Ali Zarafshan

PhD, PE

Senior Consultant, Civil Structural

As Senior Consultant, Dr. Zarafshan has extensive experience in utility, energy and industrial infrastructures and buildings. With a combination of experience in engineering, procurement, fabrication, installation, and contract management, he has made notable contributions to the energy sector, especially in renewables and the wind industry. His expertise is demonstrated by attaining Federal and State certifications for Vineyard Wind 1 and Block Island offshore wind farms, respectively. He led engineering of infrastructure projects that delivered more than 925 MW of clean energy to the national grid. Dr. Zarafshan has actively participated in pushing frontiers of structural engineering and the engineering of the first operational Hyperloop system that successfully transported passengers in 2020 was the highlight of his work.

Dr. Zarafshan is active in professional societies and has published papers in ASCE structural congress and led the AI and robotics panel in International Partnership Forum (IPF) 2024.

Education

PhD, Structural Engineering, University of Illinois Chicago, 2013

MSc, Structural Engineering, University of Tehran, 2006

BS, Civil Engineering, University of Tehran, 2004

Licenses & Certifications

- State of California P.E. License No. 81429
- State of Nevada Civil Engineer (CE) License No. 024015
- State of Louisiana Civil Engineer License No. 40386 (Inactive)
- State of New York Professional Engineer No. 95393 (Inactive)

Languages

- Farsi.

Contact Information

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ESi Santa Ana

Areas of Specialization

- Advanced Structural Analysis
- Offshore Wind Energy
- Structural Dynamics
- Seismic Engineering
- Onshore Wind Farms
- Downstream Oil and Gas
- Progressive Failure Analysis
- Fatigue Analysis
- Structural Health Monitoring
- Bridge and Infrastructure Assessment
- Foundation Design and Certification
- Failure Risk Mitigation
- Transportation Infrastructure
- Energy Systems Engineering
- Computational Modeling
- Structural System Integration

Positions Held

Engineering Systems Inc., Orange County, California

- Senior Consultant, 2025 – Present

Vineyard Offshore, Boston, Massachusetts

- Foundation Package Manager – Excelsior Wind, Vineyard Wind 2, Apr. 2024 – Mar. 2025
- Foundation Design Manager – Vineyard Wind 1, Nov. 2020 – Feb. 2025

Virgin Hyperloop, Los Angeles, California

- Infrastructure Program Manager, Feb. 2018 – Oct. 2020
- Senior Structural Engineer – Hyperloop 1, Dec. 2015 – Jan. 2018

Keystone Engineering, New Orleans, Louisiana

- Lead Structural Engineer, Mar. 2013 – Nov. 2015

University of Illinois at Chicago, Smart Structures Laboratory, Chicago, Illinois

- Research Assistant, Jan. 2009 – Mar. 2013

BIDEC, Tehran, Iran

- Structural Engineer III, Feb. 2008 – Dec. 2008

EIED, Tehran, Iran

- Structural Engineer I, Feb. 2005 – Jan. 2008

Professional Affiliations/Honors

United States Patent and Trademark Office

- Patent Holder – Vibration-based method and sensor for monitoring of bridge scour, US Patent No. 10589756, March 17, 2020

American Society of Civil Engineers (ASCE)

- Author – *Design Considerations for Offshore Wind Energy Support Structures*, presented at the Structures Congress, Portland, OR, 2015

Project Experience

Investigations

Offshore Wind Energy – Design and Construction

- Managed engineering, design, certification, and delivery of $650M foundations package for the first U.S. utility-scale offshore wind farm, Vineyard Wind 1 with capacity of over 880 MW.

- Directed cross-functional international engineering teams, contractors, and suppliers across five business lines.
- Secured design certification for Vineyard Wind 1 offshore wind farm from Det Norske Veritas (DNV)
- Attained no objection letter (Federal approval of project construction) from the Bureau of Ocean Energy Management (BOEM).
- Resolved execution-phase issues and external conflicts, including cracked landing rings and broken wind turbine blades.
- Oversaw a $1.4B foundation package (FEED and preliminary design) for two offshore wind projects (Vineyard Mid-Atlantic and Excelsior) with 2.4+ GW combined capacity and $8B+ in development CAPEX.
- Directed Front End Engineering and Design (FEED), procurement, and early construction phases and their associated contracts for XL monopiles and transition pieces.
- Led engineering and design of jacket foundations for the Block Island Wind Farm, the U.S.'s first offshore wind project.
- Developed in-house automation software to run millions of time-domain simulations, increasing analysis throughput by 300%.

Emerging Transportation Systems

- Led the design and construction of the first operational Hyperloop system (CAPEX over $100M).
- Supervised structural interface with levitation, propulsion, and vehicle systems for load envelope development, vehicle sizing and system performance optimization.
- Formed and managed a 15-person engineering team (structural, mechanical, weld and robotics engineers) from the ground up.
- Oversaw $250M+ in hardware development budget across six cross-functional teams
- Developed digital twin model of high-speed transportation systems and led feasibility studies for global project opportunities.
- Resolved fluid-structure-vehicle interaction challenges during system-level integration.

Structural Health Monitoring and Failure Risk Mitigation

- Designed a novel fiber optic scour sensor for real-time bridge monitoring.
- Led software development for structural monitoring systems, including documentation.
- Created a level 3 damage detection algorithm using Hilbert-Huang Transform to detect, locate and measure the damage in linear infrastructures (bridges, pipes, etc.).
- Directed risk mitigation and monitoring for Salt Creek Bridge (IL) and an RC bridge in California.

Seismic and Structural Engineering

- Designed and analyzed seismic strengthening for reinforced concrete columns and shear walls.
- Engineering and design the main pipe racks and corresponding foundation of NGL plants.
- Designed foundation for rotating, reciprocating, and impact machinery and equipment.
- Performed seismic analysis of steel moment frames and large liquid storage tanks.
- Developed in-house software for designing AISC prequalified steel connections.
- Supported design and certification of structural components in accordance with IBC, ACI, API and AISC standards.

Publications

"Vibration-Based Method and Sensor for Monitoring of Bridge Scour," **A. Zarafshan**, A. Iranmanesh, and F. Ansari, Journal of Bridge Engineering, 17(6), pp. 829–838 (2012).

"Design Considerations for Offshore Wind Energy Support Structures," **A. Zarafshan** and R. Hall, Structures Congress 2015 Proceedings, ASCE, Portland, OR, April 30–May 2, 2015.

"Reference-Free Method for Real-Time Monitoring of Bridge Deflections," K. Helmi, **A. Zarafshan**, F. Ansari, and R. Hall, Engineering Structures, 103, pp. 116–124 (2015).

Presentations

"The Next Frontier: How AI and Robotics Will Impact Offshore Wind," Oceantic Network, International Partnering Forum (IPF) 2024, New Orleans, LA, April 22–25, 2024.