive Manufacturing (Pro-AM), Singapore, May. 14-17, 2018.

12. **Ko, H.**, Moon, S. K.*, "**Contradicting Functions with Affordances in Design for Additive Manufacturing**," ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Cleveland, Ohio, USA, Aug. 6-9, 2017.

13. **Ko, H.**, Moon, S. K.*, Wood, K. L., Oh, H. S., "**An Integration of Function- and Affordance-based Methods for Product-service System Utilizing Finite State Automata**," 9th IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Bali, Indonesia, Dec. 4-7, 2016.

14. Moon, S. K., Tan, Y. E., **Ko, H.**, Chua, Z. Y., Ngo, T. H., Hwang, J. H., Baek., J. W.*, "**A Customized 3D Printed Sensor Development Framework for Component Condition Monitoring**," The 18th International Conference on Industrial Engineering (IJIE2016), Seoul, South Korea, Oct. 10-12, 2016.

15. **Ko, H.**, Sacco, E., Chua, Z. Y., Moon, S. K.*, Otto, K., "**User-centered Design for Additive Manufacturing as a Customization Strategy**," 2nd International Conference on Progress in Additive Manufacturing (Pro-AM), Singapore, May. 16-19, 2016.

16. **Ko, H.**, Lee, S. W., Shin, D. M., Moon, S. K.*, "**A Formal Model of Human Interactions for Service Ecosystem Design**," ASME 2014 International Engineering Technical Conferences & Computers and Information in Engineering Conference, Buffalo, New York, USA, Aug. 17-20, 2014.

17. **Ko, H.**, Moon, S. K.*, Otto, K., "**Customization Design Knowledge Representation to Support Additive Manufacturing**," 1st International Conference on Progress in Additive Manufacturing (Pro-AM), Singapore, May. 26-28, 2014.
18. **Ko, H.**, Shin, D.*, "**s-Scape: a Service Prototype Testing Space for Innovation of Service Quality Improvement**," 2011 IIE Asian Conference AIIE, Shanghai, China, Jun. 10-12, 2011.
19. **Ko, H.***, Shin, D., "**Formal Modeling of Quality-Measurable Service Systems using Affordance-based Finite State Automata**," Korean Institute of Industrial Engineers, Seoul, South Korea, Nov. 5, 2011 (In Korean).

RESEARCH PROJECTS

Arizona State University, USA

AI-driven Additive Manufacturing Advisor for Manufacturability Prediction
Phoenix Analysis and Design Technologies, Inc. (PADT) &
Science and Technology Center (STC), ASU   Aug. 1 – Present
- Playing a role of Co-PI
- Compiling a comprehensive list of manufacturability factors (MFs) that span the geometric design, quality specs, and AM configurations
- Developing a new, machine learning (ML) approach that predicts the manufacturability of an additive manufacturing (AM) product given its MFs
- Designing a database to support the ML modeling
- Evaluating the prediction confidence, which mitigates the risk of wrong predictions and thus enhances the success of the method.
- Interpreting the ML models to generate new knowledge on the cause of the manufacturability issues

National Institute of Standards and Technology (NIST), USA

Measurement Science for Additive Manufacturing Program
Data Driven Decision Support for Additive Manufacturing   Oct. 2018– Sep. 2021
- Developed data models to enhance knowledge transfer and AI/ML deployment for AM, leveraging standardized data formats and representations of predictive, ML models
- Constructed data-driven design rules for AM using measurement and monitoring data from Laser Powder Bed Fusion processes
- Identified AI and ML algorithms to support control-decisions for AM
- Identified and prioritized data analytics, ML, and AI opportunities in AM
- Integrated additive-manufacturability knowledge with three-dimensional (3D), solid and tessellated geometry data

Data Integration and Management for Additive Manufacturing   Oct. 2018– Sep. 2021
- Constructed a data-analytics framework to enhance ML and processing of measurement and monitoring data for AM
- Designed AM data queries by combining semantic knowledge for adaptive AM data acquisition
- Explored physics-based data fusion and ML on in-situ monitoring and ex-situ nondestructive evaluation (NDE) data acquired from NIST AM metrology testbed (AMMT)
- Investigated continuous learning and explainable AI approaches for data-driven ML modeling and knowledge construction in AM
- Developed a common data model for AM toward ASTM standards in a working group including industries such as GE additive

Systems Integration for Additive Manufacturing   Oct. 2017– Sep. 2018
- Defined principles and fundamentals of design for AM (DfAM)

- Formalized design fundamentals and principles of DfAM in AM feature-geometry-process-material relationships
- Developed the structure of a DfAM knowledge base based on AM taxonomies and relationships (in collaboration with Dr. David W. Rosen from Georgia Institute of Technology)
- Expanded a working item for standards of AM design guidelines toward new ASTM/ISO standards

Nanyang Technological University (NTU), **Singapore**
  Design for Additive Manufacturing in Customized Products
  NTU-Singapore University of Technology and Design (SUTD)   Aug. 2013 – Sep. 2017
- Investigated conventional design theories and methodologies on their advantages and limitations in adopting AM capabilities
- Developed representations of functional requirements for AM-enabled customization in bio/medial applications
- Developed formal design methods and frameworks for AM
- Adopted systematic engineering design approaches to DfAM to synthesize products' functional requirements and structures to maximize product performances while considering additive manufacturability
- Applied design methods and frameworks to high-value, mission-critical, AM applications such as trans-tibial, prosthetic sockets

  Development of Method for 3D Printing of Electronic Sensors
  ST Dynamics PTE LTD-NTU Joint R&D   Apr. 2017 – Sep. 2017
- Investigated AM for manufacturing customized sensors
- Investigated how to apply the design freedom of AM to customized sensors
- Directly manufactured strain gauges on complex, 3D structures using Aerosol Jet AM technology

  Structural Health Monitoring of Mechanical Power Transmission System with Customised 3D Printed Sensor
  National Research Foundation (NRF) and SMRT Trains   Jul. 2016 - Sep. 2017
- Identified functional volumes of parts for structural health monitoring using additively manufactured strain gauges
- Designed a framework for exploring dependences between strain gauges' performance and geometry, parts' behavior and geometry, and AM process parameters
- Designed and conducted experiments for developing strain gauges using Aerosol Jet AM technology

  NTU-TUHH Research Exchange Collaboration on Lightweight Additive Manufacturing within Product Family Design
  Singaporean-German Researchers Mobility Scheme and NTU   Sep. 2016 - Sep. 2017
- Investigated principles of DfAM to identify opportunities for product platform and product family design in AM
- Identified AM opportunities in lightweight applications

Hanyang University, **South Korea**
  Establishment of a Virtual Service Test Laboratory for Innovation of Service Quality
  Korean Ministry of Knowledge Economy   Apr. 2010 – Feb. 2013
- Modeled human behaviors in a virtual reality/augmented reality (VR/AR) environment called s-Scape and designed human-machine interfaces of s-Scape

- Designed a coordination system for input-output, VR/AR devices and participated in a system evaluation by conducting a prototype test
- Designed a component-oriented, VR/AR-system architecture, component interactions in the architecture, and information flows between the components
- Designed a software engine called Event Handler and a database that support the interpretation of sensory information about human behaviors in s-Scape
- Designed and implemented a software prototype for controlling VR/AR service delivery processes

Developing an Affordance-based Human Intervention Model for Decision-making of Accident Handling in Safety-critical Systems

Korean National Research Foundation   Sep. 2011 - Feb. 2013
- Investigated theoretical aspects of human-machine-interaction modeling
- Designed a modeling framework for human-machine interactions and system controls using affordance-based finite state automata

Standardizing Manufacturing Software Capability Profiling

Korean Agency for Technology and Standards (KATS)   Mar. 2010 - Oct. 2010
- Reviewed ISO 16100-1: 2009, ISO 16100-2: 2003, ISO 16100-3: 2005, ISO 16100-4: 2006, and ISO 16100-4: 2006
- Translated ISO 16100-1: 2009, ISO 16100-2: 2003, ISO 16100-3: 2005, ISO 16100-4: 2006, and ISO 16100-4: 2006 into Korean for the drafts of "KS B ISO 16100 Industrial Automation Systems and Integration - Manufacturing Software Capability Profiling for Interoperability:
  KS B ISO 16100 - 1 Part 1: Framework
  KS B ISO 16100 - 2 Part 2: Profiling Methodology
  KS B ISO 16100 - 3 Part 3: Interface Services
  KS B ISO 16100 - 4 Part 4: Conformance Test Methods, Criteria, and Reports
  KS B ISO 16100 - 5 Part 5: Methodology for Profile Matching using Multiple Capability Class Structures"

Product Development Lifecycle-based Enterprise BOM Management: Toward Collaborative Manufacturing Processes

Korea Institute of Industrial Technology (KITECH)   Nov 2009 – Feb. 2011
- Developed a methodology for constructing an enterprise BOM to support product-lifecycle-information management

Project: Collaboration-based Process Integration for Manufacturing Activities

Korea Institute of Industrial Technology (KITECH)   Nov. 2009 - Feb. 2010
- Developed process abstraction models to integrate collaborative, manufacturing processes

TEACHING EXPERIENCE

• Advanced Simulation (EGR 608)	Spring 2023
• Engineering Economics (EGR 598, MFG 461), Arizona State University	Spring 2022 & 2023
• MA2071 Laboratory Experiments (ME): E2.2 Study of Fan Performance using Dimensional Analysis, School of Mechanical and Aerospace Engineering, Nanyang Technological University	Jan. 2017 – Jun. 2017
• Undergraduate Final Year Project, Customized 3D Printed Sensor for Structural Health Monitoring of Unmanned Aerial Vehicles (UAVs), School of Mechanical and Aerospace Engineering, Nanyang Technological University	Aug. 2016 – Mar. 2017

- Undergraduate Final Year Project, System Dynamics on Product Service System and Sustainability, School of Mechanical and Aerospace Engineering, Nanyang Technological University — Aug. 2016 – Mar. 2017
- P3.6AE Familiarisation of Air Traffic Control (ATC) Tower Operations and Flight Sequencing, Air Traffic Management Research Institute, Nanyang Technological University — Aug.–Dec. 2016
- MA4843 Management of Product Development, School of Mechanical and Aerospace Engineering, Nanyang Technological University — Aug. 2016
- Undergraduate Final Year Project, Function- and Affordance-based Product Service System, School of Mechanical and Aerospace Engineering, Nanyang Technological University — Aug. 2015 – Jun. 2016
- Computer Integrated Manufacturing, Department of Industrial and Management Engineering, Hanyang University — May 2012, May 2011, Nov. 2010

PRESENTATIONS

Invited Talks

1. Ko, H., "A Framework Driven by Physics-guided Machine Learning for Process-structure-property Causal Analytics in Digital Additive Manufacturing," 2nd IEEE Workshop on Reliable and Resilient Manufacturing (R2DM2), New York University, New York, New York State, May 1 – 2, 2023.
2. Ko, H., "A Framework Driven by Physics-guided Machine Learning of Process-structure-property Causality for Digital Additive Manufacturing," Korea Institute of Machinery & Materials, Korea, Nov. 30, 2022.
3. Ko, H., "A Framework Driven by Physics-guided Machine Learning of Process-structure-property Causality for Digital Additive Manufacturing," National University of Singapore, Singapore, Nov. 28, 2022.
4. Ko, H., "AI-Driven Digital Additive Manufacturing," Korea Institute of Industrial Technology, Korea, Nov. 20, 2022.
5. Ko, H., "A Framework Driven by Physics-guided Machine Learning for Process-structure-property Causal Analytics in Digital Additive Manufacturing," Ulsan National Institute of Science & Technology, Korea, Nov. 17, 2022
6. Ko, H., "AI-Driven Digital Additive Manufacturing," Hanyang University, Korea, Nov. 9, 2022
7. Ko, H., "A Framework Driven by Physics-guided Machine Learning for Process-structure-property Causal Analytics in Digital Additive Manufacturing," Korea University, Korea, Nov. 8, 2022.
8. Ko, H. "Machine-Learning-Driven Spatial-Temporal Modeling for In-Situ Monitoring of Laser Powder Bed Fusion," Hack3D Symposium, New York University, Jul. 15, 2022
9. Ko, H. "Machine Learning in Additive Manufacturing: Opportunities and Challenges," New York University, Jul. 5, 2022
10. Ko, H. "Design for Additive Manufacturing and Machine-learning-driven Opportunities," Keynote Speaker, Workshop of Professional Manpower Training for New-materials 3D Printing, Korea Electronics Technology Institute, Gyeongju, Gyeongsangbuk-do, South Korea, Feb. 9, 2022
11. Ko, H., "A Framework driven by Physics-informed Machine Learning for Causality Analytics for Additive Manufacturing," Kyunghee University, Suwon, South Korea, Dec. 16, 2021.
12. Ko, H., "AI-driven Design for Additive Manufacturing in Medical Applications," 8th Annual Winter Congress of the Korean Medical 3D Printing Society, Sejong University, Seoul, South Korea, Dec. 11, 2021.
13. Ko, H., "Additive Manufacturing, Design for Additive Manufacturing, and Machine-learning-driven Potential," Kyonggi University, Suwon, South Korea, Nov. 15, 2021.
14. Ko, H., "Machine Learning and Artificial Intelligence Opportunities in Additive Manufacturing," Dong-A University, Busan, South Korea, Jul. 13, 2021.

15. Ko, H., "Machine-learning-driven Process-structure-property Analytical Framework for Additive Manufacturing," Tea Seminar, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, Jun. 30, 2021.
16. Ko, H., "Process-structure-property Modeling and Machine Learning in Additive Manufacturing," NIST AM Seminar Series w/ Nuclear Regulatory Commission – Data, Information, and Modeling Considerations, Session: Using Predictive Analytics to Establish Part Conformity, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, Apr. 14, 2021.
17. Ko, H., "Machine Learning and AI driven Process-structure-property Analytics and Decision-support for Additive Manufacturing," Arizona State University, Arizona, USA, Apr. 5th, 2021.
18. Ko, H., "Machine Learning and AI driven Process-structure-property Analytics and Decision-support for Additive Manufacturing," Joint Seminar, IEEE Technology Engineering Management Society, Nanyang Technological University, Singapore, Apr. 1st, 2021,
19. Ko, H., "Machine-learning-driven Process-structure-property Analytical Framework for Additive Manufacturing," Invited Lecture, Hanyang University, South Korea, Feb. 23, 2021.
20. Ko, H., "Artificial Intelligence driven Laser Powder Bed Fusion Additive Manufacturing," Industrial AI Seminar, Hanyang University, South Korea, Aug. 31, 2020.
21. Ko, H., "Continuous Knowledge Engineering for Additive Manufacturing," NIST AM Caucus, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, April 15, 2019.
22. Ko, H., Witherell, P., Rosen, D. W., and Kim, S., "A Methodology for Modular Design Rule Representation and Ontology Development for Additive Manufacturing," NIST Presentations on Additive Manufacturing from the 2018 Solid Freeform Fabrication Symposium., National Institute of Standards and Technology, Gaithersburg, Maryland, USA, Sept. 4, 2018.
23. Ko, H. and Kim, S., "Developing Design Rules for Additive Manufacturing," Seminar, National Institute of Standards and Technology, Gaithersburg, Maryland, USA, Dec. 20, 2017.
24. Ko. H., "Design for Additive Manufacturing in Customized Products", Singapore Centre for 3D Printing (SC3DP) Technical Talks, Nanyang Technological University, Singapore, March 25, 2015.

Conference Proceeding Presentations
1. Ko, H., "Explainable Machine Learning for Causality Analytics in Additive Manufacturing," 2022 INFORMS Annual Meeting, Indianapolis, IN, USA, Oct. 16-19, 2022.
2. Ko, H., Kim, J., Lu, Y., Shin, D., Yang, Z., & Oh, Y., "Spatial-Temporal Modeling Using Deep Learning for Real-Time Monitoring of Additive Manufacturing," ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, St. Louis, Missouri, USA, Aug. 14-17, 2022.
3. Ko, H., "A Review on Machine Learning Interpretation for Additive Manufacturing," 33rd Annual International Solid Freeform Fabrication Symposium - An Additive Manufacturing Conference, Austin, Texas, USA, July. 25-27, 2022.
4. Ko, H., Lu, Y., Yang, Z., & Witherell, P., "Being Real-time in Process-structure-property Analytics for Additive Manufacturing using Machine Learning and Knowledge Representation," Mechanistic Machine Learning and Digital Twins for Computational Science Engineering & Technology, San Diego, CA, USA, Sept. 26-29, 2021.
5. Ko, H., Witherell, P., Ndiaye, N. Y., & Lu, Y., "Machine Learning based Continuous Knowledge Engineering for Additive Manufacturing," 2019 IEEE 15th International Conference on Automation Science and Engineering (CASE), Vancouver, British Columbia, Canada, Aug. 22-26, 2019.
6. Ko, H., Witherell, P., Rosen, D. W., & Kim, S., "A Methodology for Modular Design Rule Representation and Ontology Development for Additive Manufacturing," 29th Annual International Solid Freeform Fabrication Symposium - An Additive Manufacturing Conference, Austin, Texas, USA, Aug. 13-15, 2018.
7. Ko, H. & Moon, S. K., "Contradicting Functions with Affordances in Design for Additive Manufacturing," ASME 2017 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, Cleveland, Ohio, USA, Aug. 6-9, 2017.

8. Ko, H., Moon, S. K., Wood, K. L., & Oh, H. S., "An Integration of Function- and Affordance-based Methods for Product-service System Utilizing Finite State Automata," 9th IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Bali, Indonesia, Dec. 4-7, 2016.

9. Ko, H., Sacco, E., Chua, Z. Y., Moon, S. K., & Otto, K., "User-centered Design for Additive Manufacturing as a Customization Strategy," 2nd International Conference on Progress in Additive Manufacturing (Pro-AM), Singapore, May. 16-19, 2016.

10. Ko, H., Moon, S. K., & Hwang, J., "Design for Additive Manufacturing in Customized Products," International Symposium on Green Manufacturing and Applications, Busan, South Korea, Jun. 24-28, 2014.

11. Ko, H., Moon, S. K., & Otto, K., "Customization Design Knowledge Representation to Support Additive Manufacturing," 1st International Conference on Progress in Additive Manufacturing (Pro-AM), Singapore, May. 26-28, 2014.

12. Ko, H. & Shin, D. M., "Affordance-based Interaction Design and Its Implications on Systems Design," HCI Korea 2012, Alpensia Convention Center, Gangwon-do, Korea, Jan. 11-13, 2012.

13. Ko, H. & Shin, D. M., "s-Scape: a Service Prototype Testing Space for Innovation of Service Quality Improvement," 2011 IIE Asian Conference AIIE, Shanghai, China, Jun. 10-12, 2011.

14. Ko, H. & Shin, D. M., "Formal Modeling of Quality-Measurable Service Systems using Affordance-based Finite State Automata," Korean Institute of Industrial Engineers, Seoul, Korea, Nov. 5, 2011.

SERVICE ACTIVITIES

International Standards

• Additive Manufacturing Technical Committee, Singapore	Dec. 2018 – 2021
• ASTM F42/ISO TC 261 Additive Manufacturing Standards Meetings and Sub-committee Meetings	Apr. 2018 – Sep. 2021

Conferences, Meetings, and Workshops

• Program Chair, Systems Engineering Information Knowledge Management (SEIKM), Computers and Information in Engineering Conference (CIE), American Society of Mechanical Engineers (ASME)	Aug. 2022 – Present
• Co-chair, Hackathon Committee, American Society of Mechanical Engineers (ASME)	Aug. 2022 – Present
• Chair, Hackathon Committee, American Society of Mechanical Engineers (ASME)	Aug. 2021 – Aug. 2022
• Chair, Session - Discovery of Causality in Physical Systems, 2022 Institute for Operations Research and the Management Sciences (INFORMS) Annual Meeting	Oct. 2022
• Chair, Session - CIE-24-02 - AMS-CAPPD-SEIKEM: Artificial Intelligence and Machine Learning in Design and Manufacturing, ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE2022), American Society of Mechanical Engineers (ASME)	Aug. 2022
• Chair, Session - CIE-23 AMS-CAPPD-SEIKEM: Design, Simulation and Optimization for Additive Manufacturing, ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE2022), American Society of Mechanical Engineers (ASME)	Aug. 2022
• Co-chair, Session - CIE-14 SEIKEM: Smart Manufacturing Informatics, ASME 2022 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference (IDETC/CIE2022), American Society of Mechanical Engineers (ASME)	Aug. 2022

• Public Communication Subcommittee, Quality, Statistics, and Reliability (QSR) Council, Institute for Operations Research and the Management Sciences (INFORMS)	Jan. 2022 – Present
• Judge, 2021 ASME-CIE Hackathon, Computers & Information in Engineering Division (CIE), American Society of Mechanical Engineers (ASME)	Aug. 2021
• Session Assistant, Interoperability Session (led by NIST and GE Additive), NIST/ASM International Virtual Additive Manufacturing Data Management Workshop, NIST, Gaithersburg, Maryland, USA	Oct. 27 – 28 2020
• Conference Assistant, 2016 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM), Bali, Indonesia	Dec. 4 – 7, 2016

Reviewer
- Additive Manufacturing Journal
- Advanced Engineering Informatics
- ASME International Design Engineering Technical Conferences & Computers and Information in Engineering Conference
- IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)
- Journal of Computing and Information Science in Engineering
- Journal of Mechanical Design
- North American Manufacturing Research Conference (NAMRC)
- NIST Washington Editorial Review Board
- Rapid Prototyping Journal
- Robotics and Computer-Integrated Manufacturing Journal
- Smart and Sustainable Manufacturing Systems Journal
- Virtual and Physical Prototyping Journal

University

• Faculty Search Committee, The School of Manufacturing Systems and Networks, The Ira A. Fulton Schools of Engineering, Arizona State University	Aug. 2022 – Present
• Graduate Student Club, Nanyang Technological University	Aug. 2015 – Jun. 2016
• Undergraduate Mentor, Find-SELF program, Hanyang University	Feb. 2010 – Aug. 2011

Military
Military Police (MP), Korean Augmentation To the United States Army (KATUSA), South Korea

• Special Reaction Team, 94th MP Battalion, 8th MP Brigade, 8th US Army	Sep. 2005 – Oct. 2006
• 142nd Military Police Company, 94th MP Battalion, 8th MP Brigade, 8th US Army	Dec. 2004 – Sep. 2005

TECHNCIAL SKILLS
- Additive Manufacturing Processes
- Artificial Intelligence and Machine Learning
- Computer-aided Design and Manufacturing
- Computer Programming
- Data Integration, Management, and Processing
- Design of Experiments
- Modeling and Simulation
- Optimization
- Product and System Architecture Design

- Statistics and Probability