

Ali Naderi Bakhtiyari, Ph.D.

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ABOUT

Researcher and mechanical engineer with over 10 years of cross-disciplinary experience in advanced manufacturing, laser material processing, and AI-driven process modeling and optimization. My work focuses on developing data-driven and physics-informed models to capture complex process-material interactions and translate them into deployable decision-support and optimization systems for industrial manufacturing. I have led and contributed to industrial R&D and academic collaborations involving quality prediction, parameter optimization, and closed-loop monitoring of laser-based processes under real production constraints. My research interests focus on digital twin development for manufacturing systems, AI-enabled process optimization, and integrating intelligent models into practical smart-factory environments.

EDUCATION

• *Ph.D. in Mechanical Engineering*

Sep 2019 – Jun 2024

Shandong University of Technology, Shandong, China.

- Awarded Full Fund China Scholarship Council (CSC)
- Awarded Outstanding Ph.D. Student in the School of Mechanical Engineering

Thesis Topic: Research in nanosecond laser machining of sapphire with the aid of modeling and optimization methods.

Supervisor: [Prof. Hongyu Zheng](#)

Thesis Details: My Ph.D. thesis focused on developing AI-based models and multi-objective optimization techniques for enhancing the performance and quality of sapphire nanosecond laser machining. My work involved exploring the interaction between laser parameters and material properties to optimize machining. I utilized artificial intelligence algorithms to model complex manufacturing processes. I developed predictive models that can simulate and optimize laser machining parameters by leveraging techniques such as artificial neural networks and support vector regression. This approach helps achieve desired outcomes like enhanced precision, improved surface finish, and reduced processing times. Moreover, my research included applying multi-objective optimization methods to balance various conflicting objectives in laser machining. Another study was dedicated to the functionalization of material surfaces using laser techniques. This includes creating micro and nano-scale textures to modify surface properties such as wettability, friction, and optical characteristics. The goal is to develop surfaces with tailored functionalities for specific industrial applications, such as enhancing the performance of optical devices and improving tribological properties.

Outcome: 7 ISI papers as the first author and 9 ISI papers as the co-author, 2 international conference paper, and 2 international collaborations, especially with leading researchers in Saudi Arabia and Vietnam. Due to my remarkable achievements, I was awarded the outstanding Ph.D. student prize.

• *Master of Science (M.Sc.) in Mechanical Engineering – Manufacturing and Production*

Sep 2013- Feb 2016

Semnan University, Semnan, Iran

Thesis Topic: Investigation of mechanical properties using artificial neural network and micro-structure of equal channel angular rolled Al5083 and Al6061 samples.

Supervisor: [Dr. Masoud Mahmoodi](#)

Thesis Details: My M.Sc. thesis focused on investigating the mechanical properties and microstructure of aluminum alloys (Al5083 and Al6061) processed through equal channel angular rolling (ECAR). The research aimed to understand the relationship between microstructural changes and mechanical properties induced by ECAR. By employing artificial neural networks (ANN) and nonlinear regression, I developed predictive models to estimate the mechanical properties of the processed alloys. This approach allowed for the accurate prediction of properties such as tensile strength, hardness, and ductility based on microstructural features. The study provided insights into optimizing the ECAR process parameters to enhance the mechanical performance of aluminum alloys, contributing to their potential applications in various industries.

Outcome: 2 ISI papers and 2 ISC papers

• ***Bachelor of Science (B.Sc.) in Mechanical Engineering – Manufacturing and Production*** Sep 2008- Sep 2012

- Islamic Azad University, Najafabad Branch (IAUN), Isfahan, Iran.
- Awarded outstanding B.Sc. Student in the School of Mechanical Engineering

Thesis Topic: Designing and manufacturing ultrasonic digitizer.

Supervisor: [Dr. Mohammad Amini](#)

Thesis Details: My B.Sc. thesis involved the design and manufacture of an ultrasonic digitizer, a device used for converting analog ultrasonic signals into digital form for various applications such as medical imaging, non-destructive testing, and industrial automation. The project required a comprehensive understanding of ultrasonic transducers, signal processing, and digital electronics. I focused on optimizing the design to achieve high accuracy and reliability while minimizing noise and distortion. The successful development of the ultrasonic digitizer demonstrated my ability to integrate theoretical knowledge with practical engineering skills, paving the way for advanced research and innovation in ultrasonic technology.

Outcome: The project produced a functional ultrasonic digitizer prototype that showcased innovative design and engineering capabilities. Due to my remarkable achievements, I was awarded the outstanding B.Sc. student prize.

PROFESIONAL EXPERIENCE

- **Senior Algorithm Engineer (R&D department)** (Dec 2023) Jul 2024 – Now
Bodor Laser Co., Jinan, Shandong, China: Laser cutting and welding machine manufacturer.
Main Focus: Responsible for developing and deploying AI-driven models for process modeling, quality prediction, and parameter optimization in industrial fiber laser cutting systems. My work focuses on translating experimental and production data into data-driven and hybrid physics-informed models that support process stability, efficiency, and cut quality. I contribute to the design of closed-loop monitoring and decision-support mechanisms, enabling adaptive adjustment of laser parameters under real manufacturing constraints.
- **Mechanical Design Engineer (R&D department)** Feb 2017 – Jul 2019 **Aroco**
Fanavaran Partak Co, (TibaTech), Isfahan, Iran: A company that provides, designs, and manufactures ultrasonic equipment.
Main Focus: As a Mechanical Design Engineer, I was responsible for designing new ultrasonic components based on customer requirements. I created detailed 3D models and 2D drawings using CAD software such as CATIA and SolidWorks to communicate designs to suppliers and customers effectively. Additionally, I performed mechanical simulations on the designed components using CAE software like Abaqus and actively participated in the prototype testing of these components to ensure their functionality and reliability
- **Project Engineer** Mar 2016 – Jan 2017
Kimia Nano Danesh Co, Semnan, Iran; KND Company specializes in designing, selling, and installing Nanotechnology Labs.
Main Focus: I engineered the design and production of components of the ultrasonic homogenizer, considering costs and manufacturability. I coordinated project-specific designs between sub-suppliers and conducted quality and delivery

followups with sub-suppliers. I supported the site team during the installation and commissioning phases, supervised site activities, and monitored progress according to the project schedule.

- **Researcher** Feb 2014 – Nov 2015
Nano Research Center, Semnan University, Semnan, Iran: A research group with a focus on the application of nanofluids.
Main Focus: I worked directly on several academic and industrial projects. My responsibilities included designing a new system for modeling the thermal conductivity and viscosity of nanofluids. I also applied Artificial Neural Networks to predict the properties of nanofluids. The results were published in several high-impact ISI journals.
- **Internship** May 2012 – Aug 2012
Isfahan Steel Company, Isfahan, Iran: A leading steel manufacturing company.
Main Focus: During my internship at Isfahan Steel Company, I focused on gaining a comprehensive understanding of the technology and mechanical components involved in the casting process. This experience provided me with hands-on knowledge of industrial practices and the operational aspects of casting technology

RESEARCH PUBLICATION

Journal Papers:

- 1- **A. N. Bakhtiyari**, V. Hassani, M. Omid, (2026), “An Auditable, Deployment-Aware Multi-Agent Framework for Automated Remaining Useful Life Prediction and Maintenance Decision Support”, Under review, *Journal of Intelligent Manufacturing*. (SJR Q1)
- 2- **A. N. Bakhtiyari**, V. Hassani, M. Omid, (2026), “[CPU Deployment–Oriented Evaluation of Compact Neural Networks for Remaining Useful Life Prediction](https://doi.org/10.3390/machines14040375)”, *Machines*, Volume 14 (4), 375. <https://doi.org/10.3390/machines14040375> (SJR Q2)
- 3- Z. Wang, L. Chen, T. Zang, **A. N. Bakhtiyari**, D. Qi, Y. Wu, W. Yu, H. Zheng, (2025) “[Enhancing optical integration: One-step fabrication of multilevel and bifocal Fresnel diffractive microlenses with high focusing efficiency via two-photon polymerization](https://doi.org/10.1016/j.jmapro.2025.05.071)”, *Journal of Manufacturing Processes*, Volume 149, Pages 198-206. <https://doi.org/10.1016/j.jmapro.2025.05.071> (SJR Q1)
- 4- Z. Wang, Y. Wu, L. Chen, **A. N. Bakhtiyari**, W. Yu, D. Qi, H. Zheng, (2025), “[Spatial light assisted femtosecond laser direct writing of a bionic superhydrophobic Fresnel microlens arrays](https://doi.org/10.1016/j.optlastec.2024.111451)”, *Optics & Laser Technology*, Volume 180, 111451. DOI: [10.1016/j.optlastec.2024.111451](https://doi.org/10.1016/j.optlastec.2024.111451) (SJR Q1)
- 5- **A. N. Bakhtiyari**, M. Omid, A. Yadav, Y. Wu, H. Zheng, (2024), “[AI-based modeling and multi-objective optimization of ultraviolet nanosecond laser-machined sapphire](https://doi.org/10.1007/s00339-023-07259-9)”, *Applied Physics A*, Volume 130,101. DOI: [10.1007/s00339-023-07259-9](https://doi.org/10.1007/s00339-023-07259-9) (SJR Q2)
- 6- Z. Wang, Y. Wu, W. Yu, D. Qi, **A. N. Bakhtiyari**, H. Zheng, (2024), “[Investigation into fabrication and optical characteristics of tunable optofluidic microlenses using two-photon polymerization](https://doi.org/10.1364/OE.515245)”, *Optics Express*, Volume 32, Pages 7448-7462. DOI: [10.1364/OE.515245](https://doi.org/10.1364/OE.515245) (SJR Q1)
- 7- **A. N. Bakhtiyari**, A. Yadav, Y. Wu, H. Zheng, (2023), “[Enhancing wettability of sapphire \(Al₂O₃\) substrate through laser surface texturing](https://doi.org/10.1016/j.matlet.2023.135506)”, *Materials Letters*, Volume 355, 135506. DOI: [10.1016/j.matlet.2023.135506](https://doi.org/10.1016/j.matlet.2023.135506) (SJR Q2)
- 8- **A. N. Bakhtiyari**, K. Wang, C. Wang, Y. Wu, H. Zheng, (2023), “[Effect of using reflective target materials on enhancing UV nanosecond laser machining of sapphire](https://doi.org/10.1016/j.ijleo.2023.171333)”, *Optik*, Volume 290, 171333. DOI: [10.1016/j.ijleo.2023.171333](https://doi.org/10.1016/j.ijleo.2023.171333) (SJR Q2)
- 9- K. Wang, **A. N. Bakhtiyari**, Y. Wu, M. Liu, H. Zheng, (2023), “[Magneto-responsive wettability-switchable surfaces for in-situ large distance droplets capturing-releasing-bouncing](https://doi.org/10.1016/j.ccej.2023.147420)”, *Chemical Engineering Journal*, Volume 478:147420. DOI: [10.1016/j.ccej.2023.147420](https://doi.org/10.1016/j.ccej.2023.147420) (SJR Q1)

- 10-K. Wang, **A. N. Bakhtiyari**, Y. Wu, M. Liu, H. Zheng, (2023), "[Magnetic-responsive Fe₃O₄@PDMS@SiO₂ omniphobic microciliary arrays for dynamic manipulation of droplets and spheres](#)", *Surface and Interfaces*, Volume 42, 103487. DOI: [10.1016/j.surf.2023.103487](#) (SJR Q1)
- 11-**A. N. Bakhtiyari**, Y. Wu, L. Wang, Z. Wang, H.Y. Zheng, (2023), "[Laser machining sapphire via Si-sapphire interface absorption and process optimization using an integrated approach of the Taguchi method with grey relational analysis](#)", *Journal of Materials Research and Technology*, Volume 24, Pages 663-674. DOI: [10.1016/j.jmrt.2023.02.218](#) (SJR Q1)
- 12-**A. N. Bakhtiyari**, Y. Wu, D. Qi, H.Y. Zheng, (2023), "[Modeling temporal and spatial evolutions of laser-induced plasma characteristics by using machine learning algorithms](#)", *Optik*, Volume 272, 170297. DOI: [10.1016/j.ijleo.2022.170297](#) (SJR Q2)
- 13-M. Omid, Z. Karimi, S. Rahmani, **A. N. Bakhtiyari**, M. K. Abdolmaleki, (2023), "[Molecular dynamic study of perovskite with improved thermal and mechanical stability for solar cells application: Calculation of the final strength of the modeled atomic structures and Young's modulus](#)", *Engineering Analysis with Boundary Elements*, Volume 156, Pages 1-7. DOI: [10.1016/j.enganabound.2023.07.037](#) (SJR Q1)
- 14-**A. N. Bakhtiyari**, Z. Wang, H.Y. Zheng, (2021), "[Feasibility of artificial neural network on modeling laser-induced colors on stainless steel](#)", *Journal of Manufacturing Processes*, Volume 65, 471-477. DOI: [10.1016/j.jmapro.2021.03.044](#) (SJR Q1)
- 15-**A. N. Bakhtiyari**, Z. Wang, L. Wang, H.Y. Zheng, (2021), "[A review on applications of artificial intelligence in modeling and optimization of laser beam machining](#)", *Optics & Laser Technology*, Volume 135, 106721. DOI: [10.1016/j.optlastec.2020.106721](#) (SJR Q1)
- 16-A. Asadi, **A. N. Bakhtiyari**, I. M. Alarifi, (2021), "[Predictability evaluation of support vector regression methods for thermophysical properties, heat transfer performance, and pumping power estimation of MWCNT/ZnO-engine oil hybrid nanofluid](#)", *Engineering with computers*, Volume 37. Pages 3813-3823. DOI: [10.1007/s00366-020-01038-3](#) (SJR Q1)
- 17-W. Liu, Z. Wang, W. Yuan, W. Tian, X. Sun, C. Wang, **A. N. Bakhtiyari**, J. Cong, H. Zheng, (2021), "[Simultaneous laser in situ generation of graphene and micro-textures on ductile iron and their effects on tribological properties](#)", *Journal of Materials Research and Technology*, Volume 15, Pages 6541-6550. DOI: [10.1016/j.jmrt.2021.11.091](#) (SJR Q1)
- 18-L. Wang, Z. Wang, **A. N. Bakhtiyari**, H.Y. Zheng, (2020), "[A comparative study of laser-induced graphene by CO₂ infrared laser and 355 nm Ultraviolet \(UV\) laser](#)", *Micromachines*, Volume 11(12), Page 1094. DOI: [10.3390/mi11121094](#) (SJR Q2)
- 19-I. M. Alarifi, H. M. Nguyen, **A. N. Bakhtiyari**, A. Asadi, (2019), "[Feasibility of ANFIS-PSO and ANFIS-GA models in predicting thermophysical properties of Al₂O₃-MWCNT/Oil hybrid nanofluid](#)", *Materials*, Volume 12, Issue 21. DOI: [10.3390/ma12213628](#) (SJR Q2)
- 20-M. Mahmoodi, **A. N. Bakhtiyari**, (2019), "[Microstructure and its relationship to mechanical properties in equal channel angular rolled Al6061 alloy sheets](#)", *Iranian Journal of Materials Forming*, Volume 6, Issue 1, Pages 16-23. DOI: [10.22099/ijmf.2019.31820.1118](#) (ISC Journal)
- 21-M. Mahmoodi, **A. N. Bakhtiyari**, G. Dini, (2017), "[Correlation between microstructure and mechanical properties of Al5083 alloy sheets processed by equal channel angular rolling](#)", *Journal of Materials Engineering and Performance*, Volume 26, Pages 6022-6027. DOI: [10.1007/s11665-017-3021-z](#) (SJR Q2)
- 22-M. Mahmoodi, **A. N. Bakhtiyari**, (2016), "[Applicability of artificial neural network and nonlinear regression to predict mechanical properties of equal channel angular rolled Al5083 sheets](#)", *Latin American Journal of Solids and Structures*, Volume 13, Pages 1515-1525. DOI: [10.1590/1679-78252154](#) (SJR Q2)
- 23-M. Mahmoodi, **A. N. Bakhtiyari**, (2015), "[Prediction of mechanical properties of equal channel angular rolled Al6061 alloy sheet using artificial neural networks and nonlinear regression](#)", *Journal of Modeling in Engineering*, Volume 15, Pages 197207. DOI: [10.22075/jme.2017.2690](#) (ISC Journal)

- 24-M. H. Esfe, S. Saedodin, **A. N. Bakhtiyari**, A. Alirezaie, A. Karimipour, S. Wongwises, M. Goodarzi, M. Dahari, (2015), “[Modeling of thermal conductivity of ZnO-EG using experimental data and ANN methods](#)”, *International Communications in Heat and Mass Transfer*, Volume 63, Pages 35-40. DOI: [10.1016/j.icheatmasstransfer.2015.01.001](#) (SJR Q1)
- 25-M. H. Esfe, **A. N. Bakhtiyari**, M. Akbari, M. Afrand, A. Karimipour, (2015), “[Evaluation of thermal conductivity of COOHfunctionalized MWCNTs/water via temperature and solid volume fraction by using experimental data and ANN methods](#)”, *Journal of Thermal Analysis and Calorimetry*, Volume 121, Issue 3, Pages 1273-1278. DOI: [10.1007/s10973-015-4565-5](#) (SJR Q2)
- 26-M. H. Esfe, S. Wongwises, **A. N. Bakhtiyari**, A. Asadi, M. R. Safaei, H. Rostamian, M. Dahari, A. Karimipour, (2015), “[Thermal conductivity of Cu/TiO₂-water/EG hybrid nanofluid: Experimental data and modeling using artificial neural network and correlation](#)”, *International Communications in Heat and Mass Transfer*, Volume 66, Pages 100-104. DOI: [10.1016/j.icheatmasstransfer.2015.05.014](#) (SJR Q1)
- 27-M. H. Esfe, M. Afrand, S. Wongwises, **A. N. Bakhtiyari**, A. Asadi, S. Rostami, M. Akbari, (2015), “[Applications of feedforward multilayer perceptron artificial neural networks and empirical correlation for prediction of thermal conductivity of Mg\(OH\)₂-EG using experimental data](#)”, *International Communications in Heat and Mass Transfer*, Volume 67, Pages 46-50. DOI: [10.1016/j.icheatmasstransfer.2015.06.015](#) (SJR Q1)

Conference Papers:

- 1- A.N. Bakhtiyari, K. Wang, Z. Wang, L. Wang, Y. Wu, H. Zheng, (2025) “[Hybrid Intelligent Algorithm for Modeling and Optimization of Laser Microgrooving of Sapphire](#)”, The 9th International Conference on Manufacturing Technologies ([ICMT 2025](#)), 13-17 Jan 2025, Atlanta, USA. (Accepted for presentation in ICMT 2025 and publication in “[Lecture Notes in Mechanical Engineering](#)”)
- 2- A.N. Bakhtiyari, H. Zheng, (2024) “A Hybrid Approach to Simulating and Optimizing Laser-Induced Plasma-Assisted Ablation (LIPAA) of Sapphire Using Machine Learning and Numerical Modeling Methods”, International Symposium on Advanced Intelligent Manufacturing Technology, 1-4 Dec., Zibo, Shandong, China.
- 3- A. N. Bakhtiyari, Z. Wang, H.Y. Zheng, (2021), “Application of artificial neural network in improving color consistency and repeatability of laser color marking”, The 8th International Conference on Surface Engineering ([8th ICSE 2021](#)), 3-5 Dec 2021, Weihai, China.
- 4- M. H. Esfe, S. Saedodin, A. N. Bakhtiyari, A. Alirezaie, (2014) “Proposing a new empirical correlation of thermal conductivity of ZnO-EG nanofluid”, The 2nd Conference on Heat and Mass Transfer, 19-20 Nov 2014, Semnan University, Semnan, Iran.

INDUSTRIAL/ACADEMIC PROJECTS

Project Manager, *Opti-Cut: AI-Based Optimization Tool for Laser Cutting* – Bodor Laser Co.

Led the development and deployment of a user-friendly AI-powered tool for optimizing fiber laser cutting parameters, enhancing cutting efficiency and quality across diverse materials.

Lead Developer, *AI-Powered Monitoring and Control System for Fiber Laser Cutting* – Bodor Laser Co.

Designed and implemented a real-time intelligent control platform integrating machine learning models for defect prediction, parameter adjustment, and quality monitoring.

Head of Research Core, *Isfahan Science and Technology Town*

Directed interdisciplinary research initiatives and innovation-driven collaborations focused on smart manufacturing and emerging technologies.

Mechanical Design Engineer, *Ultrasonic Transducer Simulation and Design* – Aroco Fanavaran Partak Co.

Simulated, designed, and tested ultrasonic components, contributing to the development of high-performance ultrasonic welding and cleaning devices.

Project Engineer, *Design and Manufacturing of Ultrasonic Homogenizer* – Kimia Nano Danesh Co.

Led the design, prototyping, and commissioning of ultrasonic homogenizers for nanotechnology applications, coordinating with suppliers and installation teams.

Teaching Assistant, *Press Die and Jig Design Course* – Semnan University

Supported undergraduate education by assisting in course delivery, project supervision, and practical design tutorials.

Researcher, *ANN-Based Modeling of Nanofluid Properties* – Nano Research Center, Semnan University

Developed predictive models for thermal conductivity and viscosity of nanofluids using artificial neural networks, with outcomes published in high-impact journals.

Guest Editor — Machines (Special Issue), Served as Guest Editor for a Special Issue on *Intelligent Fault Diagnosis and Predictive Maintenance Systems: Advanced Methods for Industrial Equipment and Dynamic Operating Conditions*, overseeing manuscript evaluation, coordinating peer review, and supporting editorial decision-making in collaboration with the journal's editorial office.

Peer Reviewer, *Optics & Laser Technology*, *OPTIK*, *Heliyon*, *Case Studies in Thermal Engineering*

Contributed to the academic community by reviewing research articles in the fields of laser processing, thermal engineering, and applied optics.

HONORS AND AWARDS

- **Global Talent Endorsement**, Royal Academy of Engineering (UK); awarded under the Exceptional Promise route
- **Outstanding Ph.D. Student Award**, Shandong University of Technology, China
- **China Scholarship Council (CSC) Ph.D. Scholarship** — full funding for doctoral studies
- **Outstanding B.Sc. Student Award**, IAU, Najafabad Branch, Iran
- **China Scholarship Council (CSC) Ph.D. Scholarship** — full funding for doctoral studies
- **China Tier A Work Permit** — granted to highly qualified foreign talent under national high-level talent criteria

PROFESSIONAL MEMBERSHIPS

- Active member of [the American Society of Mechanical Engineers \(ASME\)](#)
- Active member of [the Institution of Engineering and Technology \(IET\)](#)
- Active member of [the Society of Manufacturing Engineers \(SME\)](#)
- Previous member of Young Researchers and Elite Club (2012)

SOFTWARE SKILLS

- **Programming:** Python, MATLAB, C++
- **CAD software:** CATIA, SolidWorks
- **CAE software:** COMSOL
- **CAM software:** Mastercam
- **Graphic design software:** Blender, CorelDraw, Photoshop

REFERENCES

Prof. Hognvu Zheng (Ph.D. supervisor)

Dean of the Mechanical Engineering Department, Shandong University of Technology, Shandong, China

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Prof. Yongling Wu

Mechanical Engineering Department, Shandong University of Technology, Shandong, China;

Email: [ylwu06@sdut.edu.cn](mailto:ywu06@sdut.edu.cn)

Dr. Vahid Hassani

Department of Engineering, School of Science and Technology, City St George's,
University of London, London, United Kingdom; Email: vahid.hassani@city.ac.uk

Dr. Masoud Mahmoodi (M.Sc. Supervisor)

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