

## Seungchul Lee

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CONTACT INFORMATION	Department of Mechanical Engineering Pohang University of Science and Technology (POSTECH) 223, 5th Engineering Building 77 Cheongam-Ro, Nam-Gu Pohang, Gyeongbuk, 37673 Korea	+ 82 (0)54 279-2181 seunglee@postech.ac.kr <a href="http://iai.postech.ac.kr/">http://iai.postech.ac.kr/</a>
RESEARCH INTERESTS	Artificial Intelligence Applications to Mechanical Systems, Material Science, Healthcare	
EDUCATION	<b>University of Michigan</b> , Ann Arbor, MI USA Ph.D., Mechanical Engineering – Dissertation: Maintenance Strategies for Manufacturing Systems using Markov Models – Advisor: Jun Ni M.S.E., Mechanical Engineering	Aug. 2010    April 2008
	<b>Seoul National University</b> , Seoul, South Korea B.S.E., Mechanical and Aerospace Engineering	February 2001
RESEARCH EXPERIENCE	<b>Assistant Professor</b> at POSTECH, Korea – Principal Investigator of Industrial AI Lab. – (Adjunct) Department of Industrial and Management Engineering – (Adjunct) Graduate School of Artificial Intelligence – (Adjunct) Graduate School of Information Technology  <b>Assistant Professor</b> at UNIST, Korea – Principal Investigator of iSystems Design Lab.  <b>Postdoctoral Research Fellow</b> , Ann Arbor, MI USA <b>Graduate Student Research Assistant</b> , Ann Arbor, MI USA	Jan. 2018 - present       July 2013 - Dec. 2017   July 2010 - May 2013 2006 - 2010
HONORS AND AWARDS	Best Teaching Award in ME, POSTECH Best Student Paper in IDPP Conference 2019 Best Student Paper in QR2MSE 2019 Certificate of Appreciation from KSME Certificate of Appreciation from Materials Research Society of Korea Certificate of Appreciation from Korean Society for Fluid Machinery Certificate of Appreciation from KSNVE Best Student Paper in Reliability Division of KSME Certificate of Appreciation from Korean Society for Noise and Vibration Engineering (KSNVE) Outstanding Young Researcher in KSME Best Teaching Award in UNIST Certificate of Appreciation from Korean Society of Mechanical Engineers (KSME) NAVER Award in Korea Traffic Data Competition Best Student Paper in Reliability Division of KSME ICORES 2013 Best Student Paper Award Nominated by Ford Motor Company for 2012 Henry Ford Technology Award Program	2019 2019 2019 2019 2019 2018 2018 2017 2017 2017 2016 2016 2016 2016 2013 2012

JOURNAL  
PUBLICATIONS

1. J. Lee, S. Kim, **S. Lee**, and W Hwang\*, 2020, "Exponential Promotion and Suppression of Bubble Nucleation in Carbonated Liquid by Modification of Surface Wettability," *Applied Surface Science*, Vol. 512, <https://doi.org/10.1016/j.apsusc.2020.145709>.
2. S. Y. Lee, B. A. Tama, C. Choi, J. Y. Hwang, J. Bang, and **S. Lee**\*, 2020, "Spatial and Sequential Deep Learning Approach for Predicting Temperature Distribution in a Steel-making Continuous Casting Process," *IEEE Access*, 8(1), pp. 2169-3536, 10.1109/ACCESS.2020.2969498.
3. S. Y. Lee, B. A. Tama, S. J. Moon, and **S. Lee**\*, 2019, "Steel Surface Defect Diagnostics using Deep Convolutional Neural Network and Class Activation Map," *Applied Sciences*, 2019, 9(24), 5449; <https://doi.org/10.3390/app9245449>.
4. G. W. Song, B. A. Tama, J. Park, J. Y. Hwang, J. Bang, S. J. Park, and **S. Lee**\*, 2019, "Temperature Control Optimization in a Steel-Making Continuous Casting Process Using Multimodal Deep Learning Approach," *Steel Research International*, 90(12), pp. 1900321, <https://doi.org/10.1002/srin.201900321>.
5. W. Choi+, H. Huh+, B. A. Tama, G. Park, and **S. Lee**\*, 2019, "A Neural Network Model for Material Degradation Detection and Diagnosis Using Microscopic Images," *IEEE Access*, 7, pp.92151-92160. (+ equally contributed)
6. J. Jeon, Y. J. Han, G. Y. Park, D. G. Sohn, **S. Lee**\*, and S. Im\*, 2019, "Artificial Intelligence in the Field of Electrodiagnosis – A New Threat or Heralding a New Era in Electromyography?," *Clinical Neurophysiology*, 130(10), <https://doi.org/10.1016/j.clinph.2019.06.005>.
7. D. Shin, C. Lee, S. Kim, D. Park, J. Oh, C. Gal, J. Koo, S. Park and **S. Lee**\*, 2019, "Analysis of Cold Compaction for Fe-C, Fe-C-Cu Powder Design based on Constitutive Relation and Artificial Neural Networks," *Powder Technology*, 353, <https://doi.org/10.1016/j.powtec.2019.05.042>.
8. B. Park, H. Jeong, H. Huh, M. Kim and **S. Lee**\*, 2018, "Experimental Study on the Life Prediction of Servo Motors through Model-based System Degradation Assessment and Accelerated Degradation Testing," *Journal of Mechanical Science and Technology*, 32(11), 5105-5110.
9. S. Park, H. Jeong and **S. Lee**\*, 2018, "Wavelet-like CNN Structure for Time-Series Data Classification," *Smart Structures and Systems*, 22(2), pp. 175-183.
10. H. Jeong, B. Park, S. Park, and **S. Lee**\*, 2018, "Fault Detection and Identification Method using Observer-based Residuals," *Reliability Engineering and System Safety*, Vol. 184, 27-40.
11. S. Kim, S. Park, S. Woo, and **S. Lee**\*, 2017, "Development and Analysis of the Interchange Centrality Evaluation Index Using Network Analysis," *J. Korean Soc. Transp.* Vol.35, No.6, pp.525-544. [in Korean]
12. H. Jeong, S. Kim, S. Woo, S. Kim, and **S. Lee**\*, 2017, "Real-time Monitoring System for Rotating Machinery with IoT-based Cloud Platform," *Transactions of the KSME A*, [in Korean].
13. H. Jeong, S. Woo, and **S. Lee**\*, 2016, "Rotating Machinery Diagnostics using Deep Learning on Orbit Plot Images," *Procedia Manufacturing*, Vol. 5, pp. 1107-1118.
14. L. Cui, Y. Zhang, F. Zhang\*, J. Zhang, and **S. Lee**, 2016, "Vibration Response Mechanism of Faulty Outer Race Rolling Element Bearings for Quantitative Analysis," *Journal of Sound and*

*Vibration*, 364, pp. 67-76.

15. Z. Zhang, S. Wu\*, L. Binfeng, and **S. Lee**, 2015, “ $(n, N)$  Type Maintenance Policy for Multi-component Systems with Failure Interactions,” *International Journal of Systems Science*, 46(6), pp. 1051-1064.
16. Z. Zhang, S. Wu, **S. Lee\***, and J. Ni, 2014, “Modified Iterative Aggregation Procedure for Maintenance Optimization of Multi-component Systems with Failure Interaction,” *International Journal of Systems Science*, 45(12), pp. 2480-2489.
17. A. Almuhtady, **S. Lee\***, E. Romeijn, M. Wynblatt, and J. Ni, 2014, “A Degradation-Informed Battery Swapping Policy for Fleets of Electric or Hybrid-Electric Vehicles,” *Transportation Science*, 48(4), pp. 609-618.
18. W. Cheng, Z. Zhang\*, **S. Lee**, and Z. He, 2014, “Investigations of Denoising Source Separation Technique and Its Application to Source Separation and Identification of Mechanical Vibration Signals,” *Journal of Vibration and Control*, 20(14), pp. 2100-2117.
19. L. Cui\*, J. Wang, **S. Lee**, 2014, “Matching Pursuit of an Adaptive Impulse Dictionary for Bearing Fault Diagnosis,” *Journal of Sound and Vibration*, 333(10), pp. 2840-2862
20. **S. Lee**, J. Ko, X. Tan, I. B. Patel, R. Balkrishnan, J. Chang\*, 2014, “Markov Chain Modeling and Analysis of HIV/AIDS Progression: A Race-based Forecast in the United States,” *Indian Journal of Pharmaceutical Sciences*, 76(2), pp. 107-115.
21. Z. Zhang, S. Wu, L. Binfeng, **S. Lee\***, 2013, “Optimal Maintenance Policy for Multi-Component Systems under Markovian Environment Changes,” *Expert Systems With Applications*, 40(18), pp. 7391-7399.
22. **S. Lee\***, X. Gu, M. Garcellano, M. Diederichs, and J. Ni, 2013, “Discovery of Hidden Opportunities in Manufacturing Systems: MOW and GMOW,” *International Journal of Advanced Manufacturing Technology*, 68(9), pp. 2611-2623.
23. **S. Lee\***, X. Gu, and J. Ni, 2013, “Stochastic Maintenance Opportunity Windows for Unreliable Two-Machine One-Buffer System,” *Expert Systems With Applications*, 40(13), pp. 5385-5394.
24. X. Gu, **S. Lee\***, X. Liang, M. Garcellano, M. Diederichs, and J. Ni, 2013, “Hidden Maintenance Opportunities in Discrete and Complex Production Lines,” *Expert Systems with Applications*, 40(11), pp. 4353-4361.
25. **S. Lee**, L. Li\*, and J. Ni, 2013, “Markov-based Maintenance Planning Considering Repair Time and Periodic Inspection,” *ASME Journal of Manufacturing Science and Engineering*, 135(3), 031013 (12 pages), DOI:10.1115/1.4024152.
26. **S. Lee\*** and J. Ni, 2012, “Joint Decision Making for Maintenance and Production Scheduling of Production Systems,” *International Journal of Advanced Manufacturing Technology*, 66(5-8), pp. 1135-1146.
27. W. Cheng, **S. Lee**, Z. Zhang\*, and Z. He, 2012, “Independent Component Analysis based Source Number Estimation and Its Comparison for Mechanical Systems,” *Journal of Sound and Vibration*, 331(2012), pp. 5153-5167.
28. W. Cheng, Z. Zhang\*, **S. Lee**, and Z. He, 2012, “Source Contribution Evaluation of Mechanical Vibration Signals via Enhanced Independent Component Analysis,” *ASME Journal of Manufacturing Science and Engineering*, Vol. 134(2), pp. 021014 (9 pages).

29. **S. Lee\*** and J. Ni, 2012, "Genetic Algorithm for Job Scheduling with Maintenance Consideration in Semiconductor Manufacturing Process," *Mathematical Problems in Engineering*, Volume 2012, Article ID 875641, 16 pages, DOI:10.1155/2012/875641.
30. **S. Lee**, L. Li\*, and J. Ni, 2010, "Online Degradation Assessment and Adaptive Fault Detection Using Modified Hidden Markov Model," *ASME Journal of Manufacturing Science and Engineering*, 132(2), pp. 021010-11.

#### PAPERS UNDER REVIEW

1. S. Y. Lee, S. Byeon, B. A. Tama, H. Jin, and **S. Lee\***, "Comments on 'Machine-learning phase prediction of high-entropy alloys, Acta Materialia Volume 169 1 May 2019, Pages 225-236'," submitted.
2. H. Kim+, J. Jeon+, Y. J. Han, Y. Joo, J. Lee, **S. Lee\***, and Sun Im\*, "Can Artificial Intelligence Help Distinguish Voice Changes in Laryngeal Cancer Patients?," submitted (+ equally contributed)
3. Y. Hwang, H. H. Lee, C. Park, B. A. Tama, J. S. Kim, D. Y. Cheung, W. C. Chung, Y. S. Cho, K. M. Lee, M. G. Choi, **S. Lee\***, and B. I. Lee\*, "Detection, Classification, and Localization of Small Dowel Lesions Based on Convolutional Neural Network Using Gradient-Weighted Class Activation Mapping," submitted
4. K. H. Sun, H. Huh, B. A. Tama, J. H. Jung, S. Y. Lee, and **S. Lee\***, "Vision-based Fault Diagnostics using Explainable Deep Learning with Class Activation Map," submitted
5. B. A. Tama, S. Y. Lee, and **S. Lee\***, "Machine Learning and Deep Learning Techniques for Intrusion Detection Systems in Industrial Control Networks: A Systematic Mapping Study," submitted
6. C. Lee, J. Na, S. J. Park and **S. Lee\***, "Development of Artificial Neural Network System to Recommend Processes Conditions of Injection Molding for Various Geometries," submitted
7. D. S. Shin, C. H. Lee, U. Kühn, **S. Lee**, S. J. Park, H. Schwab, S. Scudino and K. Kosiba\*, "Additive Manufacturing Meets Artificial Intelligence: Selective Laser Melting of Metals Optimized by Deep Learning," submitted
8. S. W. Kim, Y. G. Lee, B. A. Tama, and **S. Lee\***, "Reliability-enhanced Camera Lens Module Classification using Semi-supervised Regression Method," submitted
9. B. A. Tama, S. Im, and **S. Lee\***, "Improving an Intelligent Detection System for Coronary Heart Disease using a Two-tier Classifier Ensemble," submitted
10. B. A. Tama, H. Huh, S. Y. Lee, and **S. Lee\***, "A Fine-grained Feature Engineering Technique for Faulty Detection using Fully Convolutional Network," submitted
11. "Self-tunable Mechanosensing Ability of Spider by Changing Tension of Slit Organ on Demand : better understanding through artificial slit organ," submitted

#### INTERNATIONAL CONFERENCE PAPERS

1. S. Y. Lee, C. Park, and **S. Lee**, 2019, "Classification of the Steel Surface Defects via Machine Learning and Deep Learning," *ICMR 2019 (the 5th International Conference on Materials and Reliability)*, Jeju, Korea.
2. H. H. Lee, C. Park, Y. Hwang, **S. Lee**, S. J. Kim, J. S. Kim, B. I. Lee, Y. S. Cho, and M. G. Choi, 2019, "A Convolutional Neural Network Algorithm with Class Activation Map for Detection of

Various Lesions during Small Bowel Capsule Endoscopy,” *UEG (United European Gastroenterology) Week 2019*, Fira Gran Via, Barcelona, Spain.

3. S. Kim, Y. Lee and **S. Lee**, 2019, “Camera Lens Module Classification and Recommendation Model based on Deep Neural Network,” *2019 International Conference on Quality, Reliability, Risk, Maintenance, and Safety Engineering (QR2MSE 2019)*, Zhangjiajie, Hunan, China. (Best Paper Award)
4. B. A. Tama, H. Huh, K. Sun, and **S. Lee**, 2019, “A CNN-based Fault Detection Method using Vibration Video,” *The International Conference on the Interface between Statistics and Engineering (ICISE2019)*, Seoul, Korea.
5. H. Jeong, B. Park, S. Park, and **S. Lee**, 2017, “New Approach for Fault Identification using Observer-based Residual,” *PHM Asia Pacific 2017*, Jeju, Korea.
6. S. Park, H. Jeong and **S. Lee**, 2017, “Wavelet-like CNN Structure for Time-Series Data Classification,” *PHM Asia Pacific 2017*, Jeju, Korea.
7. H. Kim, S. Park, E. Park, N. Kim, and **S. Lee**, 2017, “Mechanical Property Estimation for FDM 3D Printed Parts using Gaussian Process Regression,” *PHM Asia Pacific 2017*, Jeju, Korea.
8. H. Jeong, M. Kim, B. Park, and **S. Lee**, 2017, “Vision-based Real-time Layer Error Quantification for Additive Manufacturing,” *SME NAMRC 45*, Los Angeles, CA, USA.
9. H. Kim, E. Park, S. Kim, B. Park, N. Kim, and **S. Lee**, 2017, “Experimental Study on Mechanical Properties of Single- and Dual-Material 3D Printing,” *SME NAMRC 45*, Los Angeles, CA, USA.
10. **S. Lee**, 2016, “Machine Learning and Data Visualization in Manufacturing,” *The 2nd Pacific Rim Statistical Conference for Production Engineering*, Seoul, Korea. (**Invited**)
11. H. Jeong, S. Park, and **S. Lee**, 2016, “Deep Learning based Diagnostics for Rotating Machinery on Orbit Analysis,” *Asian Conference Experimental Mechanics 2016*, Jeju, Korea.
12. H. Jeong, S. Woo, B. Park, and **S. Lee**, 2016, “PHM for Manufacturing Industry with IoT and Cloud Platform,” *Asian Conference Experimental Mechanics 2016*, Jeju, Korea.
13. H. Jeong, S. Woo, S. Kim, S. Park, H. Kim, and **S. Lee**, 2016, “Deep Learning based Diagnostics of Orbit Patterns in Rotating Machinery,” *PHM Conference 2016*, Denver, CO, USA.
14. H. Jeong, S. Park, S. Woo, and **S. Lee**, 2016, “Rotating Machinery Diagnostics using Deep Learning on Orbit Plot Images,” *SME NAMRC 44*, Blacksburg, VA, USA.
15. S. Park, H. Jeung, H. Min, and **S. Lee**, 2015, “System Diagnostics using Kalman Filter Estimation Error,” *The 3rd International Conference on Materials and Reliability*, Jeju, Korea.
16. A. Almuhtady, **S. Lee**, and J. Ni, 2013, “Planning by Maintenance-optimal Swapping for System-level Manufacturing Utilization,” *Proc. of ASME 2013 International Manufacturing Science and Engineering Conference*, Madison, WI. (MSEC2013-1076)
17. A. Almuhtady, **S. Lee**, E. Romeijn, and J. Ni, 2013, “A Maintenance-optimal Swapping Policy for a Fleet of Electric or Hybrid-Electric Vehicles,” *The 2nd International Conference on Operations Research and Enterprise Systems (ICORES 2013)*, Barcelona, Spain. (**ICORES 2013 Best Student Paper Award**)
18. **S. Lee**, 2012, “Hidden Markov Model with Independent Component Analysis,” *US-Korea Conference on Science, Technology and Entrepreneurship*, Los Angeles, CA. (UKC2012-131)

19. **S. Lee**, H. Cui, M. Rezvanizani, and J. Ni, 2012, "Battery Prognostics: SoC and SoH Prediction," *Proc. of ASME 2012 International Manufacturing Science and Engineering Conference*, Notre Dame, IN. (MSEC2012-7345)
20. X. Gu, **S. Lee**, and J. Ni, 2012, "Extension of Maintenance Opportunity Windows to General Manufacturing Systems," *Proc. of ASME 2012 International Manufacturing Science and Engineering Conference*, Notre Dame, IN. (MSEC2012-7346)
21. W. Cheng, **S. Lee**, Z. S. Zhang, and Z. J. He, 2012, "Dissimilarity Measures for ICA-Based Source Number Estimation," *Proc. of ASME 2012 International Manufacturing Science and Engineering Conference*, Notre Dame, IN. (MSEC2012-7340)
22. A. Almuhtady, **S. Lee**, and J. Ni, 2012, "Degradation-based Swapping Policy with Application to System-Level Manufacturing Utilization," *Proc. of ASME 2012 International Manufacturing Science and Engineering Conference*, Notre Dame, IN. (MSEC2012-7280)
23. **S. Lee**, 2011, "Development and Implementation of Optimal Maintenance Strategies at Automotive Assembly Plants," *US-Korea Conference on Science, Technology and Entrepreneurship*, Park City, UT. (UKC2011-423)
24. M. Rezvani, **S. Lee**, M. AbuAli, J. Lee, and J. Ni, 2011, "A Comparative Analysis of Techniques for Electric Vehicle Battery Prognostics and Health Management (PHM)," *SAE 2011 Commercial Vehicle Engineering Congress and Exhibition*, Rosemont, IL. (11CV-0191)
25. **S. Lee**, A. Brzezinski, and J. Ni, 2011, "Plant Layout Optimization Considering the Effect of Maintenance," *Proc. of ASME 2011 International Manufacturing Science and Engineering Conference*, Corvallis, OR. (MSEC2011-50233)
26. **S. Lee**, L. Li, and J. Ni, 2010, "Adaptive Anomaly Detection Using a Hidden Markov Model," *Proc. of ASME 2010 International Manufacturing Science and Engineering Conference*, Erie, PA. (MSEC2010-34169)
27. J. Ni, **S. Lee**, and L. Li, 2009, "Predictive Modeling for Intelligent maintenance in Complex Semiconductor Manufacturing Processes," *Proc. of Advanced Equipment Control/Advanced Process Control Symposium Asia*, Tokyo, Japan.
28. **S. Lee**, L. Li, and J. Ni, 2009, "Modeling of Degradation Processes to Obtain an Optimal Solution for Maintenance and Performance," *Proc. of ASME 2009 International Manufacturing Science and Engineering Conference*, West Lafayette, IN. (MSEC2009-84166)
29. **S. Lee**, D. Djurdjanovic, and J. Ni, 2007, "Optimal Condition-Based Maintenance Decision-Making For a Cluster Tool," *Proc. of 9th Semiconductor Research Cooperation Technical Conference* (SRC TechCon).

DOMESTIC  
CONFERENCE  
PAPERS

1. **S. Lee**, 2019, "Deep Learning for Power Plant Equipment," *The Korean Society of Pressure Vessels and Piping*, Changwon, Korea. (Invited)
2. **S. Lee**, 2019, "Artificial Intelligence Applications to Mechanical Engineering," *The Korean Society of Mechanical Engineers*, Jeju, Korea. (Invited)
3. **S. Lee**, J. Jeon, S. Y. Lee, K. Lee, T. Choi, and J. Kim, 2019, "Deep Learning-based Anomaly Detection of Bearing Faults," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
4. K. Lee, J. Na, J. Sohn, S. Sohn, and **S. Lee**, 2019, "Image Recognition to Digitalize Maintenance Logs: CNN and FCN," *The Korean Society of Mechanical Engineers*, Jeju, Korea.

5. J. Na, S. W. Kim, K. Park, H. Yu, J. Kim, K. Choi, and **S. Lee**, 2019, "Domain Adaptation from Simulation Data to Experimental Data via Transfer Learning: Case Study on Injection Molding," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
6. J. Na, S. W. Kim, K. Park, H. Yu, J. Kim, K. Choi, and **S. Lee**, 2019, "AI-based Recommender System for Process Conditions of Injection Molding," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
7. H. Huh, S. Y. Lee, J. Jeong, K. Sun, and **S. Lee**, 2019, "Study on Localizing the Most Vibrating Regime on Images using Explainable Deep Learning," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
8. S. Y. Lee, J. Jeon, K. Lee, J. Kim, T. Choi, and **S. Lee**, 2019, "Data Preprocessing and Machine Learning Techniques for Detection and Classification of Bearing Faults," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
9. S. Y. Lee, J. Jeon, K. Lee, J. Kim, T. Choi, and **S. Lee**, 2019, "Transfer Learning for Enhancing Bearing Fault Detection Performance under Time-varying Speed," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
10. Y. Hwang, H. H. Lee, **S. Lee**, and B. I. Lee, 2019, "Explainable Deep Learning-based Smart Diagnostics for Capsule Endoscopy Images," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
11. S. W. Kim, J. Na, S. J. Kim, and **S. Lee**, 2019, "Phase Analysis of Multi-phase Steel using Unsupervised Deep Learning," *The Korean Society of Mechanical Engineers*, Jeju, Korea.
12. **S. Lee**, 2019, "AI in Medicine: What are the New Roles of Surgeon?," *Annual Congress of the Korean Surgical Society*, Seoul, Korea. (Invited)
13. J. Na, and **S. Lee**, 2019, "AI-based Recommender System for Process Conditions of Injection Molding," *The Korean Society of Die & Mold Engineers*, Incheon, Korea.
14. **S. Lee**, 2019, "AI Applications to Material Science," *Material Research Society of Korea*, Samcheok, Korea.
15. **S. Lee**, K. Lee, J. Na, J. Sohn and S. Sohn, 2019, "Image Recognition to Digitalize Maintenance Logs: CNN and FCN," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
16. **S. Lee**, J. Jeon, Y. Hwang, I. Jeong, Y. Han and S. Im, 2019, "Pathological Voice Diagnostics using Deep Learning," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
17. **S. Lee**, J. Jeon, S. Y. Lee, K. Lee, T. Choi and J. Kim, 2019, "Deep Learning-based Anomaly Detection of Bearing Faults," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
18. **S. Lee**, N. Lee, I. Jeong, S. Kim and S. Shon, 2019, "Ensemble Methods of Rule-based Expert System and Data-driven AI Model: Case Study of Rotating Machinery," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
19. **S. Lee**, H. Huh, S. Y. Lee, J. Jeong, K. Sun, 2019, "Study on Localizing the Most Vibrating Regime on Images using Explainable Deep Learning," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
20. **S. Lee**, S. Y. Lee, J. Jeon, K. Lee, J. Kim and T. Choi, 2019, "Data Preprocessing and Machine Learning Techniques for Detection and Classification of Bearing Faults," *The Korean Society for*

*Noise and Vibration Engineering*, Jeju, Korea.

21. **S. Lee**, S. Y. Lee, J. Jeon, K. Lee, J. Kim and T. Choi, 2019, "Transfer Learning for Enhancing Bearing Fault Detection Performance under Time-varying Speed," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
22. N. Lee, I. Jeong, S. Kim, and **S. Lee**, 2019, "Ensemble Method of Rule-Based and Deep Learning for Rotating Machine Diagnostics," *IDPP Conference 2019*, Daejeon, Korea. (Best Student Paper Award)
23. K. Lee, J. Na, J. Son, and **S. Lee**, 2019, "Image Recognition Algorithm for Maintenance Data Digitization: CNN and FCN," *IDPP Conference 2019*, Daejeon, Korea.
24. **S. Lee**, 2019, "AI Shapes the Future of Steel Making Industry," *POSCO Annual Conference on Technolgoy*, Pohang, Korea. (Invited)
25. J. Na, C. Lee and **S. Lee**, 2019, "Development of Process Recommender System for Injection Molding Based on AI," *The Korea Society of Die & Mold Engineering*, Gongju, Korea.
26. **S. Lee**, 2019, "Industrial AI for Material Science," *Material Research Society of Korea*, Pyeongchang, Korea. (Invited Keynote Speech)
27. **S. Lee**, 2019, "The Future of Industrial AI," *The Korean Society for Technology of Plasticity*, Daegu, Korea. (Invited)
28. **S. Lee**, 2019, "AI Shapes the Future of Steel Making Industry," *The Korean Institute of Metals and Materials*, Changwon, Korea. (Invited)
29. J. Jeon, H. Huh, D. Lim, and **S. Lee**, 2019, "Deep learning based diagnostics algorithm for rotating machinery," *The Korean Society for Prognostics & Health Management*, Seoul, Korea.
30. S. W. Kim, H. Huh, and **S. Lee**, 2019, "Deep Learning based Diagnostics and Prediction for Camera Lens Module Assembly," *The Korean Society for Prognostics & Health Management*, Seoul, Korea.
31. H. Huh, D. Lim, S. W. Kim, J. Jeon and **S. Lee**, 2019, "Sensor Selection in Time Series Data using Class Activation Map," *The Korean Society for Prognostics & Health Management*, Seoul, Korea.
32. J. Jeon, H. Huh, D. Lim, **S. Lee**, 2019, "Smart Diagnostics System: Deep Learning Model for Time Series Analysis of Rotating Machinery, *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
33. **S. Lee**, 2019, "Deep Learning for Noise and Vibration Engineering," *KSNVE*, Pyeongchang, Korea. (Invited Keynote speech)
34. **S. Lee**, 2018, "AI-based Diagnostics and Prognostics for Fluid Machinery," *The Korean Society of Fluid Machinery*, Yeosu, Korea. (Invited Keynote Speech)
35. **S. Lee**, 2018, "AI for Mechanical Engineering," *Pohang Division of KSME*, Pohang, Korea.
36. S. Kim, and **S. Lee**, 2017, "Artificial Intelligence in Mechanical Engineering," *CAE and Applied Mechanics Division of KSME conference*, Busan, Korea.
37. S. Park, S. Kim, and **S. Lee**, 2017, "Deep Learning Classification Models for Sequential Data," *The Korean Society for Noise and Vibration Engineering*, Gwangju, Korea.



38. H. Jeong, S. Park, and **S. Lee**, 2017, "Observer-based Fault Detection and Isolation for Rotating Machinery," *The Korean Society for Noise and Vibration Engineering*, Gwangju, Korea.
39. H. Lee, S. Park, S. Kim, and **S. Lee**, 2017, "Vibration Comparison between High Speed Trains (KTX and SRT) in Korea," *The Korean Society for Noise and Vibration Engineering*, Gwangju, Korea.
40. H. Jeong, S. Park, and **S. Lee**, 2017, "Rotating Machinery Diagnostics using Model-based Fault Detection and Isolation," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
41. B. Park, H. Jeong, and **S. Lee**, 2017, "Servo Motor Diagnostics using Anomaly Detection," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
42. S. Kim, S. Park, and **S. Lee**, 2017, "Deep Learning Structures for Time Series Data in Manufacturing: RNN Focus," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea. (Best Student Paper Award)
43. S. Park, S. Kim, and **S. Lee**, 2017, "Interpretable CNN Structure for Time Series Data in Manufacturing," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
44. H. Kim, S. Kim, E. Park, N. Kim, and **S. Lee**, 2017, "Experimental Study on Improvement and Estimation of Mechanical Properties of FDM-based 3D Printing Products," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
45. M. Kim, H. Jeong, B. Park, and **S. Lee**, 2017, "Development of Vision-based Quality Assurance System in 3D Printing," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.
46. **S. Lee**, 2016, "Mechanical Systems with Artificial Intelligence," *the Korean Society of Mechanical Engineers 2016*, Jeongseon, Korea. (**Invited**)
47. H. Jeong, and **S. Lee**, 2016, "Real-time Monitoring System for Power Plant with IoT-based Cloud Platform," *Reliability Division in the Korean Society of Mechanical Engineers*, Pusan, Korea. (**Best Student Paper Award**)
48. H. Jeong, and **S. Lee**, 2016, "Real-time Monitoring for Rotating Machinery with IoT and Cloud Platform," *The Korean Society for Noise and Vibration Engineering*, Gyeongju, Korea.
49. S. Woo, and **S. Lee**, 2016, "Visualization Method of PCA Algorithm for Machine Health Diagnostics," *The Korean Society for Noise and Vibration Engineering*, Gyeongju, Korea.
50. **S. Lee**, H. Min, H. Jeong, S. J. Lee, and C. Kim, 2015, "Anomaly Detection in Rotating Machinery based on Orbit Image Eigen-analysis," *The Korean Society for Noise and Vibration Engineering*, Jeju, Korea.
51. H. Min, H. Jeong, S. Park, and **S. Lee**, Y. Lee, 2015, "Misalignment Detection Algorithm in Stacking Processes," *Korean Institute of Industrial Engineering*, Jeju, Korea.
52. H. Jeong, S. Park, H. Min, **S. Lee**, R. Koo, Y. Bae, 2015, "Rotational Machinery Diagnostics via Singular Value Decomposition of Orbit Images," *Korean Institute of Industrial Engineering*, Jeju, Korea.
53. H. Min, H. Jeong, S. Park, and **S. Lee**, S. J. Lee, 2015, "Anomaly Detection in Rotating Machinery based on Machine Learning of Orbits' Eigenvalues," *Reliability Division in the Korean Society of Mechanical Engineers*, Jeju, Korea.

54. H. Min, Y. Lee, H. Jeong, S. Park, and **S. Lee**, 2014, "Condition Monitoring in Multilayer Stacking Processes," *The Korean Society for Noise and Vibration Engineering*, Mokpo, Korea.
55. **S. Lee**, 2014, "Intelligent Fault Detection and Prediction System on Wind Turbine Gearboxes," *The Korean Society for Noise and Vibration Engineering*, Gangchon, Korea.
56. **S. Lee**, 2014, "Diagnostics of Automated Manufacturing Processes Using Event Time Durations," *Korean Society of CAD CAM Engineers*, Pyeongchang, Korea.

#### TALKS

1. "산업 인공지능 기술의 현재와 미래," Korea Electrotechnology Research Institute (KERI), Changwon, Korea. 02/06/20
2. "AI for Noise/Vibration Engineering," KSNVE, Daejeon, Korea. 01/21/20
3. "인공지능의 현재와 미래, 그리고 교육 혁신," Gachon University, Seongnam, Korea. 12/04/19
4. "산업 인공지능 기술의 현재와 미래," 설비진단기술 강습회, 대전 11/28/19
5. "인공지능과 ICBM," 경북SW융합인력양성센터, 대구 11/23/19
6. "산업 인공지능 기술의 현재와 미래: 재료 응용 사례 중심으로," Korea Institute of Industrial Technology (KITECH), Jeonju, Korea. 10/18/19
7. "산업에 적용가능한 인공지능," IME, POSTECH, Pohang, Korea. 09/18/19
8. "기계분야의 AI 기술 개발사례 (PHM 포함) 및 미래전망," Doosan Infracore, Incheon, Korea. 09/04/19
9. "기계공학 관점에서 바라본 인공지능," SHRM, Seoul National University, Seoul, Korea. 08/02/19
10. "인공지능 기반 상태감시 및 진단," Doosan Heavy Industries, Suji, Korea. 07/24/19
11. "산업 인공지능 적용 사례," POSCO, Pohang, Korea. 07/08/19
12. "지능정보기술을 활용한 3D프린팅 기술 고도화 연구 동향," Korea Information Society Development Institute (KISDI), Seoul, Korea. 06/25/19
13. "산업에 적용 가능한 인공지능이란?," Research Institute of Industrial Science & Technology (RIST), Pohang, Korea. 06/21/19
14. "강화학습은 과연 산업에 적용 가능한가?," Research Institute of Industrial Science & Technology (RIST), Pohang, Korea. 06/13/19
15. "산업 인공지능 적용 사례," LG Electronics, Pyeongtaek, Korea. 05/29/19
16. "산업 인공지능 적용 사례," SK Hynix, Pohang, Korea. 05/20/19
17. "산업 인공지능 기술의 현재와 미래," Samsung Heavy Industries, Pangyo, Korea. 05/13/19
18. "기계공학과 인공지능," Ajou University, Suwon, Korea. 03/22/19
19. "산업 인공지능 기술 개발 현황," 스마트 재료공정 심포지엄, Korea Institute of Materials Science (KIMS), Changwon, Korea. 01/31/19
20. "Introduction to AI and AI-based PHM," Hyundai Namyang Technology Research Center, Hwaseung, Korea. 12/20/18
21. "Computational Mechanics and AI," Korea Institute of Science and Technology Information (KISTI), Seoul, Korea. 12/19/18
22. "4차 산업혁명과 인공지능," 대구경북 중소기업 연합회, 대구 12/12/18
23. "기계공학과 인공지능," Gangneung-Wonju National University, Wonju, Korea. 11/27/18

24. “Deep Learning for Smart Manufacturing Digital plant,” Korea Institute of Industrial Technology (KITECH), Seoul, Korea 11/22/18
25. “Make it Smarter with Deep Learning,” Department of Creative IT Engineering, POSTECH, Pohang, Korea. 11/21/18
26. “AI Helps Make Nuclear Power Plants Safer,” Division of Advanced Nuclear Engineering, POSTECH, Pohang, Korea. 11/15/18
27. “4차 산업혁명과 인공지능,” 경상북도 인공지능 거점센터, 경산상공회의소, 경상 11/15/18
28. “인공지능을 활용한 설비관리,” BIXPO 2018, Gwangju, Korea. 11/01/18
29. “인공지능 소개,” 과학기술정보통신부 중앙전파관리소, 서울 09/19/18
30. “인공지능 기반 상태감시 및 진단,” Samsung Electro-Mechanics, Suwon, Korea. 09/14/18
31. “4차 산업혁명과 인공지능,” 경상북도 인공지능 거점센터, 영천상공회의소, 영천 08/29/18
32. “인공지능 기반 상태감시 및 진단에 대한 고찰,” KEPIC Week, Busan, Korea. 08/28/18
33. “AI for Shipbuilding Industry,” Samsung Heavy Industries, Daejeon, Korea. 08/27/18
34. “인공지능 기술과 조선해양 ICT 융합,” Korea Maritime and Ocean University, Gyeongju, Korea. 08/17/18
35. “AI Technology and Shipbuilding ICT,” Smart Ship and Shipbuilding Forum, Ulsan, Korea. 07/24/18
36. “Introduction to AI for Automotive Manufacturing,” Hyundai KEFICO, Gunpo, Korea. 07/18/18
37. “Deep Learning for Engineered Systems,” University of Ulsan, Ulsan, Korea. 07/12/18
38. “Introduction to AI for PHM,” Korea Hydro and Nuclear Power (KHNP), Gyeongju, Korea. 07/11/18
39. “Smart Mechanical Engineering – Big Data and AI,” POSTECH Summer Program, Pohang, Korea. 07/03/18
40. “AI for Automotive Manufacturing,” Hyundai Motor Company, Ulsan, Korea. 06/25/18
41. “인공지능, 기계공학에서 이렇게 쓰인다,” ME, KAIST, Daejeon, Korea. 05/29/18
42. “Deep Learning for Mechanical Engineering,” ME, POSTECH, Pohang, Korea. 04/25/18
43. “Deep Learning for Engineered Systems,” Korea Aerospace Research Institute (KARI), Daejeon, Korea. 04/24/18
44. “AI for Engineered Systems,” Korea Institute of Industrial Technology (KITECH), Incheon, Korea. 04/20/18
45. “Deep Learning for Healthcare and Medical Applications,” Catholic University of Korea Seoul St. Mary’s Hospital, Seoul, Korea. 04/16/18
46. “AI/Big Data for Energy and Utilities,” SK E & S, Pohang, Korea. 04/06/18
47. “AI for Engineered Systems,” Korea Institute of Materials Science (KIMS), Changwon, Korea. 03/30/18
48. “Deep Learning for PHM and Smart Factory,” POSCO, Pohang, Korea. 03/26/18
49. “Deep Learning for Semiconductor Equipment PHM,” Tokyo Electron Ltd. (TEL), Suwon, Korea. 03/22/18

50. "Deep Learning for Engineered Systems," Korea Atomic Energy Research Institute (KAERI), Daejeon, Korea. 03/21/18
51. "Deep Learning for Automotive Industry," Hyundai Motor Company, Namyang, Korea. 03/16/18
52. "Deep Learning for Engineered Systems," Korea Railroad Research Institute, Uiwang, Korea. 02/13/18
53. "PHM using Deep Learning," Korea Hydro and Nuclear Power, Seoul, Korea. 01/30/18
54. "AI and Smart Factory," Computational Design and Engineering Conference, Hoengseong, Korea. 01/25/18
55. "Introduction to PHM for Smart Plant Monitoring and Maintenance," Engineering Development Research Center (EDRC), Seoul, Korea. 01/23/18
56. "Monitoring and Diagnostics in Manufacturing using Deep Learning," Global Technology Center of Samsung Electronics, Suwon, Korea. 12/18/17
57. "Deep Learning for Smart Manufacturing," Research Institute of Industrial Science and Technology (RIST), Pohang, Korea. 12/08/17
58. "Deep Learning and Smart Manufacturing," Pusan National University, Pusan, Korea. 12/01/17
59. "Machine Learning and Deep Learning," Korea East-West Power, Ulsan, Korea. 11/28/17
60. "Deep Learning for Smart Diagnostics," Korea Hydro and Nuclear Power (KHNP), Daejeon, Korea. 11/09/17
61. "Deep Learning and its Applications to Smart Manufacturing," GIST, Gwangju, Korea. 10/11/17
62. "Make it Smarter via Deep Learning," K-Scool, KAIST, Korea. 09/27/17
63. "The 4th Industrial Revolution and Smart Manufacturing," Ulsan, Korea. 09/18/17
64. "Data Analytics in Manufacturing and Transportation: Deep Learning and PageRank," KAIST, Daejeon, Korea. 09/14/17
65. "Deep Learning Applications to Smart Factory," Korea Institute of Communication and Information Science, Pusan, Korea. 08/21/17
66. "Make it Smarter with Deep Learning," Chung-Ang University, Seoul, Korea. 08/10/17
67. "AI-based Smart Manufacturing," Hyundai Mobis, Mabuk, Korea. 07/26/17
68. "Deep Learning and its Applications to Smart Manufacturing," Hanwha Techwin, Pangyo, Korea. July 2017
69. "Deep Learning and its Applications to Smart Manufacturing," Samsung Electro-Mechanics, Suwon, Korea. June 2017
70. "AI for the Future of Production," UNIST, Ulsan, Korea. June 2017
71. "PHM with IoT Smart Sensors," Hyundai Heavy Industries, Ulsan, Korea. May 2017
72. "Intelligent Mechatronic Systems with Signal Processing, Control, and Optimization," Hongik University, Seoul, Korea. April 2017
73. "How to Teach Engineering Mechanics," as a recipient of outstanding teaching award at UNIST, Ulsan, Korea. April 2017
74. "Mechatronics with Machine Learning and Deep Learning," Inha University, Incheon, Korea. April 2017
75. "Machine Learning and Deep Learning in Manufacturing," KIMM, Daejeon, Korea. March 2017

76. "Bayesian Machine Learning and Data Visualization in PHM," Korea Atomic Energy Research Institute, Daejeon, Korea. Jan. 2017
77. "Machine Learning and Data Visualization in Manufacturing," the department of Industrial and Management Engineering at POSTECH, Pohang, Korea. Nov. 2016
78. "Intelligent Mechanical Systems with Machine Learning," KIMM, Daejeon, Korea. Aug. 2016
79. "IoT and Cloud Platform for Monitoring," Signallink, Daejeon, Korea, July 2016
80. "IoT-based PHM in Power Plants," KEPCO, Daejeon, Korea. July 2016
81. Introduction to PHM and Big Data Visualization," The Korea Aerospace University, Seoul, Korea. Dec. 2015
82. "Machine Learning for Machine Healthcare Systems," the Korea Institute for Machine Diagnostics, Gwangju, Korea. Sep. 2015
83. "Big Data Mining and IoT-based PHM," Seoul National University, Seoul, Korea. Aug. 2015
84. "Big Data Visualization," ASPM Business Analytic Program, UNIST, Ulsan, Korea. May 2015
85. "Big Data Visualization in Manufacturing," UNIST Big Data Symposium, UNIST, Ulsan, Korea. Mar. 2015
86. "Issues on Intelligent PHM," the Korea Certification Institute for Machine Diagnostics, Kyeongju, Korea. Sep. 2014
87. "Diagnostics and Prognostics of Battery Management Systems," Samsung Advanced Institute of Technology, Suwon, Korea. Dec. 2013
88. "Guest Lecture on Self-Healing Engineering Systems," Ajou University, Suwon, Korea. Nov. 2013
89. "Issues on Intelligent Prognostics," KEPCO, Daejeon, Korea. Oct. 2013
90. "Introduction to iSystem Design Laboratory," UNIST, Ulsan, Korea. Oct. 2013
91. "Die Monitoring in Progressive Stamping Process," IAB 25, P&G Mason Business Center, Mason, OH. May 2013
92. "Diagnostics, Prognostics, and Decision-Making for Next Generation Manufacturing Factories," University of Maryland, College Park, MD. Mar. 2013
93. "Diagnostics, Prognostics, and Decision-Making for Next Generation Manufacturing Factory," University of Toronto, Toronto, ON, Canada. Feb. 2013
94. "Introduction to Intelligent Maintenance with Industrial Case Studies," Samsung Electro-mechanics, Suwon, Korea. Jan. 2013
95. "Smart Factory of the Future: Diagnostics, Prognostics, and Decision-Making," UNIST, Ulsan, Korea. Jan. 2013
96. "Linear Systems Theory for Prediction with Industrial Applications," UNIST, Ulsan, Korea. Jan. 2013
97. "Self-diagnostic Module Development for MLCC Stacker," IAB 24, National Instruments, Austin, TX. Nov. 2012
98. "Diagnostics and Prognostics for Machine Health and Decision-making towards Predictive Manufacturing Factory," Ajou University, Suwon, Korea. Oct. 2012
99. "IMS Introduction with Industrial Case Studies," Samsung Electro-mechanics, Suwon, Korea. Oct. 2012

100. "Remaining Useful Life Prediction and Optimal Replacement Policy for Battery," 2011 INFORMS Annual Meeting Conference, Charlotte, NC. Nov. 2011
101. "Job Scheduling Considering the Effect of Maintenance in Semiconductor Manufacturing," 2011 INFORMS Annual Meeting Conference, Charlotte, NC. Nov. 2011
102. "Maintenance Opportunity Windows in Manufacturing Systems," KSEA MI Local Chapter Technical Seminar, Ann Arbor, MI. Nov. 2011
103. "Introduction to Intelligent Maintenance Systems – Advanced Prognostics for Smart Systems," LG Electronics, Seoul, Korea. Oct. 2011
104. "Introduction to Intelligent Maintenance Systems," Samsung SDS, Seoul, Korea. Sep. 2011
105. "Development and Implementation of Maintenance Strategies for Assembly Line," IAB 21, Boeing, St Louis, MO. May 2011
106. "Decision Making for Joint Maintenance and Product Policies," 2010 INFORMS Annual Meeting Conference, Austin, TX. Oct. 2010
107. "Integrated Production and Maintenance Planning for a Multiple Product System," IAB 19, GE Aviation, Cincinnati, OH. May 2010
108. "Maintenance Strategies for Manufacturing Systems using Markov Models," Ph.D. Oral Defense, University of Michigan, Ann Arbor, MI. May 2010
109. "Degradation Modeling, Fault Detection, and Maintenance Planning," Eaton Innovation Center, Southfield, MI. Dec. 2009
110. "Machine Degradation Estimation and Maintenance for Multiple Product System," IAB 18, Avetec, Springfield, OH. Oct. 2009
111. "Online Self-Adaptive Fault Learning and Pattern Discovery Method," IAB 17, Ford, Dearborn, MI. May 2009
112. "An Overview of the Maintenance Decision Support Tool," IAB 17, Ford, Dearborn, MI. May 2009
113. "Modeling of Degradation Processes to Obtain an Optimal Solution for Maintenance," Engineering Graduate Symposium, University of Michigan, Ann Arbor, MI. Nov. 2008
114. "Degradation Modeling and Buffer Management: A Maintenance Perspective," IAB 15, Caterpillar, Peoria, IL. April 2008
115. "Optimal Maintenance Solution for Degradation System," IAB 14, Chrysler, Warren, MI. Oct. 2007
116. "Modeling of Degradation Processes to Obtain an Optimal Solution for Maintenance and Performance," Ph.D. Preliminary Examination, University of Michigan, Ann Arbor, MI. Sep. 2007
117. "Optimal Condition-Based Maintenance Decision-Making for a Cluster Tool," 2007 Semiconductor Research Cooperation Technical Conference, Austin, TX. Sep. 2007
118. "Predictive Modeling and Intelligent Maintenance Tools for High Yield Next Generation Fab," 2007 SRC FORCeII Research Review, Durham, NC. July 2007
119. "Optimal Condition-Based Maintenance Decision-Making and Production Dispatching," IAB 13, P&G, Cincinnati, OH. May 2007
120. "Intelligent Maintenance Decision-Making," IAB 12, Boeing, Saint Louis, MO. Nov. 2006

## TUTORIALS

1. "Intro. to AI," 경북 혁신아카데미사업, Pohang 01/22/20 ~ 01/30/20
2. "PHM: AI Applications," KSPHM, Seoul 01/17/20
3. "Deep Learning," Samsung Heavy Industries, Pangyo 01/07/20
4. "Deep Learning," Dong-A University, Pusan 01/06/20 ~ 01/10/20
5. "RNN and Reinforcement Learning," KIMM, Daejeon 12/13/19
6. "RNN and Reinforcement Learning," KIMM, Daejeon 08/29/19
7. "AI Summer School," KSME, Seoul 08/21/19 ~ 08/23/19
8. "Intro. to AI," SK Hynix, Pohang 04/24/19 ~ 04/30/19
9. "Signal Processing for PHM," KSPHM, Seoul 01/28/19
10. "Machine Learning and Deep Learning," Kumoh National Institute of Technology, Gumi 01/12/19
11. "Signal Processing and Deep Learning," KSNVE, Yeosu 10/17/18
12. "Signal Processing for PHM," KSPHM, Seoul 08/23/18
13. "Intro. to AI," SK Hynix, Pohang 07/23/18 ~ 07/27/18
14. "Machine Learning and Deep Learning," Computational Structural Engineering Institute of Korea, Seoul 02/08/18
15. "Machine Learning and Deep Learning," Hanwha Techwin, Seoul 02/01/18 ~ 02/02/18
16. "Deep Learning," Pusan National University, Pusan 01/29/18
17. "AI Winter School, KSME," Seoul 01/16/18 ~ 01/19/18
18. "Machine Learning and Deep Learning," Hanwha Techwin, Seoul 12/14/17 ~ 12/15/17
19. "Machine Learning and Deep Learning," Hanwha Techwin, Seoul 11/22/17 ~ 11/23/17
20. "Coding for Deep Learning," KSVNE, Yesan 10/18/17
21. "머신러닝에서 딥러닝까지," 기계학회 CAE및응용역학부문, Seoul 08/25/17
22. "AI Summer School," KSME, Seoul 08/21/17 ~ 08/23/17
23. "Deep Learning for PHM," PHMAP, Jeju 07/14/17
24. "Coding for Machine Learning and Deep Learning with Vibration Signals," KSNVE, Gwangju 04/26/17

## GRANTED RESEARCH PROJECTS

### On-going

1. PI, "인공지능 기반 건진성 관리 지능화: 유사/비유사 환경에서의 강건성 증대를 위한 딥러닝 기반 진단·예지 요소 기술 개발," 한국연구재단 2020.03 ~ 2022.12
2. PI, "풍력터빈 기어박스 Subscale 모델 고장시험 및 진단 알고리즘 개발," 두산중공업 2020.02 ~ 2020.11
3. PI, "열연 조압연에서의 바 상향 예측을 위한 데이터 기반 모델 개발," 포스코 2020.01 ~ 2020.11
4. PI, "IIoT와 인공지능 기반의 지속 가능한 스마트 제조 모델 구축," 정보통신기획평가원 2019.07 ~ 2020.12
5. co-PI, "상호연동 모듈형 허리, 어깨, 무릎 근력보조 엑소수트 기술 개발," 국방과학연구소 2019.06 ~ 2024.05
6. co-PI, "산업인공지능 전문인력양성사업," 산업통상자원부 2019.03 ~ 2024.02
7. co-PI, "조건적중을 60%이상의 인공지능형 사출성형 시스템 개발," 산업통상자원부 2019.01 ~ 2020.12

8. PI, “기계시스템 진단 및 제어를 위한 차세대 인공지능 기초 연구,” 한국기계연구원 2018.01 ~ 2020.12
9. co-PI, “IoT 기반 보조기기 원격 진단지원 툴킷 개발,” 한국전력연구원 2017.06 ~ 2020.05

### Completed

1. PI, “제동시 발생하는 일시적 브레이크 노이즈 검출의 AI 활용,” 현대자동차 2019.08 ~ 2019.12
2. PI, “딥러닝을 이용한 다상 조직상의 미세조직 분류기술 개발,” 재료연구소 2019.07 ~ 2019.12
3. PI, “진동 Wavelet 신호 학습 알고리즘 진단성능 검증,” 두산중공업 2019.04 ~ 2019.07
4. co-PI, “음성 신호를 기반으로 인공지능을 이용한 질병의 진단 및 임상예측 모델 개발,” 포-가 공동연구지원사업 2019.03 ~ 2020.02
5. co-PI, “인공지능 기반 스포츠 빅데이터 분석 알고리즘 및 원천기술 개발,” 중소벤처기업부 2019.01 ~ 2019.12
6. PI, “지능형 학습기반 대상조건 조향계 이음판별 장치개발,” 현대모비스 2018.05 ~ 2018.12
7. co-PI, “인공지능 딥러닝 기반 소장캡슐 내시경 스마트 판독 시스템 개발,” 포-가 공동연구지원사업 2018.04 ~ 2020.02
8. PI, “연주기 2차냉각 기계학습 모델 확대 적용 기술개발,” 포스코 2019.03 ~ 2020.02
9. PI, “종합 설비데이터 진단을 위한 딥러닝 플랫폼 개발,” 삼성전기 2018.03 ~ 2019.02
10. co-PI, “선박 회전기기 상태기반 유지보수를 위한 스마트 모니터링 시스템 개발,” 산업기술평가관리원 2017.07 ~ 2019.12
11. PI, “가스터빈 통합 데이터 기반 상태 진단 및 예측 시스템 개발,” 한국전력연구원 2017.07 ~ 2018.09
12. co-PI, “AI-based Unconventional Architecturing Technologies for Hybrid-scale Micro-/Nano-structures,” UNIST 2017.01 ~ 2017.12
13. PI, “A Deep Learning Framework for Human Motion Classification,” Samsung Electronics, Korea. Feb. 2017 ~ Aug. 2017
14. co-PI, “Development of an Intelligent Diagnosis and Automatic Control Software Platform for Smart Factory,” UNIST, Korea. Feb. 2017 ~ Dec. 2017
15. PI, “Industrial Robot Health Monitoring Systems using Big Data and IoT Sensors (Phase II),” National IT Industry Promotion Agency (NIPA), Korea. Jan. 2017 ~ Dec. 2017
16. PI, “Vision-based BIW ID Recognition at Automotive Painting Shop (Phase I),” Small and Medium Business Administration, Korea. Nov. 2016 ~ Oct. 2017
17. PI, “Development of Diagnostics Algorithm using Deep Learning on Acoustic Signals,” Samsung Electronics, Korea. Sep. 2016 ~ Sep. 2017
18. PI, “3D Printing Monitoring Systems and Control Algorithms for Minimal Manufacturing Deformation in Automotive Industries (Phase I)” National Research Foundation of Korea (NRF) June 2016 ~ May 2017
19. co-PI, “Program for Creative and Innovative Design Engineering,” Korea Institute of Advancement of Technology (KIAT), Korea. Mar. 2016 ~ June 2020
20. co-PI, “R&BD Infrastructure for Environment-friendly 3D Printed Automotive Parts,” Korea Institute of Advancement of Technology (KIAT), Korea. July 2015 ~ June 2020



21. co-PI, "BK21+: Strategic Program of Interdisciplinary Human & Systems Engineer for Technologically Driven Human-Centered Factories of the Future," National Research Foundation of Korea (NRF), Korea. Sep. 2013 ~ Feb. 2020
22. co-PI, "Ulsan Industry-University Convergence Campus," Korea Institute of Advancement of Technology (KIAT), Korea. July 2012 ~ June 2017
23. PI, "Industrial Robot Health Monitoring Systems using Big Data and IoT Sensors (Phase I)," National IT Industry Promotion Agency, Korea. May 2016 ~ April 2017
24. PI, "Development of PHM Algorithms and Monitoring Systems: Virtual Machine for Machine Prognostics," Samsung Electro-Mechanics, Korea. Nov. 2014 ~ Oct. 2015
25. PI, "Anomaly Detection of Fan Vibration in Power Plants," Korea Electric Power Research Institute, Korea. Nov. 2014 ~ July 2015
26. PI, "Prognostics of Plant BOP Rotational Machinery using Vibration Signals," Doosan Heavy Industries, Korea. Nov. 2014 ~ Sep. 2015
27. PI, "Prognostics Health Management (PHM) Algorithm Development and PHM System Implementation," Samsung Electro-Mechanics, Korea. Feb. 14 ~ Nov. 2015
28. PI, "Development of Self-Diagnostic Algorithm in a MLCC Stacker," UNIST, Korea. July 2013 ~ Jan. 2015

TEACHING  
EXPERIENCE

**POSTECH, Korea**

**Graduate**

*MECH701 - Deep Learning* Spring, 2019, 2020

**Undergraduate**

*MECH490 - Machine Learning* Spring, 2018, 2019, 2020

*MECH323 - Control Systems* Fall, 2018, 2019

*MECH202 - 전산제도및설계* Fall, 2019

*MECH199 - 새내기연구참여* Fall, 2018, 2019

Spring, 2019

*MECH100 - Intro. to Mechanical Engineering* Fall, 2019

**UNIST, Korea**

**Graduate**

*DHE 545 - Machine Learning* Spring, 2016

*DHE 542 - Advanced Multivariate Analysis and Data Mining* Spring, 2015

*DHE 573 - Advanced Control and Signal Processing* Fall, 2015

*DHE 571 - Root Cause Analysis* Fall, 2014

*DHE 802 - Special Topics in ESD 2 (Optimization Methods)* Winter, 2013

*DHE 801 - Special Topics in ESD 1 (Big Data Analytics)* Fall, 2013

**Undergraduate**

*MEN 230 - Solid Mechanics I* Spring, 2017

*SDC 401 - Introduction to Mechatronics* Fall, 2016, Spring, 2017

*HSE 402 - Engineering Design Method* Spring, 2015

*ESD 201 - Engineering Mechanics* Spring, 2014, 2015, 2016

*ESD 301 - Engineering Drawing and Analysis* Spring, 2014

RESEARCH  
SUPERVISOR**Ph.D. Committee**

- Member of the doctoral committee for Woongyoung Lee (POSTECH) Fall 2019  
Dissertation title: "Development of Torque-controlled Electro-hydraulic Actuators and Stability-guaranteed Interaction Control"
- Member of the doctoral committee for Sunkyum Yoo (POSTECH) Fall 2019  
Dissertation title: "Dynamic Interaction Control of Hydraulic Actuation Systems with Inherent Compliance and Backdrivability"
- Member of the doctoral committee for Jaehyeok Doh (Yonsei Univ.) Fall 2017  
Dissertation title: "A Study on Structural Prognosis and Design Optimization Considering Uncertainties"
- Member of the doctoral committee for Md Saiful Islam (Univ. of Ulsan) Spring 2016  
Dissertation title: "Induction Motor Fault Detection by Advanced Signal Processing Techniques using Vibration Data"
- Member of the doctoral committee for Md Rashedul Islam (Univ. of Ulsan) Spring 2016  
Dissertation title: "Discriminant Fault Feature Selection and Reliable Online Bearing Fault Diagnosis System using Signal Processing and Machine Learning Techniques"
- Member of the doctoral committee for Ahmad Almuhtady (Univ. of Michigan) Winter 2013  
Dissertation title: "Degradation-Based Swapping Optimization Policy for Fleet-Level Battery Utilization"

**M.S. Committee**

- Member of the master committee for YoungSin Kim (POSTECH) Fall 2019  
Dissertation title: "Development of Diagnostic Method for Heart Disease using Infrasonic Heart Sound"
- Member of the master committee for Seokho Nam (POSTECH) Fall 2019  
Dissertation title: "Torque Controlled Hydraulic Actuator with Improved Stiffness using Feedback Spring and Parallel Connecting Mechanism"
- Member of the master committee for Seong Ju Kim (POSTECH) Fall 2019  
Dissertation title: "Design of Inkjet Printing Waveform by Machine Learning"
- Co-chair of the master committee for Chihum Lee (POSTECH) Spring 2019  
Dissertation title: "Development of Process Recommender System for Injection Molding Based on Artificial Neural Networks"
- Co-chair of the master committee for Giwoung Song (POSTECH) Spring 2019  
Dissertation title: "Development of Artificial Intelligence Prediction Model to Substitute Continuous Casting Process Simulation"
- Co-chair of the master committee for Doohee Kim (POSTECH) Spring 2019  
Dissertation title: "A Study on the Correlation of Chatter in Rolling Process based on Deep Learning"
- Member of the master committee for Mario Ruttgers (POSTECH) Fall 2018  
Dissertation title: "Prediction of Typhoon Tracks using a Generative Adversarial Network with Observational and Meteorological Data"
- Chair of the master committee for Hee-Chang Kim (UNIST) Fall 2017  
Dissertation title: "Mechanical Properties Assessment and Reliability Verification for FDM 3D"

Printed Products”

- Chair of the master committee for Suhyun Kim (UNIST) Fall 2017  
Dissertation title: “Deep Learning Applications in Manufacturing: Sound-based Fault Detection and Human Motion Recognition”
- Chair of the master committee for Sunhee Woo (UNIST) Fall 2016  
Dissertation title: “Machine Learning Toolbox and Data Visualization for PHM”
- Member of the master committee for Wonil Jeong (UNIST) Fall 2016  
Dissertation title: “IIoT-Enabled Manufacturing Process Monitoring and Resource Positioning”
- Member of the master committee for Ikchan Ju (UNIST) Spring 2016  
Dissertation title: “A Study on Manufacturing Complexity and Difficulty in a Mixed Model Assembly Line: Application of Automotive Assembly Process”
- Member of the master committee for Hweeyoung Han (UNIST) Spring 2016  
Dissertation title: “A Study on Additive Manufacturing Technology as a Manufacturing Tool of Automotive Industry”
- Chair of the master committee for Hyungcheol Min (UNIST) Fall 2015  
Dissertation title: “Statistical Approaches for Fault Diagnostics and Root Cause Analysis with Industrial Applications: MLCC and Rotating Machinery”
- Member of the master committee for Wooyeol Lee (UNIST) Fall 2014  
Dissertation title: “Analysis of Manufacturing Complexity for Optimal Resource Allocation in Mixed Model Production of the Automotive Industry”
- Member of the master committee for A-Rm Yoo (UNIST) Spring 2014  
Dissertation title: “A Framework for a Real-Time Product Quality Monitoring System with the Consideration of Process-Induced Variations”
- Member of the master committee for Amit Kumar Sinha (UNIST) Spring 2014  
Dissertation title: “Effects of Part-to-Part Gap and the Variation of Weld Seam on LASER Welding Quality”

PROFESSIONAL  
COMMITTEE

- Committee in the CAE & Applied Mechanics Division of the Korea Society of Mechanical Engineers since 2020
- Committee in the Korean Society for Mechanical Engineers since 2019
- Committee in the Korean Society for Prognostics & Health Management since 2018
- Committee in the Korean Society for Noise and Vibration Engineering since 2017
- Committee in the Reliability Division of the Korea Society of Mechanical Engineers since 2015
- The Vibration Technical Committee in the Korea Certification Institute of Machine Diagnostics since 2013
- The Manufacturing Systems Technical Committee (TC) in the Manufacturing Engineering Division (MED) of ASME June 2013

PROFESSIONAL  
SERVICE

- Co-organizing a technical session titled ”AI for Noise and Vibration Engineering” at Inter-noise 2020 in Seoul, Korea Aug. 2020
- Panel Session Chair in the PHM Asia Pacific 2017 Conference July 2016
- Hosting manufacturing research seminars for Prof. Samuel Kwofie from Kwame Nkrumah University

of Science and Technology, Kumasi, Ghana	Nov. 2012
Co-Chairing a session titled “Manufacturing System Prognostics” at 2012 MSEC/NAMRC in South Bend, IN.	June 2012
Chairing a session titled “Corrosion/Electrolytic Effects” at 2012 MSEC/NAMRC in South Bend, IN.	June 2012
Organizing a symposium titled “Integrated Prognostics and Health Management System” at 2012 MSEC/NAMRC in South Bend, IN.	June 2012
Hosting manufacturing research seminars for Prof. David E. Hart from MIT	Feb. 2012
Hosting manufacturing research seminars for Prof. Placid M. Ferreira from UIUC	Feb. 2012
Chair, organizing a session titled “Design and Manufacturing” at 2011 Engineering Graduate Symposium at the University of Michigan	Nov. 2011
Chair, organizing a session titled “Semiconductor Industry” at 2011 INFORMS in Charlotte, NC	Nov. 2011
Chair, organizing a session titled “Statistical Decision Making and Quality Estimation in Energy Manufacturing Application” at 2011 INFORMS in Charlotte, NC	Nov. 2011
Manufacturing Research Seminar Series Committee at the University of Michigan	2011, 2012
Member, American Society of Mechanical Engineers (ASME)	since 2009
Member, The Institute for Operations Research and Management Science (INFORMS)	since 2010
Vice President, Michigan Chapter of Korean-American Scientists and Engineers Association (KSEA)	2011
President, Korean Students Friday Tennis Club at The University of Michigan	2011
Vice President, Korean Students Association - Graduate (KSAG) at the University of Michigan	2009, 2010

#### VIDEO OUTREACH ‘iAI POSTECH’ YouTube Channel

- 405 subscribes and 19,062 views as of 02/23/2020
- 109 videos
- Topics: Machine Learning, Deep Learning, Control, Discrete Signal Processing

#### Machine Learning at Match-Up platform (MOOC)

- 1091 enrollments, 12/17/2018 ~ 06/14/2019
- 246 enrollments, 10/14/2019 ~ 12/31/2019

#### POSTECH NanoMaster at Graduate School of Information Technology

- Machine Learning
  - 09/02/2019 ~ 12/28/2019, 03/18/2019 ~ 06/30/2019, 09/03/2018 ~ 12/28/2018
- Deep Learning
  - 2019.09.02 ~ 2019.12.28

#### POSTECH MOOC

- LG Electronics
  - Machine Learning: 586 enrollments, 01/13/2020 ~ 05/03/2020
- KT
  - Deep Learning: 36 enrollments, 09/01/2019 ~ 11/30/2019

- Machine Learning: 38 enrollments, 09/01/2019 ~ 11/30/2019
- Machine Learning: 143 enrollments, 02/18/2019 ~ 06/30/2019
- Machine Learning: 249 enrollments, 09/10/2018 ~ 12/19/2018
- RIST
  - Machine Learning: 111 enrollments, 09/16/2019 ~ 01/31/2020
  - Deep Learning: 52 enrollments, 09/16/2019 ~ 01/31/2020
- Lotte Data Communication
  - Machine Learning: 57 enrollments, 09/16/2019 ~ 01/05/2020