Ashok Kumar Ghosh, Ph.D., P.E.

URL: https://www.nmt.edu/academics/mecheng/faculty/aghosh

(A) PROFESSIONAL PREPARATION

Bachelor of Technology (B. Tech) with Honors, Indian Institute of Technology, Kharagpur *1983*
Civil Engineering.
Master of Science in Structural Engineering, Washington State University, Pullman, Washington *1985*
Doctor of Philosophy (Ph.D.) in Engineering, Indian Institute of Technology, Kharagpur *1993*
Dissertation *"Static, Stability and Vibration Analysis of Laminated Composite Plates using Higher Order Shear Deformation Theory with Finite Element Discretization"*

(B) APPOINTMENTS

- President, New Mexico Solar Energy Association *2020-2021*
- Fulbright Specialist, World Learning, US Department of Education *2016-2021*
- President, Composite Solution LLC *2015-Present*
- Associate & Assistant Professor - Mechanical Engineering with Solid Mechanics specialization, New Mexico Tech, Socorro, New Mexico *2003-Present*

(C) PRODUCTS

(1) RECENT RESEARCH PROJECTS

- Development of Manufacturing Technology for Biomimetic Heat Pipe, New Mexico Space Grant Consortium *2024-2025*
- A Biomimetic Concept for the Design of Space-Flight Radiators, New Mexico Space Grant Consortium *2022-2023*
- Mission Specific Design of Structural Materials for Radiation Environment New Mexico Space Grant Consortium *2020-2021*

(2) PATENTS AND DISCLOSURES

- Apparatus for Reducing Total Dissolved Solids of a Solution, *US Patent # 9,827,533* *Issued 2017*
- Process for Reducing the Total Dissolved Solids of a Solution *US Patent # 9,370,747* *Issued 2016*
- Energy Attenuation Structure *US Patent # 7,947,364* *Issued 2011*
- A Laser Based System for Vibration Analysis *Indian Patent # 209,239* *Issued 2007*
- Layered Insulating Building Blocks (LIBB) *Indian Patent # 203,374* *Issued 2007*

(3) HONORS

- AFOSR Summer Faculty Position at Air Force Research Lab, Albuquerque, New Mexico *Summers of 2022, and 2023*
- Winner of "Covid-19 Pitch In – New Mexico's Social Enterprise Challenge" *April 2020*
  https://news.unm.edu/news/residents-win-money-in-pitch-competition-for-ideas-to-boost-local-economy-post-covid-19
- Engineer of the Year, 2019 *Spring 2019*
  Society of Professional Engineers, Albuquerque Chapter
  https://www.nmt.edu/news/2019/ghosh_awarded_engineer_of_the_year.php
- President https://nmt.edu/news/2019/spe_names_ghosh_president.php
  New Mexico Society of Professional Engineers, State Chapter *Jul to Sep, 2019*

- Fulbright Specialist Grant, Goa, India
  Birla Institute of Technology and Science (B.I.T.S) *Summer 2018*
  6-week Grant award to teach Entrepreneurship and Engineering Economics
  http://www.dchieftain.com/news/professor-helping-build-startups/article_c8da68f8-a0b6-11e8-aba2-ab7fb68ad0ae.html
- DOE Visiting Faculty Position, Los Alamos, New Mexico
  Los Alamos National Laboratory (LANL) *Summers of 2015, 2016 and 2017*

(4) FUNDING HISTORY

- As PI, Co-PI or Tech Lead in Research Projects since joining New Mexico Tech in 2003: Sponsoring Agencies are: National Science Foundation, Office of Naval Research, New Mexico Department of Transportation, Department of Energy, US Navy, New Mexico Small Business Administration, New Mexico Space Grant Consortium, SBIR, Missile Defense Agency and US Navy, New Mexico Economic Development, and Fulbright Specialist Program.
  18 awarded projects with total funding more than $3million
- STTR PROJECT
  Phase I STTR Topic: MDA14-T001- Integrated Health Sensing for Highly Efficient Weapon Inspection and Sustainment, 2014 as University PI to MSI, a local small business.
- SBIR PROJECT
  Phase I SBIR Topic: N18A-T015 – Cybersecure Health Monitoring System for Naval System, 2018 as University PI to MSI, a local small business.

(5) ***RESEARCH PUBLICATIONS*** - 70 Peer Reviewed Journal & Conference Proceeding Publications. Major publications and Masters theses related to proposed project are listed below:

- Ghosh, AK and Telford O, "A Biomimetic Concept for the Design of NASA's Deep Space-Flight Radiators", Proceedings of 17th International Heat Transfer Conference, Cape Town, South Africa, August 2023.
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/20023_Ghosh_Telford_IHTC-17.pdf
- Telford, Owen, "Investigation of a Biomimetic Heat Pipe Design for Improved Heat Transfer in Space Radiators", MS Thesis, New Mexico tech, 2023, [Ashok Ghosh is the thesis supervisor].
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2023_Telford_MS_Thesis.pdf
- Maestas G., Ghosh A., and Park C., "Robust Simulation of Radiation Shielding Effectiveness of a Layered Composite", Proceedings of the WM2023 Conference, Phoenix, Arizona, February 2023.
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2023_Maestas_WM.pdf
- Maestas, Gabriel, "Investigation of a Fluid-Filled Cellular Composite for Radiation Shielding in Medium Earth Orbit and Interplanetary Space", MS Thesis, New Mexico Tech, 2021, [Ashok Ghosh is the thesis supervisor].
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2021_Maestas_MS_Thesis.pdf
- Sidharth A.K., "Investigation Into Conductive Patterns and Receptor Designs for Effective Lightning Investigation", MS Thesis, New Mexico Tech, 2017, [Ghosh is one of the supervisors].
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2017_Sidharth_MS_Thesis.pdf
- A.K.Ghosh, R. Martinez, and Cady, " A Biomimetic Composite for Space Vehicle/Habitat Design", Challenges in Mechanics of Time Dependent Materials, Vol. 2, Proceedings of the 2017 Annual Conf. on Experimental and Applied Mechanics, 2017.[Ghosh as the DoE summer visiting faculty]
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2017_SEM_LANL.pdf
- Garley, L., "Characterization of a Fluid Filled Composite for Radiation Protection", MS Independence Study, New Mexico Tech, 2015 , [Ghosh is the supervisor].
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2015_Garley_MS_Thesis.pdf
- Birbahadur, N., "The High-Strain Rate Response of Polyurethane Foam and Kevlar Composite", MS Thesis, New Mexico Tech, 2011, [Ghosh is the supervisor].
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/2011_Birbahadur_MS_Thesis.pdf

- A.K.Ghosh, A.D.Williams, J.M.Zucker, J.L.Mathews and N. Spinhirne, "An Experimental Investigation into the Acoustic Characteristics of Fluid-filled Porous Structures – A Simplified Model of the Human Skull Cancellous Structures", J. of Experimental Mechanics, April 2008. https://www.nmt.edu/academics/mecheng/faculty/aghosh/2008_EM_Acoustic_Investigation.pdf
- Matthew, J., "Shock and Vibration Characteristics of a Bio-Inspired Structure Under Blast Loading", MS Thesis, New Mexico Tech, 2008, [Ghosh is the supervisor]. https://www.nmt.edu/academics/mecheng/faculty/aghosh/2008_Matthew_MS_Thesis.pdf
- *N.C.Pal* & A.K.Ghosh, " An Experimental Investigation on Impact Response of Laminated Composite Beams ", Experimental Mechanics, Vol 33, No 2, pp. 159-163, June 1993.
- Authored a peer reviewed Book Chapter on "Structural Testing" . Embedded in the chapter is a Case Study on the World Bank Project to determine the health of Highway Bridges. As PI, I supervised 14 investigators during the testing. One Indian Patent on vibration analysis was also awarded.
  https://www.nmt.edu/academics/mecheng/faculty/aghosh/1999_World_Bank_Project_Bridge_Testing.pdf

  "Chapter 35 on Structural Testing Applications" in Springer handbook of Experimental Solid Mechanics, ISBN 978-0-387-26883-5, 2008
  Abstract of the book chapter
  This chapter addresses various aspects of testing of a structural system. The importance of "the Management Approach" to planning and performing structural tests (ST) is emphasized. When resources are limited, this approach becomes critical to the successful implementation of a testing program. The chapter starts with illustrations on some of the past structures that were built using concepts developed through testing. Most often, these structures were built even before the principles of engineering mechanics were understood. At present, due to the unprecedented expansion of computing power, numerical and experimental techniques are interchangeably used in simulating complex natural phenomena. Despite encouraging results from simulation and predictive modeling, structural testing is still a very valuable tool in the industrial development of product and process, and its success depends on judicious choice of testing method, instrumentation, data acquisition, and allocation of resources. A generic description of the current test equipment and types of measurements is included in this chapter. After careful selection, three case studies were included. The complexity involved with the modeling of structural steel retrieved from the collapse site of the World Trade Center (WTC) under High-Rate and High-Temperature is highlighted in the first case study. The second case study highlights the importance of the planning phase in providing the basis for a manageable and high-quality testing of concrete highway bridges. The final case study details the development of a Lightweight Automobile Airbag from inception through innovation. This case study also illustrates the close ties between structural testing and numerical simulation. The chapter closes with examples of a few future structural systems, highlighting the complexity involved in their testing.

- A.K. Ghosh, "A Status Report on Reliability of Wind Turbine Blades", Society of Experimental Mechanics (SEM) Symposium, June 2010, Indianapolis, IN.
- A.K.Ghosh, Kerry J. Howe, A.K.Maji, B.C. Letellier, R.C. Jones, "Head Loss Characteristics of a Fibrous Bed in a PWR Chemical Environment", Nuclear Technology, Feb.2007, Vol. 157, No 2 pp. 196-207.
- A.K.Ghosh, A. K. Maji, M. T. Leonard, D.V. Rao, B. Letellier, G. Urgessa and S. Ashbaugh, "Accumulation and Head Loss Characteristics of Selected Pressurized Water Reactor LOCA-Generated Debris", Nuclear Technology, April 2006, Vol. 154, No 1 pp. 69-84.
- A.K.Ghosh & A.K.Maji, "Smart Bridge Bearing Sensor System", SEM Annual Meeting, June 2003, Charlotte, NC.
- B.C.Panda & A.K.Ghosh, "Structural behavior of Concrete Block Paving – Part I: Sand in bed and Joints, J. of Trans. Engg., ASCE, 2002, Vol. 128, No. 2, pp. 123-129.
- B.C.Panda & A.K.Ghosh, "Structural behavior of Concrete Block Paving – Part II: Concrete Blocks, J. of Trans. Engg., ASCE, 2002, Vol. 128, No. 2, pp. 130-135.
- B.C.Panda & A.K.Ghosh, "Sources of Jointing Sand for Concrete Block Pavement", J. of Materials in Civil Engineering, ASCE, May/June, 2001, Vol 13, No 3, 235-239.
- A.K.Ghosh et al, "NDE of Fracture in an Ultra Lightweight Cement Composite", Proc. 8th Int. Congress of SEM at Nashville, June 1996

(D) CERTIFICATIONS

Professional Engineer
State of New Mexico *2004-Current*
Center for Commercialization and Entrepreneurial Training
Technology Venture Corporation *2012*

(E) SYNERGISTIC ACTIVITIES

Green Desalination Tech,
Based on Forward Osmosis *Aired April 2023*
Krqe.com/video/extended-interview-dr-ashok-ghosh-green-desalination-tech/8531042
Good Day New Mexico
based on Fulbright Specialist program in India during summer of 2018 *Aired August 2018*
https://www.youtube.com/watch?v=k495Lj-dpXk&t=3s
Debate Competition, March 2018, 2019 Driverless Cars- Policy Issues
As part of the education outreach program of New Mexico Society of Professional Engineers (NMSPE), I organized the first NMT debate competition on campus in March 2018 followed by another in 2019.
https://www.nmt.edu/news/2018/studentdebate.php
https://www.nmt.edu/news/2019/second_annual_debate_competition.php
Student Team Places Second In Business Entrepreneurship Pitch Competition
Mentored to win "Innovate New Mexico Student Pitch Competition" in *2016*
http://nmt.edu/news/second-place-business-pitch.php
Research Rocks- KOAT TV
based on "Students Explore Submarine Materials" *Aired February 12, 2010*
https://www.youtube.com/watch?v=650DGf62MPs

(F) COMMUNITY DEVELOPMENT PROJECTS

Project 1: President of New Mexico Solar Energy Association (NMSEA), a Non-Profit

Mission of NMSEA is to educate, empower, collaborate, and advocate for clean renewable energy. NMSEA is a state chapter of the American Solar Energy Society (ASES). During the summer of 2020, NMSEA had 4 interns from New Mexico Tech working in designing a new education tool called Sun Chaser 2k20. The objectives of this tool is to develop a mobile educational tool that can be hauled to school campuses all around New Mexico to instruct in a "Show & Tell" manner the virtues of passive solar architecture, solar thermal & PV theory & installation, bio-fuels, greenhouse design & construction, and energy efficiency. The link below will take you that site:
https://www.nmsolar.org/sun-chaser-2020/

Project 2: *Fulbright Specialist program in India during summer of 2018, Funded by US State Department*

Mentoring aspiring entrepreneurs at the Birla Institute of Technology & Science in Goa, India. Through targeted efforts of bridging various entrepreneurial actors; two business models were developed.
https://www.youtube.com/watch?v=k495Lj-dpXk&t=3s

Project 3: Philadelphia Business Opportunity Compass – Connecting neighborhood minority and immigrant entrepreneurs to the thriving downtown Philadelphia tech entrepreneurial ecosystem (Co-PI). Funded by US State Department

Abstract: We believe that an open, accessible, and diverse entrepreneurial ecosystem is an indispensable tool in increasing minority business growth, creating neighborhood jobs, and combating poverty. The goal of the project is to strategize ways to promoting effective and successful entrepreneurial ecosystems in the communities. https://phillybusinessreso.wixsite.com/mysite-2/about

Project 4: Carbon Valley, Wyoming- Enabling Entrepreneurship for a New Carbon World (Co-PI). Funded by US State Department

Abstract: Campbell County commissioners want northeast Wyoming to become the hub for advanced carbon research, but they need to lay a foundation for that to happen, which is why they're looking to conduct a study that would offer blueprint for making Gillette a "Carbon Valley". The overall goal of the Carbon Valley project is to identify and facilitate action on key programs to aid Campbell County to transform its economy from one of dependence on mineral extraction for fuels to a more diversified ecosystem that focuses on innovation for advanced carbon uses.

(G) OVERVIEW OF INVITED/OTHER PRESENTATIONS

- Invited to speak at 2024 National Society of Professional Engineers E-Week Conference at Albuquerque, February 23rd, 2024.
- Invited as "Tech Idol" speaker at American Water Summit 2016 to participate as one of the six researchers in USA to give a talk under "Tech Idol" on Dec. 6th 2016 at Miami
- Sidharth, A.K. and Ghosh, A. K , Poster presentation at 2016 Wind Energy Research Workshop, U. of Massachusetts Lowell, March 15-17, 2016
- Invited talk on "Technology, Engineering and Economic Feasibility for Brackish Groundwater Desalination" at Understanding New Mexico's Brackish Groundwater Resources conference, July 23rd, 2015, Albuquerque, NM
- An invited talk at ASCE Fall Meeting at NMSU. The theme of that year's meeting was "Water and Energy in New Mexico". Topic of my talk was "The Science and Economics of Water Desalination using Forward Osmosis", 2013
- Presented to Lauren, Abilene Texas and Sandbox Energy Resources (SER) and Erin Consulting "Development of a 125 barrel per day desalination System using Forward Osmosis" on September 25, 2013
- Invited presentation on "Desalination of High TDS Oilfield Produced Water" at Hobbs, for Emergent Technologies Inc., January 21, 2011
- Presentation to Senator Tom Udall at Hobbs, on January 21, 2011 on "Desalination of High TDS Oilfield Produced Water"
- Presentation to Congressman Steve Pierce on April 18, 2011, at Hobbs, on "Commercial potential for the technology of desalination of High TDS Oilfield Produced Water"
- Invited presentation on "Desalination of High TDS Oilfield Produced Water" at Hydration Technologies Innovation, Albany, OR, Dec. 23, 2010
- Invited lecture to introduce the NMT ASCE Student chapter to the local ACI members. The outcome is the donation of some laboratory equipment to NMT and arrangement of industrial trips for NMT students.

(H) PRINCIPAL INVESTIGATOR IN MAJOR INDUSTRIAL PROJECTS

- As Professional Engineer for Solar Thermal Water Heating System Installation Project at Kirtland Air Force Base Aquatic Training Center, Albuquerque, NM, 2010
- Design and Testing (Load and Nondestructive) of Highway Bridges on National Highway 5 – A World Bank Project (PI)
- Design and Laboratory Investigation on Embankment using fly ash from an area Power Plant – A World Bank project (PI)
- Laboratory Investigation on "Alkali-Aggregate reactivity", - A World Bank project (PI).