Byung-Gun Joung

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Education

B.S. Computer Communication Engineering, Korea University **2009 - 2016**
M.S. Electrical Engineering, Korea University **2016 - 2018**
Advisor: Chulwoo Kim
Ph.D. Environmental and Ecological Engineering, Purdue University, **2018 - present**
Advisor: John W Sutherland

Professional Experience

1. Research Assistant, Purdue University, West Lafayette, Indiana, USA **2018 - present**
   a. Research activities dedicated to WHIN project including DAQ, data analysis for Predictive maintenance of rotating machinery
   b. Assistive work to prepare materials for academic sessions or presentations
   c. Become professional to machine learning algorithm and smart manufacturing system

2. Korea University, Research Assistant **2016 - 2018**
Design integrated circuits in Cadence environment and do digital logic coding via Verilog language and MATLAB
   a. Become familiar with wireline data transmission and power management system
   b. Verify manufactured IC through experimental work and validate the predicted performance of simulation result
   c. Prepare publication in journal paper

3. Sergeant, Republic of Korea Air Force based in Seoul **2011 - 2013**
   a. Military service ROKAF (Republic of Korea Air Force). Selected Koreans have the privilege of working as the Republic of Korea Air Force Special Forces through screening process including an interview
   b. Responsible for computer security-based military security systems
   c. Conducted on intranet security, coding, compilation to administrative work

Engineering Experience

1. Engine Verification Project with Cummins corp. **2023 - present**
Develop data analytical tools for engine verification using machine learning models.
   a. Experienced in data processing on cloud-based platform (e.g., Databrick)
   b. Skilled in programming with Python language
   c. Developed an ensemble model for anomaly detection. The work covers dataset construction, model development with training/validation/testing, visualization for representation/interpretation of a model, implementation of the model into cloud-based computing platforms.

2. WHIN project, Purdue University **2018-2023**
Develop smart manufacturing technologies for solving complex manufacturing problems
   a. Develop data acquisition system for machine health monitoring
   b. Develop machine learning models for predictive maintenance, anomaly detection, classification of machine failure, prediction on remaining useful life for manufacturing components
   c. Develop real-time visualization tools on web-based applications

3. MSEC 2022 hosted by Purdue University **2022.06**
Presented a paper titled “Anomaly Scoring Model for Diagnosis on Machine Condition and Health Management” at a doctoral symposium.

4. 8th International Conference on Through-Life Engineering Services 2019 **2019.10**
Professional presentation of the paper titled “Development and Application of a Method for Real Time Motor Fault Detection.”

5. IEEE International SoC Design Conference 2016 (ISOCC 2016) **2016.10**
Professional presentation of the paper titled “A digital low-dropout (DLDO) regulator with 14dB power supply rejection enhancement.”

Research Proposal, Korea University **2016**
1. National R & D Project Research Plan for Multidimensional Smart IT Convergence System Research, Development for Smart IT Convergence Platform, Cooperative research with Korea Advanced Institute of Sci. & Tech., Sungkyunkwan Univ., Korea Univ., developing a self-powered sensor node platform and commercializing it. The total R & D cost supported is 12.4 billion KRW (11.4 M in US Dollar) for 5 years

Publication

[1] ByungGun Joung, Y. Seo and C. Kim, "A Digital Low-Dropout (DLDO) regulator with -14 dB PSR enhancement technique," IEEE SoC Design Conference (ISOCC), Oct 2016, pp. 353-354
[2] ByungGun Joung, Wo Jae Lee, Aihua Huang, John W. Sutherland, “Development and Application of a Method for Real Time Motor Fault Detection”, Procedia Manufacturing, Volume 49, 2020, pp. 94-98
[3] Dheeraj Peddireddy, Xingyu Fu, Haobo Wang, Byung Gun Joung, Vaneet Aggarwal, John W. Sutherland, Martin Byung-Guk Jun, “Deep Learning Based Approach for Identifying Conventional Machining Processes from CAD Data”, Procedia Manufacturing, Volume 48, 2020, pp. 915-925
[4] Dheeraj Peddireddy, Xingyu Fu, Anirudh Shankar, Haobo Wang, Byung Gun Joung, Vaneet Aggarwal, John W. Sutherland, Martin Byung-Guk Jun, “Identifying manufacturability and machining processes using deep 3D convolutional networks”, Journal of Manufacturing Processes, Volume 64, 2021, pp.1336-1348
[5] Byung Gun Joung, Zhongtian Li, John W. Sutherland, “Anomaly Scoring Model for Diagnosis on Machine Condition and Health Management”, Manufacturing Science & Engineering Conference, 2022
[6] Wo Jae Lee, Byung Gun Joung, John W. Sutherland, “Environmental and Economic Performance of Different Maintenance Strategies for a Product Subject to Efficiency Erosion”, Journal of Cleaner Production, accepted
[7] Matthew J. Triebe; Sidi Deng; Jesús R. Pérez-Cardona; Byung Gun Joung; Haiyue Wu; Neha Shakelly; John P. Pieper; Xiaoyu Zhou; Thomas Maani; Fu Zhao; John W. Sutherland, “Perspectives on future research directions in green manufacturing”, Green Manufacturing Open, accepted
[8] Huang, A., Triebe, M., Li, Z., Wu, H., Joung, B.G. and Sutherland, J.W., 2022. A review of research on smart manufacturing in support of environmental sustainability. *International Journal of Sustainable Manufacturing*, *5*(2-4), pp.132-163.
[9] Abdallah, Mustafa, Byung-Gun Joung, Wo Jae Lee, Charilaos Mousoulis, Nithin Raghunathan, Ali Shakouri, John W. Sutherland, and Saurabh Bagchi. "Anomaly detection and inter-sensor transfer learning on smart manufacturing datasets." *Sensors* 23, no. 1 (2023): 486.
[10] Byung-Gun Joung, Chandra Nath, Zhongtian Li, and John W. Sutherland. " Bearing Anomaly Detection in an Air Compressor using an LSTM and RNN-Based Machine Learning Model.", *International Journal of Advanced Manufacturing Technology*, (under review)

Honors and Awards

1. Korean National Sci. & Eng. and Honors Scholarship, two times **2009, 2015**
2. SK-Hynix scholarships awarded to industry-academy scholars **2016 - 2018**

Coursework (Completed - Undergraduate)

Data Structure, Logic Circuit Design and Practice, Computer Architecture, Digital Signal Processing, Java Computing, Computer Science and Practice, Computer Language and Practice, Linear Algebra, Electronic Circuit, Communication circuit, Electromagnetic field , Communication engineering design, Sys Model, Analysis & Control

Coursework (Completed - graduate)

Design of Analog Integrated Circuit, Power Conversion Circuits, Low Noise Circuit Design, Design of Micro-Semiconductor, Digital Integrated Circuit Design, Design of Memory Interface Circuit and Semiconductor Material, Design and Control of Production and Manufacturing Systems, Theory and Design of Control Systems, Machine Learning