Exponent®
Engineering & Scientific Consulting

Nathanael Seay, Ph.D.

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Professional Profile

Nathanael Seay earned his Ph.D. in Mechanical Engineering from the University of Maryland Baltimore County, focusing on improving the durability of artificial joints. He has extensive expertise in engineering software and hardware, including the innovative application of machine learning and artificial intelligence across diverse industries. At the University of Maryland Baltimore County, he developed novel solutions for enhancing the durability of artificial joints through groundbreaking research in titanium carbide surfaces and plasma-enhanced chemical vapor deposition.

His research developed a novel titanium carbide surface on a titanium alloy substrate using plasma-enhanced chemical vapor deposition (CVD). This work aimed to address the significant issue of wear in joint replacements by investigating how micro-textured surfaces could extend their lifespan. His analysis of the interface revealed crucial tribological features, such as crystalline channels with nanocrystalline characteristics. Through extensive mechanical testing and sophisticated modeling techniques like molecular dynamics and finite element analysis, Nathanael's study offered valuable insights into the adhesive properties and resistance to crack propagation at the interface, suggesting a potential breakthrough in joint replacement technology. His expertise spans advanced material characterization, computational modeling, and surface engineering, with proficiency in material science and computational tools essential for high-performance applications across diverse industries.

Nathanael is proficient in a range of computational models and experimental techniques aimed at improving system reliability and operational efficiency. His skills include deploying complex machine learning models to predict material behaviors and system failures. He is skilled in software and programming languages relevant to machine learning, such as TensorFlow and Keras, and engineering analysis tools like MATLAB and SolidWorks. His technical acumen extends to material analysis ensuring a robust application of his multidisciplinary skills to practical engineering challenges. Nathanael is proficient in using material science tools like SEM, XRD, AFM, and nanoindentation.

Academic Credentials & Professional Honors

Ph.D., Mechanical Engineering, University of Maryland, Baltimore County, 2023

M.S., Mechanical Engineering, University of Maryland, Baltimore County, 2013

B.S., Mechanical Engineering, University of Maryland, College Park, 2008

Prior Experience

Mechanical Engineer, NTI Corporation – Bethesda, MD | 09/2023 – 12/2024

Mechanical Engineer, US Navy, NAVSEA Logistics Center – Mechanicsburg, PA | 09/2022 – 09/2023

Mechanical Engineer, ORISE Research Fellow US Food and Drug Administration – Silver Spring, MD | 02/2022 – 09/2022

General Engineer US Department of Commerce – Washington, DC | 04/2012 – 08/2013

Professional Affiliations

National Society of Black Engineers (NSBE)

American Society of Mechanical Engineers (ASME)

Publications

Sullivan SJL, Rinaldi JE, Hariharan P, Casamento JP, Baek S, Seay N, Vesnovsky O, Topoleski LDT. Clinical evaluation of non-contact infrared thermometers. Sci Rep. 2021 Nov 11;11(1):22079. doi: 10.1038/s41598-021-99300-1. PMID: 34764438; PMCID: PMC8586154.

Stacey JL Sullivan, Nathanael Seay, Liang Zhu, Jean E Rinaldi, Prasanna Hariharan, Oleg Vesnovsky, LD Timmie Topoleski, Performance characterization of non-contact infrared thermometers (NCITs) for forehead temperature measurement, Medical Engineering & Physics, Volume 93, 2021, Pages 93-99, ISSN 1350-4533, https://doi.org/10.1016/j.medengphy.2021.05.007.