CENTER FOR INTELLIGENT MAINTENANCE SYSTEMS

The National Science Foundation
Industry/University Cooperative Research Center for
Intelligent Maintenance Systems

University of Cincinnati
Baldwin Hall 560
Cincinnati, OH 45221-0072

513.556.3412
513.556.3390
imscenter.net

Vibhor Pandhare

Graduate Researcher
PhD Candidate, Mechanical Engineering
University of Cincinnati, OH, U.S.A.

2419 Ohio Avenue, Apt. 15, Cincinnati, OH, U.S.A. 45219
+1-(513)-641-7185, +91-(860)-217-6319
pandhavr@mail.uc.edu, vibhorpandhare@gmail.com

AIM

Development of Industrial Artificial Intelligence and Data Analytics solutions for profitable asset management and operational efficiency.

EDUCATION

University of Cincinnati (UC), Cincinnati, OH, U.S.A. *Aug. 2017 - Present*

- *Ph.D.* in Mechanical Engineering
- Advisor: Prof. Jay Lee
- GPA: 4.0/4.0
- Graduate Researcher at the NSF Industry/University Cooperative Research Center (I/UCRC) for Intelligent Maintenance Systems (IMS)
- Expected Graduation: Fall 2021

Indian Institute of Technology Indore (IIT Indore), India *Jul. 2011 - Jun 2016*

- *5 Year B. Tech + M. Tech Dual Degree*
- Mechanical Engineering, specialization in Production and Industrial Engineering
- GPA: 8.0/10.0
- Thesis Title: *A Social Network for Machines – Realizing INDUSTRY 4.0*
- Advisor: Dr. Bhupesh Kumar Lad

EXPERIENCE

Mazak Corporation, Florence, Kentucky, US *Jan. 2021 – Present*

Analytics Intern

- Development of health assessment and diagnose algorithms for machine tool Spindles
- Exploration of algorithms for model adaptation across multiple machines.

Plastic Omnium Auto Exterior, Arevalo, Madrid, Spain *Jun. 2019 – Aug. 2019*

Data Analyst Intern (Predictive Maintenance)

- Performed a proof-of-concept for predicting failures in Injection Molding Machine using high-frequency current signal.
- Developed systematic methodology to select critical assets for predictive maintenance using historical failure data.
- Defined a domain ontology for preliminary text mining of maintenance records.

Indian Institute of Technology Bombay (IIT Mumbai), India *Jul. 2016 – Jul. 2017*

Research Associate, National Center for Aerospace Innovation and Research

- Developed statistical models for reliability estimation of naval equipment
- Considered Data availability from perfect time to failure data to expert judgement
- Designed a web-application for commercialization of the solution as a product
- Supervisor: Prof. Makarand Kulkarni

AVTEC Ltd., Pithampur, Madhya Pradesh, India *Oct. 2015 – Mar. 2016*

Graduate Intern

- Implementation and Validation of a Machine Simulator (Digital Twin): A Case Study

University of Cincinnati 513.556.3412
Baldwin Hall 560 513.556.3390
Cincinnati, OH 45221-0072 imscenter.net

Piaggio Vehicles Pvt. Ltd., Baramati, Maharashtra, India *May. 2014 – Jun 2014*
Summer Intern
- Complete Process Analysis of Supply Input and Supply Quality Control
- Application of KANBAN System on 4-Wheeler Assembly Line

Tata Motors Pvt. Ltd., Pune, Maharashtra, India *May. 2013 – Jun 2013*
Summer Intern
- Designing of Fixtures for Automation of Manufacturing Processes in Gear Factory

Geekware, IIT Indore, India *Jan. 2014 – Dec. 2015*
Co-founder
- A student-driven virtual market for goods and services for the IIT Indore community

RESEARCH EXPERIENCE

Hiwin Corporation, Taiwan *Sep. 2020 - Present*
Physics-informed Digital Twins for Robust Ball Screw Condition Monitoring
IMS Center, University of Cincinnati

Politecnico di Milano, Milan, Italy *Sep. 2019 – Present*
Field Synchronized Digital Twin for Production Scheduling with Uncertainty
IMS Center, University of Cincinnati

National Institute of Standards and Technology, U.S.A. *Nov. 2018 - Present*
Development of Health Assessment Tool using NIST Inertial Measurement Unit (IMU)
IMS Center, University of Cincinnati

Mazak Corporation, Florence, KY, U.S.A. *Jan. 2019 – Oct. 2019*
Expansion of Spindle Health Assessment Tool to Multiple Machine Models
(*Demonstrated at MAZAK DISCOVER 2019,* Florence, KY)
IMS Center, University of Cincinnati

Weichai America Corp., IL, U.S.A. *Dec. 2018 – May. 2019*
Condition Monitoring of Diesel Engines using Engine Control Unit (ECU) Data
IMS Center, University of Cincinnati

Plastic Omnium, Anderson, SC, U.S.A. *Mar. 2018 – Apr. 2019*
Designing a Predictive Maintenance Tool for Injection Molding Machine using Text-Mining on Maintenance Records
IMS Center, University of Cincinnati

Procter & Gamble Co, Lima, OH, U.S.A. *Jan. 2018 – Nov. 2018*
A Feasibility Study on Designing a Predictive Solution for Capping Quality Control
IMS Center, University of Cincinnati

Mazak Corporation, Florence, KY, U.S.A. *Oct. 2017 – Oct. 2018*
Design and Development of a System for Spindle Health Assessment and Fault Diagnosis (*Demonstrated at IMTS 2018, Chicago*)
IMS Center, University of Cincinnati

Indian Naval Ship Maintenance Authority (INSMA), India *Jul. 2016 – Jul. 2017*
Design and Development of a Reliability Estimation Tool for Naval Equipment
NCAIR, IIT Bombay

IEDC, Ministry of Sci. & Tech., Govt. of India, India *Mar. 2015 – Mar. 2016*
A Smart Communication Network for Shop-floor Planning in Industries
Intelligent Manufacturing Planning Lab, IIT Indore

IEDC, Ministry of Sci. & Tech., Govt. of India, India *Mar. 2014 – Mar. 2015*
Design and Development of a Smart Manager Android App for Industries
Intelligent Manufacturing Planning Lab, IIT Indore

AWARDS & HONORS

- *Third Position*, *ARAMIS European Innovation Challenge*, 2020
- *Exhibitor, Mazak Spindle Health Monitoring System,* MAZAK DISCOVER, KY, 2019
- *Exhibitor, Mazak Spindle Health Monitoring System*, IMTS, Chicago, IL, 2018
- *Exhibitor, Robot Health Monitoring System*, Foxconn Groundbreaking, WI, 2018
- *Innovative Student Projects Award*, Indian National Academy of Engineering, 2016
- *Manufacturing Today Award*, National Technical Institutes Competition, India, 2016
- *Senate Member,* Alumni Representative, Indian Institute of Technology Indore, *2016*
- *Best All-Rounder Award*, Indian Institute of Technology Indore, India, 2016
- *Academic Excellence In M.Tech*, Indian Institute of Technology Indore, India, 2016
- *Delegate, Start-Up India Policy Launch* by the Prime Minister of India, 2016
- *Delegate, Smart Manufacturing Summit*, Confederation of Indian Industry, 2015
- *Delegate, India International Science Festival*, IIT Delhi, New Delhi, India, 2015

TEACHING EXPERIENCE

Introduction to Industrial Artificial Intelligence *Spring 2021*
Teaching Assistant
IMS Center, University of Cincinnati

Introduction to Industrial Big Data Analytics *Spring 2020*
Teaching Assistant
IMS Center, University of Cincinnati

Introduction to Industrial Big Data Analytics *Spring 2019*
Teaching Assistant
IMS Center, University of Cincinnati

Lecture: Data Acquisition and Data Preprocessing *Multiple Occasions*
IMS Members' Training Module on Industrial Artificial Intelligence
IMS Center, University of Cincinnati

Reliability Engineering *Fall 2015*
Teaching Assistant
Intelligent Manufacturing Planning Lab, IIT Indore

PUBLICATIONS & PATENTS

Google Scholar Profile

- **Pandhare V.**, Li X., Miller M., Jia X. and Lee J., *Intelligent Diagnostics for Ball Screw Fault Through Indirect Sensing Using Deep Domain Adaptation,* IEEE Transactions on Instrumentation and Measurement, vol. 70, pp. 1-11, 2021

- Negri E., **Pandhare V.,** Cattaneo L., Singh J., Macchi M., Lee J., *Field-synchronized Digital Twin framework for production scheduling with uncertainty*, Journal of

Intelligent Manufacturing, pp. 1-22, Oct. 2020

- Lee J., Singh J., Azamfar M., **Pandhare V.**, *Industrial AI and predictive analytics for smart manufacturing systems*, Smart Manufacturing (Elsevier), pp. 213-244 [Book Chapter]
- **Pandhare V.**, Singh J, Lee J., *Convolutional Neural Network Based Rolling-Element Bearing Fault Diagnosis for Naturally Occurring and Progressing Defects Using Time-Frequency Domain Features*. 2019 Prognostics and System Health Management Conference (PHM-Paris), May 2019
- Azamfar M., Jia X., **Pandhare V.**, Singh J., Davari H., Lee J., *Detection and diagnosis of bottle capping failures based on motor current signature analysis*. Procedia Manufacturing. vol. 34, pp. 840 – 846, Jan. 2019
- Lee J., Davari H., Singh J., **Pandhare V.**, *Industrial Artificial Intelligence for Industry 4.0-based Manufacturing Systems*. Manufacturing Letters. 2018 Sep 10
- *Method and System for Providing Smart Communications for Distributed Operations Planning in an Industrial Network*
  B. K. Lad, M. S. Kulkarni, **V. Pandhare**, N. Agrawal, K. Upasani, M. Bakshi, 2016 Indian Patent Application No. 201621007003 [Patent] (Filed)
- Upasani K., Bakshi M., **Pandhare V.**, Lad B. K., *Distributed Maintenance Planning for Industry 4.0*, Computers and Industrial Engineering, vol. 8, Jun. 2017, pp. 1-14
- Upasani K., Bakshi M., **Pandhare V.**, Lad B. K., *Memetic Algorithm to Optimize Preventive Maintenance Schedule for a Multi-component Machine*, International Journal of Performability Engineering, vol. 12, No. 2, Mar. 2016, pp. 183-95.
- **Pandhare V.**, Sankhla V. K., Lad B. K., *Design and Development of a Machine Simulator for Cyber-Physical Systems Based Operations Planning*, Proceedings of the 57th National Convention of IIIE, SVNIT, India, Nov. 2015, pp. 807-812.
- Agrawal N., **Pandhare V.**, Lad B. K., *A Bayesian Algorithm for Cyber-Physical System Realization for Industry 4.0*, 3rd International Conference on Business Analytics and Intelligence, Data Centre & Analytics Lab, IIM Bangalore, India, 2015

PROGRAMMING LANGUAGES

MATLAB, Python (Analytics & Development), C#, MySQL, R, Java

UNIVERSITY COURSES

Intelligent Systems; Introduction to Industrial Big Data Analytics; Complex Systems and Networks; Mathematical Models for Decision Making; Reliability Engineering; Applied Fast Fourier Transform

ONLINE COURSES

Deep Learning Specialization, *Coursera, April 2019*
Neural Networks and Depp Learning; Improving Deep Neural Networks: Hyperparameter tuning, Regularization and Optimization; Structuring Machine Learning Projects; Convolutional Neural Networks; Sequence Models