Binesh Sadanandan

Sr. Principal R&D Engineer (Technical Fellow) | Ph.D. Candidate, Applied Data Science
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SUMMARY

Research engineer with 17 years bridging data and insights in medical technology. At Medtronic Surgical Innovation, I lead data-driven initiatives to advance minimally invasive therapies. As a Ph.D. candidate at the SAIL Lab (University of NewHaven, Advisor: Dr. Vahid Behzadan), my research focuses on robust defense strategies for medical vision-language models, developing detection mechanisms and mitigation strategies to ensure AI safety in clinical settings. Two patents in ML-powered healthcare products.

EXPERIENCE

Senior Principal R&D Engineer & Technical Fellow Sep 2023 - Present
Medtronic Surgical Innovation, North Haven, CT

- Lead data science and machine learning integration for surgical instruments and complex medical systems, driving predictive insights in product development
- Architect scalable data pipelines using Snowflake and AWS for comprehensive analysis supporting R&D decision-making
- Oversee PLM and engineering data management with enhanced compliance, ensuring data integrity and traceability
- Mentor teams on advanced engineering techniques and data science, fostering innovation and continuous learning

Senior Principal R&D Engineer Jul 2021 - Sep 2023
Medtronic, North Haven, CT

- Developed scientific and clinical evidence strategies for surgical staplers in minimally invasive surgery
- Built scalable data pipelines using BigData architecture (Dataiku, Python, Redshift/Snowflake)
- Contributed to scientific literature and conferences, building relationships with key opinion leaders

Principal R&D Applications Engineer Jun 2016 - Jul 2021
Medtronic, North Haven, CT

- Supported Model-Based Enterprise initiatives through cloud solutions, high-throughput event processing, and analytics
- Led technical teams analyzing requirements and designing solutions for complex product development processes

Technical Architect, Product Lifecycle Management Nov 2012 - Nov 2015
Barry-Wehmiller Design Group, St. Louis, MO

- Architected Windchill and PTC Integrity solutions for enterprise PLM deployments; led requirements gathering and IT infrastructure design

Product Specialist / Infrastructure Engineer 2009 - 2012
PTC / Hewlett Packard Enterprise

- Subject matter expert for PTC Windchill architecture and enterprise deployments; managed Solaris/Oracle infrastructure

EDUCATION

Ph.D. in Engineering and Applied Science 2021 - 2027 (Expected)
University of New Haven | SAIL Lab, Advisor: Dr. Vahid Behzadan

M.S. in Data Science 2017 - 2019
University of Connecticut School of Business | GPA: 3.92

B.E. in Electronics and Communication 2004 - 2008
Cochin University of Science and Technology

PUBLICATIONS

Comparative Study of Generative Models for Early Detection of Failures in Medical Devices
B. Sadanandan, B.A. Nobar, V. Behzadan | arXiv:2505.04845, 2025

VSF-Med: A Vulnerability Scoring Framework for Medical Vision-Language Models
B. Sadanandan, V. Behzadan | arXiv:2507.00052, 2025

Promise of Data-Driven Modeling and Decision Support for Precision Oncology and Theranostics
B. Sadanandan, V. Behzadan | arXiv:2505.09899, 2025

Machine Learning for Anastomotic Leak Prediction: A Systematic Review and Experimental Validation
B. Sadanandan | Int. J. Trend Sci. Res. Dev. 8(3), 2024

PATENTS

Two patents in machine learning-powered healthcare products (Medtronic)