Muhammad Saif Ullah Khalid, PhD, P.Eng.

Contact Information

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Career Highlights

- Professional engineer, researcher, and teacher with extensive experience and advanced training in mechanical engineering
- Recipient of national and international funding grants of worth $\sim \$740,000$ for research and industrial projects
- Developed and taught fundamental and advanced courses in mechanical engineering and supervised more than 75 undergraduate and graduate engineering students in different universities of the world
- Led and participated in many collaborative projects in knowledge-based work environments, resulting in 35 technical journal articles and 20 papers & presentations in internationally reputed conferences, including ASME, AIAA, and IEEE
- Excellent leadership, project management, organizational, interpersonal, analytical, communication, presentation, and problem-solving skills

Areas of Interest

Fluid-Structure Interaction, Bio-inspired Propulsion, Aerodynamics, Hydrodynamics, Multiphysics Simulations, Nonlinear Dynamics, Renewable Energy, and Energy Harvesting

Current Academic Appointments

Lakehead University, Canada
Assistant Professor (Tenure-Track) 01/2023 – Present

- Affiliation:
  - ◇ Department of Mechanical and Mechatronics Engineering
  - ◇ Founding Director: Nature-Inspired Engineering Research Lab (NIERL)

University of Alberta, Canada
Adjunct Professor 07/2021 – Present

- Affiliation:
  - ◇ Department of Mechanical Engineering

Industrial Appointment

AeroEnergy Consulting, Canada
R&D Lead 09/2023 – Present
Simulation Specialist Consultant 01/2021 – 08/2023

Education

National University of Sciences & Technology, Pakistan

Ph.D., Mechanical Engineering, 05/2016

- Dissertation: *Numerical Simulations, Nonlinear Analysis, and Control of Bio-inspired Flows: A Step towards Autonomous Vehicles*
- Advisor: Professor Imran Akhtar

University of Virginia, USA

Visiting Doctoral Student, Mechanical and Aerospace Engineering, 10/2014 – 03/2015

- Adviser: Professor Haibo Dong
- Area of Study: Nonlinear Mechanics of Bio-inspired Swimming and Flight

National University of Sciences & Technology, Pakistan

M.Sc, Mechanical Engineering, 08/2009

- Thesis: *CFD Based Analysis of Supersonic Flows*
- Adviser: Professor Muhammad Afzaal Malik
- Area of Research: Computational Fluid Dynamics and Compressible Flows

B.E., Mechanical Engineering, 05/2007

- Senior Design Project: *Modeling and Simulation of a MEMS Gyroscope*

Previous Academic & Research Appointments

University of Alberta, Canada

Associate Teaching Professor 09/2022 – 12/2022

Research Associate 04/2021 – 08/2022

Visiting Postdoctoral Research Fellow 09/2020 – 03/2021

- Affiliation:
  - ◇ Department of Mechanical Engineering
- Key Outcomes:
  - ◇ Conducted fundamental and applied research in computational fluid-structure-acoustic interactions
  - ◇ Taught courses (MEC E 563 - Finite Element Method for Mechanical Engineers, MEC E 430 - Fluid Mechanics II, MEC E 230 - Introduction to Thermal-Fluid Science and MEC E 362 - Mechanics of Machines) to undergraduate and graduate students in mechanical engineering
  - ◇ Actively collaborated with Professor David Wood (University of Calgary), Professor Haibo Dong (University of Virginia), and Professor Arman Hemmati (University of Alberta) to design nature-inspired efficient energy harvesting and propulsive systems
  - ◇ Lead Volunteers Coordinator and member of the Program Development Committee to organize Canadian Society of Mechanical Engineers (CSME) Congress, 2022
  - ◇ Mentored PhD and MSc students in their thesis research

Peking University, China 03/2019 – 02/2021

International Exchange Postdoctoral Research Fellow

- Affiliations:
  - ◇ Key State Laboratory of Turbulence and Complex Flows
  - ◇ Institute of Ocean Research
  - ◇ Department of Mechanics and Engineering Science
- Advisor: Professor Moubin Liu
- Research Project: Hydrodynamics and hydro-acoustics of fish swimming
- Key Outcomes:
  - ◇ Recipient of this highly competitive fellowship jointly funded by China National Postdoc Foundation and Peking University, China (Funding Amount $\sim$ \$1,16,000)
  - ◇ Developed advanced computational tools for integrated experimental-numerical investigations of engineering systems involving complex fluid-structure interaction using sharp interface immersed-boundary method and finite-element methods
  - ◇ Developed and employed numerical simulations tools to investigate hydrodynamics and hydro-acoustics of bio-inspired swimming
  - ◇ Examined the connectivity between the physiology and kinematics of fish locomotion
  - ◇ Developed advanced modal decomposition techniques to understand the functionality of natural physical systems involving multi sub-domains to enable machine learning control algorithms

- ◇ Investigated open-channel intense wave-structure coupling by our in-house advanced solver based on smoothed-particle hydrodynamics technique coupled with nonlinear finite element methods
- ◇ Mentored PhD and MSc students in their thesis research
- ◇ Seven journal publications in *Physics of Fluids* (featured as the Editor's Pick), *Physical Review Fluids* (featured as the Editor's Suggestion), *Bioinspiraion & Biomimetics*, *Journal of Fluids and Structures*, and *Applied Ocean Research*

National University of Sciences & Technology, Pakistan

- **Assistant Professor (Tenure Track)** 10/2016 – 03/2019
  (On leave from 09/2017 – 12/2018)
- **Assistant Professor** 04/2012 – 10/2016
  (On leave from 10/2014 – 03/2015)
- **Lecturer** 09/2009 – 04/2012
- **Lab Engineer** 05/2007 – 09/2008
- Affiliations:
  - ◇ Department of Mechanical Engineering
    NUST College of Electrical & Mechanical Engineering
- Key Outcomes:
  - ◇ Headed postgraduate program in mechanical engineering and designed a system to automate the monitoring process for academic and research progress of 350 MSc and PhD students
  - ◇ Recipient of funding grants worth $\sim$ $25,000 from different industrial organizations to design and develop unmanned aerial and underwater vehicles
  - ◇ Published three journal articles in *Journal of Computational and Nonlinear Dynamics* and *Journal of Aerospace Engineering* as the first author and 13 papers in international conferences organized by AIAA, ASME, and IEEE
  - ◇ Managed funds of $200k to purchase scientific equipment for teaching and research labs

Computational Science Research Center & **Peking University**, Beijing, China
Joint Visiting Research Fellow 10/2018 – 12/2018

- Affiliations:
  - ◇ Division of Mechanics, CSRC
  - ◇ Department of Mechanics and Engineering Science, PKU
- Key Outcomes:
  - ◇ Constructed computational tools in Fortran to prescribe kinematics for complex three-dimensional bodies discretized by finite elements and its further utilization in different CFD solvers

Jiangsu University, China 10/2017 – 10/2018
Postdoctoral Research Fellow

- Affiliation:
  - ◇ Research Center for Fluid Machinery Engineering
- Research Areas: Nature-inspired fluid-structure interaction and wind turbine aerodynamics
- Key Outcomes:
  - ◇ Developed user-defined functions (UDFs) through the macros of commercial CFD packages for flow-induced motion of multi-component systems
  - ◇ Developed mathematical models to optimize energy harvesting from bio-inspired oscillating structures
  - ◇ Conducted high-fidelity numerical simulations in advanced commercial solvers for flow and structural dynamics of vertical-axis wind turbines

- ◇ Investigated acoustic propagation associated with vibrating and rotary systems using high-end simulations in industrial and open-source CFD solvers
- ◇ Published three journal articles in *Ocean Engineering*, *Journal of Fluids and Structures*, and *Smart Materials and Structures* with two as the first author

University of Virginia, USA 10/2014 – 03/2015
Visiting Research Scholar

- Affiliation:
  - ◇ Flow Simulations Research Group, Department of Mechanical and Aerospace Engineering
- Advisor: Professor Haibo Dong
- Research Areas: Nonlinear Mechanics of Coordinated Flight and Swimming
- Key Outcomes:
  - ◇ Recipient of International Research Support Initiative Program (IRSIP) funded by the Higher Education Commission (HEC) of Pakistan to carry out doctoral research (Funding Amount $\sim$ \$16,500)
  - ◇ Performed high-end simulations using in-house solver based on finite element methods and sharp-interface immersed-boundary method to analyze nonlinear flows and structural characteristics associated with bio-inspired flight and swimming
  - ◇ Investigated the governing nonlinear hydrodynamic mechanisms in fish schooling and energetic benefits associated with this natural phenomenon
  - ◇ Published one journal article in *Journal of Fluids and Structures* and one AIAA conference paper

HITEC University, Pakistan
Department of Mechanical Engineering
Lecturer 10/2008 – 08/2009

- ◇ Taught courses for computer-aided engineering to undergraduate students in mechanical and electrical engineering

Teaching Experience

Lakehead University, Canada
Department of Mechanical Engineering

- ◇ **Assistant Professor** 01/2023 – Present
  - ○ EMEC 3454 - Heat Transfer (68 students) Winter, 2025
  - ○ EMEC 2651 - Heating, Ventilating, and Air Conditioning (17 students) Winter, 2025
  - ○ EMEC 0538 - Feedback Control Systems (27 students) Fall, 2024
  - ○ EMEC 5671 - Fluid-Structure Interactions (15 students) Fall, 2024
  - ○ ENGI 3015 - Engineering Thermodynamics and Heat Transfer (56 students) Summer, 2024
  - ○ EMEC 3454 - Applied Heat Transfer (44 Students) Winter, 2024
  - ○ EMEC 3559 - Computational Methods and Modeling for Mechanical Engineering (52 Students) Winter, 2024
  - ○ EMEC 5739 - Energy Modeling & Analysis (Special Topic) (1 Student) Winter, 2024
  - ○ EMEC 3436 - Engineering Thermodynamics Fall, 2023

(70 Students)
- EMEC 5739 - Modeling of Turbulent Flows (Special Topic)
(4 Students) Fall, 2023
- ENGI 3015 - Engineering Thermodynamics and Heat Transfer
(89 Students) Summer, 2023
- EMEC/ECIV 1111 - Dynamics I Spring, 2023
(21 Students)
- EMEC 3454 - Applied Heat Transfer Winter, 2023
(61 Students)
- EMEC 3559 - Computational Methods and Modeling for Mechanical Engineering
(66 Students) Winter, 2023

University of Alberta, Canada
Department of Mechanical Engineering

◇ **Associate Teaching Professor** 09/2022 – 12/2022
- MEC E 563 - Finite Element Method for Mechanical Engineers Fall, 2022
(51 Students)
- MEC E 430 - Fluid Mechanics II Fall, 2022
(91 Students)

◇ **Adjunct Professor** 01/2022 – 08/2022
- MEC E 362 - Mechanics of Machines Spring/Summer, 2022
(54 Students)
- MEC E 230 - Introduction to Thermal-Fluid Science Winter, 2022
(105 Students)

National University of Sciences & Technology, Pakistan
Department of Mechanical Engineering
NUST College of Electrical & Mechanical Engineering

- Developed and taught courses of statics, dynamics, thermodynamics, heat transfer, fluid mechanics, solid mechanics, mechanical vibrations, computational fluid dynamics, and finite-element methods to undergraduate and graduate students in mechanical engineering
- Mentored and supervised more than 60 undergraduate and graduate students
- Managed and conducted labs related to thermo-fluids, refrigeration, and structural mechanics
- Took initiative to record and upload my course lectures delivered to undergraduate engineering students on Youtube
- Conducted 4 voluntary workshops as a volunteer to teach MATLAB, ANSYS, and Auto-CAD to engineering students in collaboration with SAE and ASME students' chapters
- Courses Taught during Faculty Appointments:
  ◇ **Assistant Professor (Tenure Track)** 10/2016 – 03/2019
  - ME-130: Thermodynamic I Spring, 2017
  (51 Students, 1 Syndicate)
  - ME-330: Heat & Mass Transfer Fall, 2016
  (48 Students, 1 Syndicate)

  ◇ **Assistant Professor** 04/2012 – 10/2016
  - ME-233: Fluid Mechanics II Spring, 2016
  (48 Students, 1 Syndicate)
  - ME-234: Fluid Mechanics Lab Spring, 2016
  (47 Students, 1 Syndicate)
  - ME-330: Heat and Mass Transfer Fall, 2015

(87 Students, 2 Syndicates)
- ME-323: Mechanics & Measurement Lab — Fall, 2015
  (48 Students, 1 Syndicates)
- ME-445: Computational Fluid Dynamics — Spring, 2015
  (78 Students, 2 Syndicates)
- ME-112: Engineering Statics — Spring, 2014
  (95 Students, 2 Syndicates)
- ME-419: Thermo-fluids Lab III — Spring, 2014
  (47 Students, 1 Syndicate)

◇ **Lecturer** — 09/2009 – 04/2012
- ME-261: Control Systems — Fall, 2013
  (80 Students, 2 Syndicates)
- ME-419: Thermo-fluids Lab III — Fall, 2013
  (81 Students, 2 Syndicate)
- ME-112: Engineering Statics — Spring, 2013
  (89 Students, 2 Syndicates)
- ME-437: Mechanical Vibrations — Fall, 2012
  (86 Students, 2 Syndicates)
- ME-419: Thermo-fluids Lab III — Fall, 2012
  (87 Students, 2 Syndicate)
- ME-112: Engineering Statics — Spring, 2012
  (95 Students, 2 Syndicates)
- ME-322: Heat and Mass Transfer — Fall, 2011
  (88 Students, 2 Syndicates)
- ME-192: Engineering Mechanics — Spring, 2011
  (125 Students, 3 Syndicates)
  Co-taught with Professor Akhtar Nawaz Malik
- ME-322: Heat and Mass Transfer — Fall, 2010
  (89 Students, 2 Syndicates)
- ME-191 Computer Aided Drawing — Fall, 2010
  (125 Students, 3 Syndicates)
  Co-taught with Professor Rehan Ahmed Khan
- ME-112: Engineering Mechanics — Spring, 2010
  (89 Students, 2 Syndicates)
- ME-191 Computer Aided Drawing — Spring, 2010
  (90 Students, 2 Syndicates)
  Co-taught with Professor Rehan Ahmed Khan
- EM-223 Mechanics of Materials — Fall, 2009
  (96 Students, 2 Syndicates)
- ME-191 Computer Aided Drawing — Fall, 2009
  (89 Students, 2 Syndicates)
  Co-taught with Professor Rehan Ahmed Khan

◇ **Lab Engineer** — 05/2007 – 09/2008
- Assisted the departmental faculty to conduct labs and examinations of Computer-Aided Engineering and Instrumentation & Control

HITEC University, Pakistan
Department of Mechanical Engineering
Lecturer — 10/2008 – 08/2009

◇ Computer Aided Drawing — Spring, 2009
(120 Students, 3 Syndicate)
◇ Computer Aided Drawing — Fall, 2008
(150 Students, 3 Syndicate)

INDUSTRIAL & RESEARCH GRANTS

[1] Co-Principal Investigator, "Multiscale Wind Tunnel Facility for Testing Sustainable and Resilient of Canadian Built-Environment"
- CFI John R. Evans Leaders Fund Fall 2023 (Internally approved and recommended for the national CFI JELF competition)
- Funding Amount $\sim \$411,427$ (Share: 50%)

[2] Principal Investigator, "Design of an Adjustable Seedpod Dispersal System for Drone-Assisted Reforestation"
- MITACS Accelerate grant (co-funded by Tree Track Inc., Canada) 05/2024 – 05/2025
- Funding Amount $\sim \$52,500$ (Share: 100%)

[3] Recipient, "Lakehead University Senate Research Committee (SRC) Conference Travel Grant"
- Participation in the 13th International Symposium on Turbulence and Shear Flow Phenomena (TSFP13), Montreal, Canada (06/2024)
- Funding Amount $\sim \$1,000$ (Share: 100%)

[4] Principal Investigator & Supervisor, "MITACS Graduate Research Award"
- Project: Computational Modeling of Fluid-Structure-Chemical Interactions in Fish Swimming (07/2024 – 07/2025)
- Funding Amount $\sim \$5,000$ (Share: 100%)

[5] Principal Investigator & Supervisor, "MITACS Graduate Research Award"
- Project: Developing bio-inspired techniques for improving the performance of vertical-axis wind turbines (08/2024 – 12/2024)
- Funding Amount $\sim \$5,000$ (Share: 100%)

[6] Principal Investigator & Supervisor, "MITACS Graduate Research Award"
- Project: Simulation-Assisted Design of Bio-Inspired Energy Harvesting Mechanisms (05/2024 – 10/2024)
- Funding Amount $\sim \$5,000$ (Share: 100%)

[7] Principal Investigator & Supervisor, "MITACS Globalink Research Internship Award"
- Project: Computational modeling of a bio-inspired vertical-axis wind turbine (05/2024 – 08/2024)
- Funding Amount $\sim \$8,815$ (Share: 100%)

[8] Principal Investigator & Supervisor, "MITACS Globalink Research Internship Award"
- Project: Mechanical Design of a Bio-Inspired Swimming Robot (05/2024 – 08/2024)
- Funding Amount $\sim \$8,775$ (Share: 100%)

[9] Principal Investigator, "North2North (n2n) Mobility Grant"

- Faculty Exchange Grant from UArctic (to build academic and research collaboration with Norwegian University of Life Sciences, Norway) 11/2023 – 05/2024
- Funding Amount $\sim \$2,200$ (Share: 100%)

[10] Principal Investigator, "Odor-Guided Underwater Propulsion: Towards Bio-Inspired Mechanisms for Sensing, Detection, and Navigation"
- International Alliance (Catalyst) grant from Natural Sciences and Engineering Research Council (NSERC) 08/2023 – 08/2024
- Funding Amount $\sim \$25,000$ (Share: 100%)

[11] Principal Investigator, "Computational Modeling of Nature-Inspired Energy Harvesting Systems"
- Start-up Research Fund, Lakehead University 01/2023– 01/2025
- Funding Amount $\sim \$15,000$ (Share: 100%)

[12] Principal Investigator, "Flow Physics and Vortex-Induced Acoustics in Bio-Inspired Collective Locomotion"
- Discovery Grant from Natural Sciences and Engineering Research Council (NSERC) 04/2022– 03/2027
- Funding Amount $\sim \$125,00$ (Share: 100%)

[13] Principal Investigator, "Flow Physics and Vortex-Induced Acoustics in Bio-Inspired Collective Locomotion"
- Discovery Grant - Early Career Supplement from Natural Sciences and Engineering Research Council (NSERC) 04/2022– 03/2027
- Funding Amount $\sim \$12,500$ (Share: 100%)

[14] Principal Investigator, "CFD Based Design of an Underwater Vehicle"
- General Public Organization, Pakistan 09/2016– 07/2017
- Funding Amount $\sim \$1,400$ (Share: 100%)

[15] "University Conference Travel Grant",
- National University of Sciences & Technology, Pakistan 11/2016
- Funding Amount $\sim \$4,000$ (Share: 100%)

[16] "University Conference Travel Grant",
- National University of Sciences & Technology, Pakistan 06/2015
- Funding Amount $\sim \$4,000$ (Share: 100%)

[17] Principal Investigator, "CFD Based Design Development of Solar Powered Unmanned Aerial Vehicle",
- General Public Organization, Pakistan 05/2013 – 03/2014
- Funding Amount $\sim \$7,500$ (Share: 100%)

[18] Principal Investigator, "Development of a Remote-Controlled Unmanned Aerial Vehicle for 2013 International Competition on Future Flight Design, Istanbul, Turkey",
- National University of Sciences & Technology, Pakistan 01/2013 – 05/2013
- Funding Amount $\sim \$8,000$ (Share: 100%)

[19] "University Conference Travel Grant"
- National University of Sciences & Technology, Pakistan 11/2012
- Funding Amount $\sim \$4,000$ (Share: 100%)

[20] Principal Investigator, "Design and Development of a Remote-Controlled Unmanned Aerial Vehicle for Design, Build & Fly Contest at Ghulam Ishaq Khan Institute of Technology, Pakistan"
- National University of Sciences & Technology, Pakistan 08/2010 – 04/2011
- Funding Amount $\sim \$1,000$ (Share: 100%)

HONORS & AWARDS

IOP Publishing, Bioinspiration & Biomimetics
- **Outstanding Reviewer** 03/2025
  - ◇ Status in recognition of an exceptionally high level of peer review competency

Lakehead University Office of Research Services
- **Best Poster Award** 02/2025
  - ◇ Rita Nicholas Undergraduate Student Conference

IOP Publishing, Bioinspiration & Biomimetics
- **Outstanding Reviewer** 03/2024
  - ◇ Status in recognition of an exceptionally high level of peer review competency

IOP Publishing, Bioinspiration & Biomimetics
- **Trusted Reviewer** 12/2023
  - ◇ Status in recognition of an exceptionally high level of peer review competency

IOP Publishing, Bioinspiration & Biomimetics
- **Outstanding Reviewer Award for Year 2021** 04/2022
  - ◇ Recognition for quality, quantity, and timeliness of peer review activities for Bioinspiration & Biomimetics

National Natural Science Foundation, China
- **International Exchange Research Fellowship** 12/2018
  - ◇ Project: Hydrodynamics and hydro-acoustics of fish swimming
  - ◇ Funding Amount $\sim \$1,16,000$

Higher Education Commission, Pakistan
- **HEC Approved PhD Supervisor** 04/2017
- **Visiting Doctoral Research Fellowship** 09/2014
  - ◇ International Research Support Initiative Program
  - ◇ Funding Amount $\sim \$16,500$
  - ◇ To conduct partial doctoral research at University of Virginia, USA

Ghulam Ishaq Khan Institute of Technology, Pakistan
- **Supervisor for the Runner-up Team** 04/2017
  - ◇ Design, Build & Fly Contest by AIAA Chapter
- **Runner-up Prize** 04/2007
  - ◇ Pro-Engineer Design Exhibition, 1st All Pakistan Mechanical Engineering Competition

National University of Sciences & Technology, Pakistan
- **Mega S&T Graduate Scholarship** 09/2007
  - ◇ (Funding Amount $\sim \$12,000$)
- **Academic Merit Scholarship** 07/2005
- **Academic Merit Scholarship** 02/2005

Refereed Journal Publications

The symbol (∗) represents HQPs for whom I served as the direct supervisor/research advisor or co-supervisor.

Under Review/Submitted

(J43) F. Muhammad* and M.S.U. Khalid, "Vortex-induced rotational oscillations of a circular cylinder", *International Journal of Heat and Fluid Flow*, 2025.

(J42) M. Kamran*, A. Fardi*, C. Li, and M.S.U. Khalid, "On the role of physiology and kinematics of biological swimmers to spread and suppress their odors in the wake", *Journal of Fluid Mechanics*, 2025.

(J41) H. Wang* and M.S.U. Khalid, "Evolving vortex dynamics around a pitching wing for dynamic stall at a high Reynolds number", *AIAA Journal*, 2025.

(J40) A. Fardi*, H. Farooq, I. Akhtar, and M.S.U. Khalid, "Characterizing the role of hind flippers in hydrodynamics of a harbor seal", revised manuscript to be submitted to *Bioinspiration & Biomimetics*, 2025.

(J39) P. Portocarrero, A. Gungor*, S. Verma, M.S.U. Khalid, and A. Hemmati, "Three-dimensional wake instabilities behind side-by-side foils at a moderate Reynolds number", *International Journal of Heat and Fluid Flow*, 2025.

Published/In Press

(J38) H. Farooq*, I. Akhtar, A. Hemmati, and M.S.U. Khalid, "An accurate immersed-boundary method using radial-basis functions for incompressible flows", *Journal of Computational Physics*, 531; 113928, 2025.

(J37) M. Kamran*, A. Fardi*, C. Li, and M.S.U. Khalid, "How does vortex dynamics help undulating bodies spread odor?", *Physics of Fluids*, 36; 111916, 2024.

(J36) A. Gungor*, S. Verma, M.S.U. Khalid, and A. Hemmati, "Ground effect-induced shear layer instability around oscillating foils", *Journal of Fluid Mechanics*, 999; A70, 2024.

(J35) S. Verma, M.S.U. Khalid, and A. Hemmati, "Stability and characterization of secondary vortex evolution in wake of oscillating foils", *Physics of Fluids*, 36: 064106, 2024.

(J34) A. Gungor*, M.S.U. Khalid, and A. Hemmati, "Physics-informed scaling laws for the performance of pitching foils in schooling configurations", *Proceedings of the Royal Society Interface*, 21(216): 20240157, 2024.

(J33) M.S.U. Khalid, P.S. Mendoza*, D. Wood, and A. Hemmati, "On the aerodynamics of dual-stage co-axial vertical-axis wind turbines", *Wind Engineering*, 48(3): 408 – 424, 2023.

(J32) S. Verma, M.S.U. Khalid, and A. Hemmati, "On the association of kinematics, spanwise instability and growth of secondary vortex structures in the wake of oscillating foils", *Proceedings of the Royal Society A*, 479(2276): 20230353, 2023.

(J31) H. Farooq*, M.S.U. Khalid, I. Akhtar, and A. Hemmati, "Comparative performance of nonlinear energy harvesters through strongly coupled fluid-structure-electrical interactive models", *Journal of Fluids and Structures*, 121: 103957, 2023.

(J30) G. Zhu, Y. Zhao, T. Zhang, M.S.U. Khalid, M.B. Liu, S. Zhang, Z.L. Zhang, "Microscale reconstruction and CFD-DEM simulation of proppant-laden flow in hydraulic fractures", *Fuel*, 352: 129151, 2023.

(J29) A. Saeed, H. Farooq*, I. Akhtar, M.A. Tariq, and M.S.U. Khalid, "Deep-learning based reduced-order model for power generation capacity of flapping foils", *Biomimetics*, 8(2): 237, 2023.

(J28) Z. Zhang, C. Shu, Y. Liu, W. Liu, and M.S.U. Khalid, "An improved M-SPEM for modeling complex hydroelastic fluid-structure interaction problems", *Journal of Computational Physics*, 488: 112233, 2023.

(J27) J.M. Kelley*, M.S.U. Khalid, Y. Pan, and H. Dong, "Geometric characteristics of flapping foils for enhanced propulsive efficiency", *Journal of Fluids Engineering*, 145(6): 061104, 2023.

(J26) M.S.U. Khalid, D. Wood, and A. Hemmati, "Self-starting characteristics and flow-induced rotation of multi-stage co-axial vertical-axis wind turbines", *Energies*, 15(24): 9365, 2022.

(J25) Z. Zhang, C. Shu, M.S.U. Khalid, Y. Liu, Z. Yuan, Q. Jiang, and W. Liu, "SPH modeling and investigation of cold spray additive manufacturing with multi-layer multi-track powders", *Journal of Manufacturing Processes*, 84: 565–586, 2022.

(J24) A. Gungor*, M.S.U. Khalid, and A. Hemmati, "Classifications of vortex patterns of oscillating foils in side-by-side configurations", *Journal of Fluid Mechanics*, 951: A37, 2022.

(J23) G. Zhu, Y. Zhao, Z. Wang, M.S.U. Khalid, and M.B. Liu, "Semi-resolved CFD-DEM simulation of fine particle migration with heat transfer in heterogeneous porous media", *International Journal of Heat and Mass Transfer*, 197: 123349, 2022.

(J22) Z.L. Zhang, C. Shu, M.S.U. Khalid, Z. Chen, and W. Liu, "Investigations on the hydroelastic slamming of deformable wedges by using the smoothed particle element method", *Journal of Fluids and Structures*, 114: 103732, 2022.

(J21) H. Farooq*, M.S.U. Khalid, I. Akhtar, and A. Hemmati, "Nonlinear response of passively flapping airfoils", *Ocean Engineering*, 261: 112071, 2022.

(J20) H. Farooq*, M. Ghommem, M.S.U. Khalid, I. Akhtar, "Numerical investigation of hydrodynamic performance of flapping foils for energy harvesting". *Ocean Engineering*, 260: 112005, 2022.

(J19) M. Temesgen*, M.S.U. Khalid, D. Wood, and B.T. Admasu, "Some effects of turbine inertia on the starting performance of vertical-axis hydrokinetic turbine", *Ocean Engineering*, 252: 111143, 2022.

(J18) T. Asim, I. Sheikh, A. Hemmati, and M.S.U. Khalid, "A review of recent advancements in offshore wind turbines technology", *Energies*, 15(2): 579, 2022.

(J17) S. Verma, M.S.U. Khalid, and A. Hemmati, "On association of lift generation, wake topology and kinematics of oscillating foils", *International Journal of Micro Air Vehicles*, 14: 17568293211073959, 2022.

(J16) A. Gungor*, M.S.U. Khalid, and A. Hemmati, "How does switching synchronization of pitching parallel foils from out-of-phase to in-phase change their wake dynamics?", *Physics of Fluids*, 33: 081901, 2021.

(J15) M.S.U. Khalid, J. Wang, I. Akhtar, A. Hemmati, H. Dong, and M.B. Liu, "Larger wavelengths suit the hydrodynamics of carangiform swimmers", *Physical Review Fluids*, 6: 073101, 2021 (**featured as an Editors' Suggestion**).

(J14) Z.L. Zhang*, M.S.U. Khalid, T. Long, M.B. Liu, and C. Shu, "Improved element-particle coupling strategy with δ-SPH and particle shifting for modeling sloshing with rigid or deformable structures", *Applied Ocean Research*, 114: 102774, 2021.

(J13) M.S.U. Khalid, J. Wang, I. Akhtar, A. Hemmati, H. Dong, and M.B. Liu, "Why do anguilliform swimmers undulate their bodies with wavelengths shorter than their bodylengths?", *Physics of Fluids*, 33(3): 031911, 2021 (**featured as the Editor's Pick**).

(J12) M.S.U. Khalid, J. Wang, I. Akhtar, H. Dong, and M.B. Liu, "Modal Decompositions of the Kinematics of Crevalle Jack and the Fluid-Caudal Fin Interaction", *Bioinspiration & Biomimetics*, 16: 016018, 2020.

(J11) M.S.U. Khalid, J. Wang, H. Dong, and M.B. Liu, "Flow transitions and mappings for undulatory swimmers", *Physical Review Fluids*, 5(6): 063104, 2020.

(J10) M. Usman, M. Hamid, M.S.U. Khalid, R.U. Haq, and M.B. Liu, "A robust scheme based on novel-operational matrices for some classes of time-fractional nonlinear problems arising in mechanics and mathematical physics", *Numerical Methods for Partial Differential Equations*, 36(6): 1566–1600, 2020.

(J9) Z.L Zhang*, M.S.U. Khalid, T. Long, J.Z. Chang, and M.B. Liu, "Investigations on sloshing mitigation using elastic baffles by coupling smoothed finite element method and decoupled finite particle method", *Journal of Fluid and Structures*, 94: 102942, 2020.

(J8) M.S.U. Khalid, I. Akhtar, and B.W. Wu, "Quantification of flow noise produced by an oscillating hydrofoil", *Ocean Engineering*, 171: 377–390, 2019.

(J7) R. Salzar, G. Taylor, M.S.U. Khalid, and A. Abdelkefi, "Optimal design and energy harvesting performance of carangiform fish-like robotic system", *Smart Material and Structures*, 27: 075045, 2018.

(J6) M.S.U. Khalid, I. Akhtar, H. Dong, N. Ahsan, X. Jiang, and B. Wu, "Bifurcations and route to chaos for flow over an oscillating airfoil", *Journal of Fluids and Structures*, 80: 262–274, 2018.

(J5) M.S.U. Khalid, I. Akhtar, H. Imtiaz, H. Dong, and B. Wu, "On the hydrodynamics and nonlinear interaction between fish in tandem", *Ocean Engineering*, 157(C): 108–120, 2018.

(J4) M.S.U. Khalid and I. Akhtar, "Nonlinear reduced-order models for aerodynamic lift produced by oscillating airfoils", *Journal of Computational and Nonlinear Dynamics*, 12(5): 051019, 2017.

(J3) M.S.U. Khalid, I. Akhtar, and H. Dong, "Hydrodynamics of a tandem fish school with asynchronous undulation of individuals", *Journal of Fluids and Structures*, 66: 19–35, 2016.

(J2) M.S.U. Khalid, T. Rabbani*, I. Akhtar, N. Durrani, and M.S. Siddiqui, "Reduced-order modeling of torque on a vertical-axis wind turbine at varying tip-speed ratios", *Journal of Computation and Nonlinear Dynamics*, 10(4): 041012, 2015.

(J1) M.S.U. Khalid, I. Akhtar, and N. Durrani, "Analysis of Strouhal number based equivalence of pitching and plunging airfoils and wake deflection", *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering*, 229(8): 1423–1434, 2015.

Peer-Reviewed Conference Proceedings & Presentations

(C29) M. Kamran* and M.S.U. Khalid, "Coupled vortex-odor interactions in fish swimming for underwater sensing", *Science and Environmental Studies Biotechnology and Allied Sciences Symposium (SESBASS)*, Thunder Bay, ON, Canada, 2025.

(C28) A. Fardi* and M.S.U. Khalid, "Which swimmer is noisier in water? Eel or jackfish?", *The 7th symposium on Fluid-Structure-Sound Interactions and Control*, Oshawa / Toronto, ON, Canada, 2025.

(C27) M. Kamran*, C. Li, and M.S.U. Khalid, "On the role of physiology and kinematics of biological swimmers to spread and suppress their odors in the wake", *The Canadian Society of Mechanical Engineers (CSME) Congress*, Montreal, Canada, 2025.

(C26) H. Farooq*, I. Akhtar, and M.S.U. Khalid, "A Sharp Interface Immersed Boundary Method with Radial Basis Functions Interpolation", *The Fourth International Nonlinear Dynamics Conference (NODYCON 2025)*, Hoboken, NJ, USA, 2025.

(C25) A. Khan*, I. Akhtar, and M.S.U. Khalid, "Enhancing thrust in flapping airfoils through wake interactions with an oscillating cylinder",*6th International Conference on Robotics and Automation in Industry*,Rawalpindi, Pakistan, 2024.

(C24) A. Gungor*, S. Verma, M.S.U. Khalid, and A. Hemmati, "On the correspondence of ground effect and three-dimensionality in the wake of parallel oscillating foils",*13th International Symposium on Turbulence and Shear Flow Phenomena (TSFP13)*, Montreal, Canada, 2024.

(C23) H. Farooq*, I. Akhtar, A. Hemmati, and M.S.U. Khalid, "Design of bio-inspired energy harvested through strongly-coupled computational techniques", *Science and Environmental Studies Biotechnology and Allied Sciences Symposium (SESBASS)*, Thunder Bay, ON, Canada, 2023.

(C22) A. Hemmati, A. Gungor*, M.S.U. Khalid, and S. Verma,"How does ground effect impact the formation of three-dimensional instabilities in the wake of parallel oscillating foils?", *76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics*, Washington, DC, USA, 2023.

(C21) A. Gungor*, M.S.U. Khalid, and A. Hemmati,"Physics-based scaling laws for collective swimmers", *76th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics*, Washington, DC, USA, 2023.

(C20) S. Verma, M.S.U. Khalid, and A. Hemmati, "On association of wake topology and lift generation of oscillating foil in coupled motion", *Canadian Society of Mechanical Engineers (CSME) Congress*, Edmonton, Canada, 2022.

(C19) H. Farooq*, M.S.U. Khalid, I. Akhtar, and A. Hemmati, "Micro power generators based on semi-passive oscillations of airfoils", *Canadian Society of Mechanical Engineers (CSME) Congress*, Edmonton, Canada, 2022.

(C18) A.U.M. Hashmi, F. Butt, I. Akhtar, and M.S.U. Khalid, "On the effect of control temperature location on datacenter power consumption using numerical analysis", *ASME Fluids Engineering Division Summer Meeting (FEDSM)*, Toronto, Canada, 2022.

(C17) W. Siddiqui, Z. Abbas, I. Akhtar, and M.S.U. Khalid, "Nusselt number dependence on aspect ratio and Rayleigh Number: A numerical study of Rayleigh-Benard instability", *ASME Fluids Engineering Division Summer Meeting (FEDSM)*, Toronto, Canada, 2022.

(C16) A. Gungor*, M.S.U. Khalid, and A. Hemmati, "Effect of phase difference on wake and propulsive performance characteristics of pitching foils in side-by-side configuration", *ASME Fluids Engineering Division Summer Meeting (FEDSM)*, Toronto, Canada, 2022.

(C15) A. Gungor*, M.S.U. Khalid, and A. Hemmati, "The physical mechanism behind the wake merging phenomena of pitching foils in side-by-side arrangement", *74th Annual Meeting of the American Physical Society (APS) Division of Fluid Dynamics*, Phoenix, Arizona, USA, 2021.

(C14) R. Salzar, G. Taylor, M.S.U.Khalid, and A. Abdelkefi, "Insights on the piezoelectric energy harvesting performance of carangiform fish-like robotic systems", *ASME Conference on Smart Materials, Adaptive Structures and Intelligent Systems*, San Antonio, TX, USA, 2018.

(C13) R. Shahab*, A.A. Aamir*, M.S.U. Khalid, and A.U. Haq, "Three-dimensional computational fluid dynamics based design of an underwater vehicle", *15th International Bhurbhan Conference on Applied Sciences and Technology*, Islamabad, Pakistan, 2018.

(C12) M.A. Naseem*, E. Uddin, M.S.U. Khalid, A. Mubashar, and S.R. Shah, "Investigation of the flow around uncambered airfoils at 1000 Reynolds number using computational fluid dynamics for micro air vehicles", *World Engineering Congress on Advances in Structural Engineering and Mechanics*, Seoul, South Korea, 2017.

(C11) S.M. Abdullah*, A. Abdullah*, A. Shahzad*, and M.S.U. Khalid, "Aerodynamics of a flying wing UAV with backward facing stepped wing profile", *14th International Bhurbhan Conference on Applied Sciences and Technology*, Islamabad, Pakistan, 2017.

(C10) M.S.U. Khalid and I. Akhtar, "Nonlinear reduced-order models for lift of oscillating airfoils", *ASME International Mechanical Engineering Congress & Exposition*, Phoenix, AZ, USA, 2016.

(C9) H. Zaidi, I. Akhtar, S.I. Majeed, T. Zaidi, and M.S.U. Khalid, "Nonlinear Characterization of Heart Rate Variability in Normal Sinus Rhythm, Atrial Fibrillation and Congestive Heart Failure", *ASME International Mechanical Engineering Congress & Exposition*, Phoenix, AZ, USA, 2016.

(C8) M.S.U. Khalid, I. Akhtar, H. Dong, and N. Ahsan, "Nonlinear characterization of flow over oscillating elliptic airfoils", *45th Fluid Dynamics Conference, AIAA Aviation Forum*, Dallas, TX, USA, 2015.

(C7) H. Imtiaz, I. Akhtar, and M.S.U. Khalid, "Proper orthogonal decomposition closure models for Burgers and Navier-Stokes equations", *22nd Computational Fluid Dynamics Conference, AIAA Aviation Forum*, Dallas, TX, USA, 2015.

(C6) T. Rabbani*, M.S.U. Khalid, I.Akhtar, and M.S. Siddiqui, "Reduced order modeling of loads on a vertical-axis wind turbine", *11th IEEE International Bhurban Conference on Applied Sciences & Technology*, Islamabad, Pakistan, 2014.

(C5) K. Nazir*, I. Akhtar, N. Durrani and M.S.U. Khalid, "Numerical study to analyze the effects of hot/cold aisle configurations on heat transfer phenomenon in a data center", *ASME International Mechanical Engineering Congress & Exposition*, San Diego, CA, USA, 2013.

(C4) M.S.U. Khalid and I. Akhtar, "Characteristics of flow past a symmetric airfoil at low Reynolds number, A nonlinear perspective", *ASME International Mechanical Engineering Congress & Exposition*, Houston, TX, USA, 2012.

(C3) N. Qazi, M.S.U. Khalid, and I. Akhtar, "GPU-based simulations to analyze the effect of heat source in mixed convection", *ASME International Mechanical Engineering Congress & Exposition*, Houston, TX, USA, 2012.

(C2) M.A. Malik, M.S.U. Khalid, and F. Barlas, "Modeling & simulation of kinematics for an active flapping and pitching mechanism", *World Congress on Engineering*, London, UK, 2010.

(C1) M.S.U. Khalid and M.A. Malik, "Modeling & simulation of supersonic flow using McCormack's technique", *World Congress on Engineering*, London, UK, 2009.

Invited Talks, Seminar & Workshops

[1] *Interactions of Fluid Flows with Structures and Heat: Multiphysics Modeling for Interdisciplinary Applications*, Department of Mechanical Engineering, Lakehead University, Canada (Nov 9, 2022)
Host: Professor Ali Tarokh

[2] *Connecting Physiology and Kinematics of Natural Swimmers*, Intelligent and Bio-inspired Mechanics (IBiM) Seminar Series, Queen's University, Canada (June 2, 2021)
Host: Professor Dixia Fan
(Recording available at https://youtu.be/VlIcfLPV0Z8)

[3] *Undulating swimmers: A comparative perspective*, Center for System and Control, Key State Laboratory of Turbulence and Complex Flows, Institute of Ocean Research, Peking University, Beijing, China (Dec 27, 2019)
Host: Professor Guangming Xie

[4] *Fluid-structure interaction for bio-inspired propulsion and reduced-order modeling*, Department of Mechanics and Engineering Science, Peking University, Beijing, China (May 29 , 2019)
Host: Professor Moubin Liu

[5] *Bio-inspired flight and swimming: A nonlinear perspective*, Computational Science Research Center, Beijing, China (June 14, 2018)
Host: Professor Yang Ding

[6] *MATLAB for numerical methods*, Department of Mechanical Engineering, College of Electrical & Mechanical Engineering, National University of Sciences & Technology, Rawalpindi, Pakistan (Jan 18–21, 2017)
Host: NUST EME Student Section for American Society of Mechanical Engineers

[7] *Fish schooling with asynchronous undulation*, 14th International Bhurbhan Conference on Applied Sciences & Technology, Islamabad, Pakistan (Jan 12, 2017) **Session Keynote Talk**

[8] *Extracting nonlinear dynamical features of flow fields around oscillating wings & fins*, Nonlinear Dynamics & Energy Harvesting Lab, Department of Mechanical & Aerospace Engineering, New Mexico State University, Las Cruces, NM, USA (Nov 13, 2016)
Host: Professor Abdessettar Abdelkefi

[9] *MATLAB for Engineering Systems Design*, National University of Sciences & Technology, Islamabad, Pakistan (May, 2014)
Host: NUST Student Chapter for Society of Automotive Engineers

[10] *MATLAB & SIMULINK for Engineers*, International Conference on Modeling & Simulation, College of Electrical & Mechanical Engineering, National University of Sciences & Technology, Islamabad, Pakistan (Oct, 2011)
Conference Workshop

[11] *Design Issues in Unmanned Aerial Vehicles*, Air University, Islamabad, Pakistan (Dec, 2011)
Host: Professor Ejaz Yaqoob and Mr. Ahad Nazir

POSTER PRESENTATIONS

(P7) K. Khokhani*, H.M. Rathod, S. Patel, and M.S.U. Khalid, "Designing bio-inspired propulsors for small watercrafts", *Rita Nicholas Undergraduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P6) H. Wang* and M.S.U. Khalid, "Analyzing flow turbulence behind pitching airfoils using modal decomposition techniques", *Graduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P5) F. Muhammad* and M.S.U. Khalid, "Vortex-induced rotational oscillations of a circular cylinder", *Graduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P4) D.P. Nayak*, A. Tarokh, and M.S.U. Khalid, "Propulsion from semi-passive flapping tail in carangiform fish-like swimming", *Graduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P3) D. Thakur* and M.S.U. Khalid, "How does energy harvesting influence the vortex dynamics around the wings", *Graduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P2) A. Fardi* and M.S.U. Khalid, "Characterizing the role of hind flippers in hydrodynamics of a harbor seal", *Graduate Student Conference, Lakehead University 2025 Research and Innovation Week*, Thunder Bay, ON, Canada, 2025.

(P1) M. Kamran*, A. Fardi, and M.S.U. Khalid, "How do fish spread odor in their wake? A perspective from computational fluid dynamics", *Professional Engineers Ontario (PEO) Lakehead Chapter Technical Conference*, Thunder Bay, ON, Canada, 2024.

LIST OF HQPS

Postdoctoral Research Fellows

1. Zaib un Nisa (Co-supervisor) 06/2023 – Present
   - ◇ University of Alberta, Canada
   - ◇ Research Area: Nonlinear Interactions of Flexible Structures with Non-Newtonian Flows
2. Hamayun Farooq (Co-Supervisor) 06/2022 – 05/2024

- National University of Sciences & Technology, Pakistan
- Research Area: Computational modeling of fluid-structure interactions-based systems

Research Assistants

1. Egor Yaritsa (Supervisor) (07/2024 – Present)
   - Design of a Drone and Seed-Shooting Mechanisms for Dealing with Wildfires
2. Hao (Jim) Wang (Supervisor) (06/2023 – 08/2023)
   - Nature-Inspired Techniques to Enhance the Performance of Vertical-Axis Wind Turbines

PhD Students

1. Faisal Muhammad (Supervisor) (05/2023 – Present)
   - Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - Examining the Role of Vortex Generators on the Performance and Wake Dynamics of Vertical-Axis Wind Turbines
2. Amirhossein Fardi (Supervisor) (09/2023 – Present)
   - Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - Energy Harvesting through Flow-Induced Motion of Three-Dimensional Wings and Their Nonlinear Dynamics
3. Onur Erkan (Supervisor) (8/2024 – Present)
   - Visiting PhD Scholar at Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - Recipient of Study in Canada Scholarship from Bilecik Şeyh Edebali Üniversitesi, Turkiye.
   - Urban-Scale Vertical-Axis Wind Turbines Using Integrated Experimental-Computational Techniques
4. Temesgen Abriham Miliket (Supervisor) (01/2024 – 06/2024)
   - Visiting PhD Scholar at Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - Recipient of Study in Canada Scholarship from Bahir Dar University, Ethiopia
   - Experimental and Computational Investigations of Coaxial Contra-rotating Vertical Axis Turbines
5. Shahab Ahmadizadeh (Research Advisor) (09/2023 – 09/2024)
   - University of Alberta, Canada
   - Fluid-Structure Interactions in Gas Pipelines
6. Ahmet Gungor (Research Advisor) (09/2020 – 07/2024)
   - University of Alberta, Canada
   - Bio-Inspired Propulsion and Fish Schooling
7. John Kelly (Research Advisor) (08/2021 – 02/2023)
   - University of Virginia, USA
   - Advanced Computational Techniques for Shape-Changing Bio-Inspired Propulsors
8. Muluken Temesgen Tigabu (Research Advisor) (03/2021 – 04/2022)

- ◇ Bahir Dar University, Ethiopia
- ◇ Designs of efficient and low-cost vertical-axis hydrokinetic turbines

9. Hamayun Farooq (Research Advisor) (01/2019 – 05/2022)
   - ◇ Bahauddin Zakariya University, Pakistan
   - ◇ Advanced computational techniques for multiphysics interactive energy harvesting systems
10. Zhilang Zhang (Research Advisor) (05/2019 – 01/2021)
    - ◇ Peking University, China
    - ◇ Fluid-Structure Interactions through Coupling of Smoothed-Particle Hydrodynamics and Nonlinear Finite Element Methods

MSc Students (Research)

1. Dilip Thakur (Supervisor) (07/2024 –)
   - ◇ Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - ◇ Energy Harvesting from the Flutter Phenomenon
2. Dev Nayak (Co-Supervisor) (01/2024 –)
   - ◇ Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - ◇ Computational Modeling of the Fish Schooling Phenomenon
3. Hao Wang (Supervisor) (09/2023 – Present)
   - ◇ Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - ◇ How Does Tubercles on Leading Edges of the Blades Influence the Performance and Wake Dynamics of Vertical-Axis Wind Turbines?
4. Maham Kamran (Supervisor) (09/2023 – Present)
   - ◇ Nature-Inspired Engineering Research Lab (NIERL), Lakehead University, Canada
   - ◇ Computational Modeling of Odor-Guided Swimming of Fish-like Bodies
5. Amir Khan (Co-Supervisor) (01/2023 – 10/2024)
   - ◇ Department of Mechanical Engineering, College of Electrical & Mechanical Engineering, National University of Sciences & Technology, Pakistan
   - ◇ Nonlinear Dynamical Response and Energy Harvesting Capacity for Two Foils in Tandem
6. Uday Tamalla (MSc Co-Supervisor) (05/2022 – 05/2023)
   - ◇ University of Alberta, Canada
   - ◇ Computational Modeling of Flow-Induced Vibrations in Oil & Gas Pipelines

MSc Students (Capstone Projects)

1. Ashika Lakshini Senarathne (Co-Supervisor) (12/2023 – 07/2024)
   - ◇ Lakehead University, Canada
   - ◇ Design of a multiscale wind tunnel for applications in aerodynamics and wind engineering
2. Shakthi Velan Subramonian (Supervisor) (09/2022 – 02/2023)
   - ◇ University of Alberta, Canada
   - ◇ Energy Harvesting through Flow-Induced Oscillations of Foils

3. Muhammad Sufiyan Gheewala (Supervisor) (01/2023 – 05/2023)
   - ◇ University of Alberta, Canada
   - ◇ Energy Harvesting Capacity of Foils at Different Reynolds Numbers

Undergraduate Interns

1. Diana Zakharova (Supervisor) (07/2024 – 10/2024)
   - ◇ MITACS Graduate Research Intern
   - ◇ Mechanical Design of a Bio-Inspired Carangiform-like Swimming Robot
2. Vedant Vijaykrishnan (Supervisor) (05/2024 – 07/2024)
   - ◇ MITACS Graduate Research Intern
   - ◇ Computational Modeling of a Bio-Inspired Vertical-Axis Wind Turbine
3. Syed Zahid Ahmed (Supervisor) (06/2023 – 10/2023)
   - ◇ National University of Sciences & Technology, Pakistan
   - ◇ Vortex Dynamics Around Vertical-Axis Hydrokinetic Turbines
4. Muhammad Hassan Khalil Qureshi (Supervisor) (06/2023 – 08/2023)
   - ◇ National University of Sciences & Technology, Pakistan
   - ◇ Computer-Assisted Aerodynamic Design of a Passenger Car
5. Priscila Scarlet Mendoza (Mitacs Summer Intern, Co-supervisor) (01/2022 – 12/2022)
   - ◇ University of Alberta, Canada
   - ◇ Computational Modeling of Flow-Induced Rotations of Wind Turbines
6. Qasim Nazir (Supervisor) (06/2013 – 08/2013)
   - ◇ National University of Sciences & Technology, Pakistan
   - ◇ Numerical Simulations of Low-Reynolds Number Flows over Airfoils
7. Muhammad Maaz Abbasi (Supervisor) (06/2015 – 08/2015)
   - ◇ National University of Sciences & Technology, Pakistan
   - ◇ Numerical Simulations of Low-Reynolds Number Flows over Airfoils

Undergraduate Senior Design Projects
Lakehead University, Thunder Bay, ON, Canada

1. Oleksii Busha, William Kasekamp, Bryan Mendonca, and Carter Fleury (Supervisor) (09/2024 – Present)
   - ○ Project Title: Design of a Foot-Sole Heater for Skiing
2. Krish Khokhani, Smit Patel, and Harsh Mitesh Rathor (Supervisor) (09/2024 – Present)
   - ○ Project Title: Design of a Bio-Inspired Propulsion Mechanism for Marine Vessels
3. Ahmed El Henawy, Sofyan Albakheet, Mahmoud Saad, and Abdulbary Alajnaf (Supervisor) (08/2024 – Present)
   - ○ Project Title: Design and Development of a Depth-Changing Manta-Ray Inspired Swimming Robot for Underwater Surveillance
4. Conor Jackson, Kevin Goose, and Reid Cole (Supervisor) (09/2023 – 05/2024)

- Project Title: Design and Development of a Manta-Ray Inspired Swimming Robot

5. Ravi Jashavantbhai Patel, Prit Shah, and Herin Patel (09/2023 – 05/2024)
   - Project Title: Geo-Thermal Heat Pump Applications for Indigenous Housing Facilities

National University of Sciences & Technology, Pakistan

1. Rameez Shahab and Ahmed Asees Aamir (Supervisor) (09/2016 – 05/2017)
   - Project Title: 3D CFD Based Design of an Underwater Vehicle
2. Aakash Gul and Muhammad Maaz Abbasi (Supervisor) (09/2016 – 05/2017)
   - Project Title: CFD Analysis of a Tri-rotor UAV
3. Waqas Ahmed Bin Najeeb, Abdul Mannan Khalil, and Hammadullah Kitchlew (Supervisor) (09/2015 – 05/2016)
   - Project Title: Design & Fabrication of Forward Sweep UAV
4. Syed Muhammad Abdullah, Ali Abdullah, and Muhammad Asim Shahzad (Supervisor) (09/2015 – 05/2016)
   - Project Title: Design of a flying wing UAV using backward facing step based wing profile
5. Zaryab Haider and Muhammad Mohsin Khan Niazi (Co-Supervisor) (09/2015 – 05/2016)
   - Project Title: Energy harvesting through flapping wings
6. Affan Ali Syed, Nayab Shiraz, and Ovais Ahmed Bin Najeeb (Supervisor) (09/2013 – 05/2014)
   - Project Title: Analysis of vertical take-off and landing of UAV
7. Hamza Ahmed, Muhammad Taha Safdar, and Warda Naeem (Co-Supervisor) (09/2013 – 05/2014)
   - Project Title: Design, analysis and fabrication of RC Submarine
8. Zain Hassan, Zoya Farooq, and Saiqa Ijaz (Co-Supervisor) (09/2013 – 05/2014)
   - Project Title: Design and fabrication of 5-DOF Serial Manipulator
9. Muhammad Waqas us Din Arif, Saadat Azim, Anas Elahi Khan, and Obaid Khalid Khan (Supervisor) (09/2011 – 05/2012)
   - Project Title: Design & Fabrication of Solar Powered Unmanned Aerial Vehicle
10. Muhammad Yawar, Muhammad Muneeb, and Usman ul Haq (Supervisor) (09/2011 – 05/2012)
    - Project Title: Design & Fabrication of Hybrid Micro Air Vehicle
11. Sohail Tanveer, Mohib Khan, and Raza Malik (Supervisor) (09/2011 – 05/2012)
    - Project Title: Aerodynamic Drag Reduction of Hino KL-340 Truck with Wind Tunnel Testing of Scaled Down Model

12. Abdul Saim, Muhammad Tayyab Saeed, Nabeel Hussain Shah, and Usman Hafeez (Co-Supervisor) (09/2011 – 05/2012)
    - Project Title: Design a Heat Exchanger for Computing Clusters
13. Ahsan Ali Hani Bajwa, Hassan Khalid, Syed Najam Haider, and Hussain Ali Shah (Co-Supervisor) (09/2011 – 05/2012)
    - Project Title: Design, Analysis and Fabrication of Cooling Tower according to specifications of Dynamometer of Engine Testing Lab
14. Faisal Mushtaq, Muhammad Nauman Zafar, and Ahmed Rashid (Supervisor) (09/2010 – 05/2011)
    - Project Title: Design of test bench for aerodynamic characteristics of small aerial vehicles
15. Ikram ul Haq, Muhammad Mujtaba Hanif, and Muhammad Behroz Javed (Supervisor) (09/2010 – 05/2011)
    - Project Title: Design of a flapping wing micro air vehicle
16. Zafar Iqbal, Zubair Ahmed, and Talha Khalid (Supervisor) (09/2010 – 05/2011)
    - Project Title: Design & fabrication of a subsonic wind tunnel
17. Asim Razzaq, Khobeb Muslim, and Hamid Minhas (Supervisor) (09/2009 – 05/2010)
    - Project Title: Aerodynamic design study of ground vehicles

Supervision for National/International Students Competitions

- **International Students' Competition**

1. Muhammad Ahmad Tauqeer, Haseeb Chaudhry, Nouman Ali, Nouman Khalid, Kashif Ali, and Muzammal Khalil (Supervisor) (09/2012 – 05/2013)
    - Future Flight Design Competition, conducted by Turkish Air Force Academy, Istanbul, Turkey
    - Our technical report was awarded the highest score

- **National Students' Competitions**

1. Haseeb Javed, Syed Saadat Shakeel, Muhammad Sarmad, and Aqib Javed (Supervisor) (08/2016 – 04/2017)
    - EME Fliers, Design, Build, & Fly Contest, conducted by AIAA Student Chapter, Ghulam Ishaq Khan Institute of Technology, Pakistan
    - Won the runner-up prize
2. Muhammad Qasim Khan, Khadija Tahir, Khurram Abbas, Taimoor Ali, and Arfeen Ahmed Ali (Supervisor) (08/2016 – 04/2017)
    - Team Airborne, Design, Build, & Fly Contest, conducted by AIAA Student Chapter, Ghulam Ishaq Khan Institute of Technology, Pakistan
3. Mohammad Omer Siddiqui, Ayesha Shafi, Mohsin Ali Chaudhry, Ammad Riaz, and Sharjeel Asad (Supervisor) (05/2010 – 04/2011)
    - Silbers: Design, Build, & Fly Contest, conducted by AIAA Student Chapter, Ghulam Ishaq Khan Institute of Technology, Pakistan
    - Won consolation prize

Professional Service

Journal Editorships

- International Journal of Micro Air Vehicles (12/2023 – Present)
  Lead Guest Editor (Co-Guest Editor Prof. Arman Hemmati, University of Alberta)
  Special Collection: Emerging Research in Biological Locomotion: Schools and Swarms

- Transactions of the Canadian Society of Mechanical Engineers (12/2022 – 12/2023)
  Lead Guest Editor (Co-Guest Editor Prof. John Doucette, University of Alberta)
  Special Issue on CSME 2022

Conference Service

- Member of the Steering Committee and Session Chair for Bio-Inspired Engineering, Science and Environmental Studies Biotechnology and Allied Sciences Symposium (SESBASS), Thunder Bay, Canada, September, 2023.

- Member of the International Scientific Advisory Board (ISAB), 10th International and 50th National Conference on Fluid Mechanics and Fluid Power (FMFP-2023), IIT Jodhpur, India, December, 2023.

- Member of the Organizing Committee and Lead Volunteers Coordinator, Canadian Society of Mechanical Engineers (CSME) Congress, Edmonton, Canada, June, 2022.

- Session Co-Organizer: Special Session on Computational Modeling in Swimming and Flying, ASME Fluids Engineering Division Summer Meeting (FEDSM), Toronto, Canada, Aug, 2022.

- Program Committee: International Conference on Modeling and Simulation, Islamabad, Pakistan, Nov, 2011.

- Program Committee: International Conference on Energy Systems Engineering, Islamabad, Pakistan, Oct, 2010

Institutional Service

Lakehead University, Thunder Bay, ON, Canada

- Member, Senate Undergraduate Scholarships and Bursaries Committee (07/2024 – Present)
- Seminar invited by the International Office of Lakehead University for International Students (06/2024)
  "Nature-Inspired Engineering – From Propulsion to Energy Harvesting"
  Recording of the session available at the following web link:
  https://www.youtube.com/watch?v=UE4aF6IkHZI
- Member, Lakehead University Faculty Union (LUFA) Executive Committee (05/2024 -– Present)
- Chair, Lakehead University Faculty Union (LUFA) Committee for Physical Environment (05/2024 – Present)
- Member, Lakehead University Faculty Union (LUFA) Committee for Research (NSERC) (05/2024 – Present)
- Panel Member, Engineering Seminar for International Students (02/2024)
  "In-Depth with Engineering at Lakehead University"
  Recording of the session available at the following web link:
  https://www.youtube.com/watch?si=UvIAex10_LgRlEHk&v=XIrN8vmQFCM&feature=youtu.be
- Member, Faculty of Engineering Committee for Undergraduate Scholarship & Bursaries (09/2023 – Present)

National University of Sciences & Technology, Pakistan

- Head, Postgraduate Program (07/2016 – 08/2017)
  Department of Mechanical Engineering
  College of Electrical & Mechanical Engineering
- Member, Disciplinary Committee (01/2017 – 03/2017)
  College of Electrical & Mechanical Engineering
- Undergraduate Degree Coordinator (04/2015 – 04/2016)
  Department of Mechanical Engineering
  College of Electrical & Mechanical Engineering
- Officer-in-Charge, Fluid Mechanics Laboratory (04/2015 – 07/2016)
  Department of Mechanical Engineering
  College of Electrical & Mechanical Engineering
- Officer-in-Charge, Heat Transfer & Refrigeration Laboratory (06/2012 – 09/2014)
  Department of Mechanical Engineering
  College of Electrical & Mechanical Engineering
- Undergraduate Degree Coordinator (03/2012 – 08/2014)
  Department of Mechanical Engineering
  College of Electrical & Mechanical Engineering
- Technical Member, Local Purchase Committee (07/2014 – 09/2014)
  College of Electrical & Mechanical Engineering

Referee Service

- Mentor, Publons Review Academy
- Estonian Research Council (Grant Reviewer)
- Journal of Fluid Machanics (Cambridge Press)
- Energy for Sustainable Development (Elsevier)
- Physics of Fluids (AIP)
- Bioinspiration & Biomimetics (IOP Science)
- Journal of Vibrations and Acoustics (ASME)
- Ocean Engineering (Elsevier)
- International Journal for Heat and Mass Transfer (Elsevier)
- Journal of Petroleum Science and Engineering (Elsevier)
- International Journal of Micro Air Vehicles (Sage)
- Proceedings of the Institute of Mechanical Engineers, Part C: Journal of Mechanical Engineering Science (Sage)
- Proceedings of the Institute of Mechanical Engineers, Part G: Journal of Aerospace Engineering (Sage)
- Journal of Aerospace Engineering (ASCE)
- International Journal of Environmental Science and Technology (Springer)
- Fluid Dynamics Research (IOPScience)
- Mechanics and Industry (EDP Sciences)
- Machine Learning: Science and Technology (IOP Science)
- Sensors (MDPI)
- Energies (MDPI)

Member, Guidance and Evaluation Committee (MSc Research)
National University of Sciences & Technology, Pakistan

- Adil Naseem (2016 – 2017)
- Nabeel ur Rehman (2013 – 2014)
- Kamran Nazir (2012 – 2013)

- Imran Aziz (2012 – 2013)
- Sadia Riaz (2010 – 2011)
- Munzur Shaheer (2010 – 2011)
- Fahim Barlas (2010 – 2011)

External Thesis Evaluations (MSc Research)

Ghulam Ishaq Khan Institute of Technology, Pakistan

- Nayab (01/2017)

University of Huddersfield, UK

- Martin Zahariev (12/2016)

Judge for Students' Competitions

Lakehead University, Thunder Bay, ON, Canada

- Judge, Lakehead Engineering Competition (11/2023)
- Judge, Graduate Research Poster Competition (02/2023)
  Research & Innovation Week

National University of Sciences & Technology, Pakistan

- Bridge Building Design Competition (02/2013)
  - ◇ Organized by NUST EME Student Chapter, American Society of Mechanical Engineers, Department of Mechanical Engineering, College of Electrical & Mechanical Engineering
- Egg Drop Competition (10/2012)
  - ◇ Organized by NUST EME Student Chapter, American Society of Mechanical Engineers, Department of Mechanical Engineering, College of Electrical & Mechanical Engineering

Professional Memberships

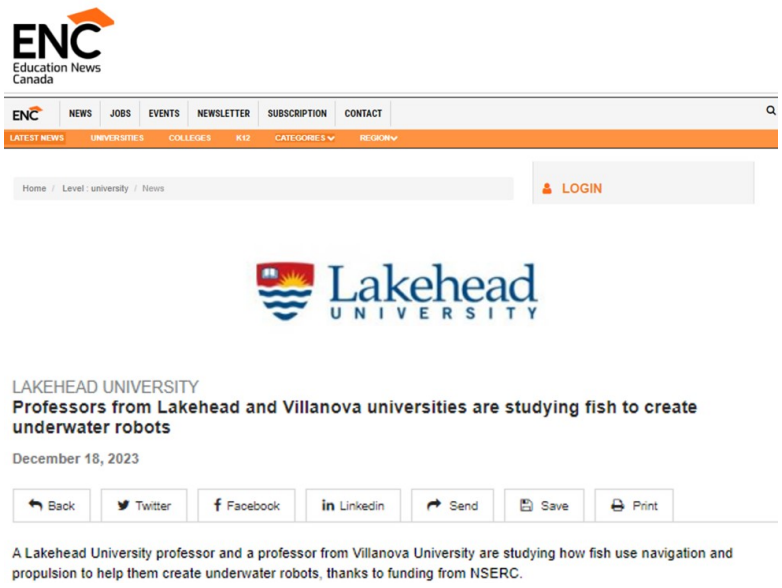
- Professional Engineer (PEng), The Association of Professional Engineers and Geoscientists of Alberta (APEGA) (Member ID: 278536) (01/2022 – Present)
- Member, Canadian Society for Mechanical Engineering (CSME) (11/2023 – Present)

News & Media

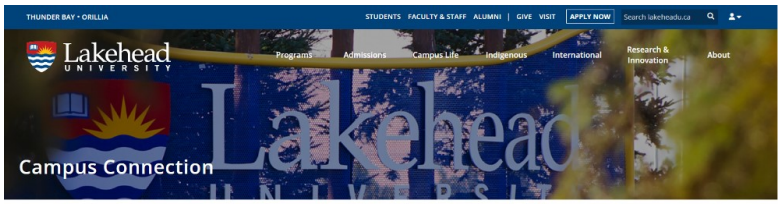
- I was invited for an interview about my research on innovative nature-inspired underwater fluid-structure-chemical interactions the radio host Jonathan Pinto in his program "Up North with Jonathan Pinto" on CBC LISTEN radio. (12/2023)
  "Research grant funds underwater robot research at Lakehead"
  Recording of the session available at the web link:
  https://www.cbc.ca/listen/live-radio/1-84-up-north/clip/16031337-research-grant-funds-underwater-robot-research-lakehead
- I was invited for an interview about my teaching and research at Lakehead University by the magazine "The Rack" that is the Lakehead Engineering Student Newspaper for its Winter 2024 Issue. (03/2024)
- My research on bio-inspired underwater robotics and novel flow sensing techniques was picked up highlighted in the national news. The web links and snapshots of those media articles are provided below:
  - TBNewsWatch:
    https://www.tbnewswatch.com/local-news/lakehead-prof-studies-fish-to-help-create-agile-underwater-robots-8011256
  - Educations News Canada:
    https://educationnewscanada.com/article/education/level/university/1/1057466/professors-from-lakehead-and-villanova-universities-are-studying-fish-to-create-underwater-robots.html

An Interview with Dr. Muhammad Khalid, P.Eng.

Dr. Muhammad Khalid is an Assistant Professor in the Department of Mechanical Engineering at Lakehead University. He joined the department in January 2023 and has already contributed immensely to the university by through his teaching on diverse topics including thermodynamics, heat transfer, and computational methods, and through his research on bio-inspired engineering. He volunteered as a judge for the 2023 Lakehead Engineering Competition.



- Campus Connection
  https://www.lakeheadu.ca/about/news-and-events/news/archive/2023/node/149389



Professors from Lakehead and Villanova universities are studying fish to create underwater robots

December 18, 2023 – Thunder Bay, Ont.

A Lakehead University professor and a professor from Villanova University are studying how fish use navigation and propulsion to help them create underwater robots, thanks to funding from NSERC.

Dr. Muhammad Khalid, Assistant Professor in Mechanical Engineering, received a $25,000 Alliance International Catalyst Grant from the National Sciences and Engineering Research Council of Canada for his project to build an international research partnership with Dr. Chengyu Li from Villanova University, and jointly investigate fluid-structure-chemical interactions in marine environments.