

Dr. Arindam Gan Chowdhury (Short Bio and SUMMARY VITAE)

Dr. Arindam Chowdhury completed his bachelor's and master's degrees from Jadavpur University (Kolkata) and Indian Institute of Technology (Mumbai) in India, respectively. He received his Ph.D. in May 2004 from Iowa State University (ISU) (Ames, IA, USA). At ISU, he developed a novel three-degree-of-freedom (3-DOF) elastic suspension system and new system identification (SID) methods to extract aeroelastic parameters for flutter analysis of flexible structures, including bridges. The novel 3-DOF suspension system and the new frequency- and time-domain SID algorithms have been widely adopted by researchers in the field. His research fostered major advances in fundamental knowledge pertaining to the design of long-span bridges around the globe. In recognition, in 2004 he was awarded the *Iowa State University Research Excellence Award*. He also has industrial experience as project director and wind/structural engineer.

Dr. Chowdhury is currently a Professor in the Civil and Environmental Engineering Department (CEE) at Florida International University (FIU) located in Miami, Florida, USA. He also serves as a Fellow of Extreme Event Institute, one of FIU's Preeminent Programs. He also served as the Interim Chair of CEE from Aug 2020 to Jan 2022, during which he promoted high-quality education, graduate student growth, improved graduation rates, research of critical need to the nation, and partnerships with national and international reach. Since 2016, Dr. Chowdhury is serving as the Principal Investigator (PI) and Director of the *NHERI Wall of Wind Experimental Facility (WOW EF)* that has been designated as one of the only two wind engineering EFs as a Shared-Use National Facility under the U.S. **National Science Foundation's (NSF) Natural Hazards Engineering Research Infrastructure (NHERI) Program**. The United States has learned very hard lessons about its human, economic, and infrastructure vulnerabilities to wind hazard events. The NSF NHERI WOW EF is allowing researchers and practitioners across the nation to explore and test ground-breaking concepts to protect homes, businesses, and infrastructure lifelines, and enable innovations to help prevent wind hazards from becoming societal disasters.

As a Principal Investigator (PI), Dr. Chowdhury has received more than **\$30 M** in research and development funding from various agencies and the industry. He is the recipient of the Faculty Early Career Development (**CAREER**) Program Award, NSF's most prestigious award in support of faculty who exemplify the role of teacher-scholars through outstanding research, excellent education, and their integration. In Feb 2022, the NSF awarded a **\$12.8 M four-year cooperative agreement** to FIU to support the design of a national full-scale testing facility capable of generating wind speeds of up to 200 miles per hour, combined with a water basin to simulate storm surge and wave action. The envisioned **National Full-Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events (NICHE)** responds to a pressing need for more resilient communities by reducing losses and disruptions due to climate-driven wind hazards, helping the U.S. and the world become more sustainable while enhancing the quality of life. Dr. Chowdhury is the PI for the NICHE project and FIU's academic partners include the University of Florida, Oregon State University, Stanford University, the University of Notre Dame, the Georgia Institute of Technology, the University of Illinois at Urbana-Champaign, Colorado State University, and Wayne State University. The principal industry partner is Aerolab. The NICHE Advisory Board involves researchers and practitioners representing the national and international communities. The NICHE is intended to become part of NSF's NHERI, a nine-member network dedicated to improved understanding and resistance to the impacts of natural hazards. Dr. Chowdhury is also a co-PI of the *Center for Wind Hazard and Infrastructure Performance (WHIP)* which is the first of its kind under the NSF Industry/University Cooperative Research Center (**I/UCRC**) program. The WHIP Center includes faculty from FIU, Texas Tech University (TTU), and Florida Institute of Technology (FIT) and six well-known partners (NIST, VERSIK, Berkshire Hathaway, GAF, State Farm and USAA).

Through his projects Dr. Chowdhury has been making significant and original contributions to wind engineering research leading to major fundamental and applied technological advances in hurricane engineering, the discipline concerned with mitigating losses due to hurricanes and achieving resilient coastal communities. He has more than **100 refereed journal and conference publications** cited in over 600 papers. He has **patented** innovative hurricane damage mitigation products (*Hurricane Resistant Concrete Roof System* and *Aerodynamic Mitigation and Power System (AMPS)*) and is an honorary charter member of the National Academy of Inventors (NAI).

Dr. Chowdhury has been facilitating applications to wind engineering practice. Innovative research projects, conducted by Dr. Chowdhury and his team, have had a significant impact in mitigating hurricane damage by **enhancing building codes and standards**. Full-scale experimentation results were applied to improve Florida Building Code's (**FBC's**) wind load provisions to decrease the vulnerability of building roofs and roof-mounted equipment for the state of Florida, including its *High Velocity Hurricane Zones*. More recently, Dr. Chowdhury and WOW team members (including Dr. Irwin, WOW Professor of Practice) conducted research on '*partial turbulence simulation*' for testing large-scale models and studied wind effects on roof pavers. The findings are incorporated in the **ASCE 49-12** "Wind Tunnel Testing for Buildings and Other Structures" and the **ASCE 7-22** "Minimum Design Loads and Associated Criteria for Buildings and Other Structures." The research-to-application endeavors are expected to create hurricane-resilient communities.

Dr. Chowdhury's WOW experimentation helped in, for the first time ever, full-scale validation of innovative mitigation devices "**AeroEdge**" (patented by FIU's industry partner WeatherPredict Consulting Inc.) to reduce hurricane-induced roof damage – one of the biggest concerns during hurricanes. This marked FIU's successful University-Industry partnership for creative initiatives. This is the kind of life-changing research that can create safer communities in Florida that will serve as a model for communities across the nation and around the globe. WOW testing has already made impacts **internationally** through Politecnico di Milano University's (Milan, Italy) 'vegetated balconies testing' project and USAID's 'Haiti's transitional shelters testing' project.

Dr. Chowdhury is making significant educational contributions in the field of wind engineering. Based on his NSF CAREER project, he has developed a new course "Hurricane Engineering and Global Sustainability" under FIU's *Global Learning for Global Citizenship* initiative. This active learning course is synergistically integrating WOW research with inductive learning to foster undergraduate student interest and, crucially important, retention in STEM programs. He has served and is serving as major professor and

dissertation/thesis advisor for several students and has graduated to date 19 PhD and 11 MS students. He is reaching out to K-12 students and teachers for fostering the next generation of hurricane/wind damage mitigation professionals. WOW Contests have been organized to educate many high school students and teachers in hurricane damage mitigation activities. The education and outreach approaches, based on Research Experience for Undergraduates (REU) and Research Experience for Teachers (RET) programs, are expected to play a major role in strengthening the STEM skills of students and teachers and underrepresented groups.

Under Dr. Chowdhury's leadership the NHERI WOW EF was lauded by the American Society of Civil Engineers (ASCE) to receive the **2018 Charles Pankow Award for Innovation**. Dr. Chowdhury received Florida Sea Grant's "**Research to Application Award**," as well as FIU President's Council "**Worlds Ahead Faculty Award**", which is the university's highest recognition for faculty members. Dr. Chowdhury was honored three times as **FIU Top Scholar**. He is serving and contributing to the profession as a member of the American Society of Civil Engineers (ASCE) sub-committees. He serves as Associate Editor for the ASCE *Natural Hazards Review*. Dr. Chowdhury has served as editorial board member of refereed journals (*Sustainable and Resilient Infrastructure, Disaster Advances, Frontiers in Built Environment*), participant in proposal review panels at NSF, reviewer of journal manuscripts, session chair and panelist in major national/international conferences, keynote speaker and invited presenter in meetings, and facilitator of media events.

Dr. Chowdhury has been an exemplary model in his profession engineering and significantly contributed to research, mentoring, teaching, and service. Below is a SUMMARY VITAE for Dr. Chowdhury.

SUMMARY VITAE OF ARINDAM GAN CHOWDHURY

Professor, Department of Civil and Environmental Engineering (CEE)
Principal Investigator (PI) and Director, NSF NHERI Wall of Wind (WOW) Experimental Facility (EF)
Co-Director, Lab. Wind Engineering Research, Extreme Events Institute, an *FIU Preeminent Program*
Florida International University (FIU), E-mail: chowdhur@fiu.edu

EDUCATION

PhD	Engineering Mechanics, Iowa State University, Ames, IA, USA	2000-2004
M.Tech	Structural Engineering, Indian Institute of Technology, Mumbai, India	1993-1995
B.C.E.	Civil Engineering, Jadavpur University, Kolkata, India	1988-1992

ACADEMIC AND INDUSTRY APPOINTMENTS

Professor, Department of Civil and Environmental Engineering (CEE), FIU, Miami, FL, USA	2017-present
Interim Chair, Department of Civil and Environmental Engineering (CEE), FIU, USA	2020-2022
PI and Director, NSF NHERI Wall of Wind (WOW) Experimental Facility (EF), FIU, USA	2016-present
Co-Director, Lab. Wind Engineering Research (LWER), Extreme Events Institute (EEI), FIU	2017-present
Associate Professor, CEE and Director of WOW Facility/LWER, FIU, USA	2012-2017
Assistant Professor, CEE and Director of LWER, FIU, USA	2006 - 2012
Project Director, Thornton Tomasetti, Fort Lauderdale, FL, USA	2005 - 2006
Project Engineer, Lear Corporation, Iowa, IA, USA	2003 - 2005
Pollution Prevention Intern, Iowa Department of Natural Resources, Des Moines, IA, USA	2002 - 2002
Partner and Project Engineer, M/s. Shapers, Kolkata, India	1998 - 2000
Structural Engineer, Development Consultants Limited, Kolkata, India	1995 - 1997
Structural Engineer, Simplex Concrete Piles Limited, Kolkata, India	1992 - 1993

PATENT DISCLOSURES, APPLICATIONS, AND AWARDS

- Under Dr. Chowdhury's leadership the NHERI WOW EF was lauded by the American Society of Civil Engineers (ASCE) to receive the **2018 Charles Pankow Award for Innovation** in recognition for opening up a realm of opportunities in research and education to enhance the safety and resiliency of new and existing buildings and infrastructure, through full- and large-scale tests simulating winds up to Category 5 hurricane force.
- U.S. Patent issued and Notice of Allowance received for *Hurricane Resistant Concrete Roof System* by Drs. Arindam Gan Chowdhury, Amir Mirmiran, and Nakin Suksawang (based on MGB Ref. No. 29171/46793).
- U.S. Patent Publication issued for *Aerodynamics Mitigation and Power System* (AMPS) (Pub. No.: US 2015/0345472 A1, Pub. Date: Dec. 3, 2015) by Drs. Arindam Gan Chowdhury and Andres Tremante. The new system is designed to simultaneously reduce wind damage to buildings, homes, and other infrastructures, and produce wind energy to provide power.
- 2012 Winner of FIU President's Council "**Worlds Ahead Faculty Award**" in recognition of sustained excellence in teaching, research, and service, which is the university's highest recognition for faculty members.
- Winner of Florida Sea Grant's "**2012 Research to Application Award**" for research that has identified innovative and practical ways to improve the structural integrity of homes and other buildings, thereby ensuring greater protection of future generations of Floridians from hurricanes and tropical storms.
- 2012 *Presidential Excellence Award* finalist in recognition for commitment to strategic, operational, and service excellence pertaining to the Wall of Wind.
- Honored three times as **FIU Top Scholar** for outstanding achievements as a faculty (2021, 2012, 2009).

- Received **Iowa State University Research Excellence Award** for Spring 2004 in recognition of outstanding research accomplishments in the field of Wind Structure Interaction. His research accomplishments comprise a significant addition to the knowledge base in the discipline of aerodynamics and aeroelasticity.

JOURNAL PUBLICATIONS (Selected) [Students' names are underlined]

Abdelfatah, N., Elawady, A., Irwin, P., **Gan Chowdhury, A.** (2022) "Experimental Investigation of Wind Impact on Low-Rise Elevated Residences" Engineering Structures, vol. 257, p. 114096. <https://doi.org/10.1016/j.engstruct.2022.114096>

Estephan, J., **Gan Chowdhury, A.**, Irwin, P. (2022) "A new experimental-numerical approach to estimate peak wind loads on roof-mounted photovoltaic systems by incorporating inflow turbulence and dynamic effects." Engineering Structures, 252, 113739. <https://doi.org/10.1016/j.engstruct.2021.113739>

Estephan, J., **Gan Chowdhury, A.**, Elawady, A., Erwin, J. (2021) "Dependence of internal pressure in low-rise buildings on aerodynamic parameters, defect features and background leakage." Journal of Wind Engineering and Industrial Aerodynamics, 219, 104822. <https://doi.org/10.1016/j.jweia.2021.104822>

Azzi, Z., Elawady, A., Irwin, P., **Gan Chowdhury, A.**, Abi Shdid, C., (2021) "Aeroelastic Modeling to Study the Wind-Induced Response of a Self-Supported Lattice Tower" Engineering Structures, 245-112885. <https://doi.org/10.1016/j.engstruct.2021.112885>

Lenjani, A., Dyke, S.J., Bilionis, I., Yeum, C.M., Kamiya, K., Choi, J., Liu, X., **Gan Chowdhury, A.** (2020). "Towards Fully Automated Post-Event Data Collection and Analysis: Pre-Event and Post-Event Information Fusion." Engineering Structures, Volume 208, 109884, <https://doi.org/10.1016/j.engstruct.2019.109884>.

Abdelfatah, N., Elawady, A., Irwin, P., **Gan Chowdhury, A.** (2020) "A Study of Aerodynamic Pressures on Elevated Houses" Wind and Structures, Vol. 31, No. 4 (2020) 335-350; doi: <https://doi.org/10.12989/was.2020.31.4.335>.

Estephan, J., Feng, C., **Gan Chowdhury, A.**, Chavez, M., Baskaran, A., Moravej, M. (2021). "Characterization of Wind-Induced Pressure on Membrane Roofs Based on Full-Scale Wind Tunnel Testing." Engineering Structures, 235, Article 112101. <https://doi.org/10.1016/j.engstruct.2021.112101>

Azzi Z., Habte F., Vutukuru, K.S., **Gan Chowdhury, A.**, Moravej, M. (2020). "Effects of Roof Geometric Details on Aerodynamic Performance of Standing Seam Metal Roofs." Engineering Structures 225, 111303, <https://doi.org/10.1016/j.engstruct.2020.111303>

Vutukuru, K.S., Moravej, M., Elawady, A., **Gan Chowdhury, A.** (2020) "Holistic Testing to Determine Quantitative Wind-Driven Rain Intrusion for Shuttered and Impact Resistant Windows." Journal of Wind Engineering & Industrial Aerodynamics 206 (2020) 104359, <https://doi.org/10.1016/j.jweia.2020.104359>

RESEARCH PROJECTS (Selected):

As a PI, Dr. Chowdhury has received more than **\$30 M** in research and development funding from various agencies and the industry.

National Science Foundation (NSF) Award (NSF Award No. 2131961)

PI: Arindam Gan Chowdhury; Co-PIs: Tracy Kijewski-Correa, Forrest Masters, Pedro Lomonaco, Catherine Gorle
Project Title: Mid-scale RI-1 (M1:DP): National Full-Scale Testing Infrastructure for Community Hardening in Extreme Wind, Surge, and Wave Events (NICHE)

Award Amount: \$12,835,821, Award Duration: 02/02/2022-01/31/2026

National Science Foundation (NSF) Award (NSF Award No. 2037899)

PI: Arindam Gan Chowdhury; Co-PIs: Peter Irwin, Seung Jae Lee, Ioannis Zisis, Amal Elawady
Project Title: Natural Hazards Engineering Research Infrastructure: Experimental Facility with Twelve-Fan Wall of Wind 2021-2025
Award Amount: \$5,651,188, Award Duration: 01/01/2021-09/30/2025

National Science Foundation (NSF) Award (NSF Award No. 1828585)

PI: Arindam Gan Chowdhury; Co-PIs: Ioannis Zisis, Peter Irwin, Amal Elawady, Maryam Refan
Project Title: MRI: Acquisition of a Three Component Particle-Image Velocimetry System to Enable Fundamental Research in Wind Engineering and Fluid Mechanics

Award Amount: \$605,899 (\$466,076 from NSF + \$139,823 in cost sharing), Award Duration: 09/15/18-08/31/20

National Science Foundation (NSF) Award (NSF Award No. 1635569)

PI from FIU: Arindam Gan Chowdhury; PI from Ohio State University (OSU): Abdollah Shafieezadeh
Project Title: Experimentally Validated Stochastic Numerical Framework to Generate Multi-Dimensional Fragilities for Hurricane Resilience Enhancement of Transmission Systems

Award Amount: \$529,807 (FIU: \$199,807, OSU: \$330,000), Award Duration: 08/01/2016-07/31/20

Industry Funding from industry leaders such as FM Global, Applied Insurance Research (AIR) Worldwide, Renaissance Re Holdings Ltd., Roofing Alliance for Progress, and Florida Power & Light.