DHEERAJ SHARAN SINGH

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https://dheeraj2015.github.io/my-resume/

PROFESSIONAL SUMMARY

Accomplished Senior Staff Data Scientist with a proven track record at GE Digital, specializing in software product development, machine/deep learning, and project management. Spearheaded the entire lifecycle of AI-driven software development and launching of an AI-driven product, showcasing expertise in technical leadership. Apart from leading a software and data science team, I have led multiple proof of concept and pilot implementation of new products demonstrating a blend of technical acumen and visionary leadership.

SKILLS

- Computer vision, GEN AI
- Statistical Analysis
- Python programming
- Technical Leadership
- Machine/Deep Learning Expertise
- Project Management
- Predictive Analytics
- Software Development

EXPERIENCE

SENIOR STAFF DATA SCIENTIST at GE Vernova — May 2019- present

GEN AI Initiatives across digital product suites

AI-Agent Platform for Carbon Emission Reporting (CERius)

- Led the redesign of CERius reporting into an AI-agent–based platform enabling multi-standard, region-specific carbon emission compliance.
- Architected agent workflows for data retrieval, analytics, and automated insights generation, improving accuracy and scalability.
- Delivered interactive emission analysis capabilities, empowering users to identify high-emission assets and explore AI-generated trends and recommendations.

AI-Driven Tag Mapping Automation for Industrial Assets

- Directed development of a visual-language + OCR solution to automate 500+ tag mappings per blueprint across 10k+ customer tags.
- Built a scalable framework integrated with SmartSignal and GE product suites, reducing manual engineering effort and deployment timelines.
- Improved data quality and consistency by enabling automatic P&ID-driven validation of mapped tags.

Generative AI for Predictive Inspection & Asset Health Insights(APM)

- Executed a strategic PoC integrating work history, inspection summaries, measurements, recommendations, and images into a unified knowledge base.
- Designed AI pipelines to generate asset health insights, recommend optimal inspection intervals, and identify recurring defects and root causes.
- Demonstrated measurable value by enabling proactive maintenance planning and improved asset reliability for industrial customers.

Key technologies used: GPT4, Claude, Llama, Database**,** SQL, Textract, OCR, AI agents, LangGraph

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Computer Vision product development and launched in market:

Incubated and transformed a computer vision product named Autonomous Inspection, which automates plant inspections through camera and mobile devices.

- **Led the cross-disciplinary team** of data scientists, front-end, back-end and cloud engineers in developing and productionizing a AI product with a scalable cloud architecture. The product is launched in Market in '23. Led the solution testing and **implementation on a greenfield site in Germany**.
- The product includes, **multiple CNN models** for detecting industrial assets and corresponding defects. The models include object detection, semantic segmentation, and key point detection modules.
- Worked with **two major oil and gas customers** to validate, refine and showcase our **corrosion module**.
- Design and implemented the **cloud architecture of end-to-end product**, including data flow, data processing and data presentation on UI dashboard.
- **Invented and implemented** an advanced camera health monitoring solution using image processing techniques to detect and address issues like unwanted camera motions, blur, focus problems, and zoom changes. Applied the solution to surveillance cameras. A **patent** on this technology is filed and under review.
- **Set up a lab** with varied RGB and IR camera configurations, forming an IoT-like network Cameras connect to an edge server via a network switch for real-time photo collection. The edge server processes data, forwarding crucial information to the cloud, facilitating solution evaluation before customer deployment.

Key technologies used: Computer Vision models for object detection, Image segmentation, AWS, Sagemaker, On-prem data transfer, CI/CD pipeline, ML Ops, Classical Image processing

Key skills used: Team Technical leadership, AI Model training, AI product Architecture Design and

Implementation, Project budgeting, Stakeholder communications, Lab development and testing, cyber security.

Predictive Emissions Monitoring System (PEMS) Lead

Contributing to GE Vernova's mission of "Electrifying the world while decarbonizing it." I am leading the development of a **Predictive Emissions Monitoring System (PEMS)** as part of a broader solution to automate accurate Greenhouse Gas (GHG) emissions reporting and provide actionable insights for emission reduction.

Key contributions:

- Designed and led the implementation of an **adaptive multivariate regression model (Random Forest)** to predict key emissions (CO_2, NO_x, SO_2, HC) using historical plant operational data.
- The model supplements Continuous Emissions Monitoring Systems (CEMS) by:
    - Validating CEMS data and flagging significant deviations to ensure data integrity.
    - Providing backup emissions estimates during CEMS faults or outages.
    - Handling missing data in CEMS to maintain consistent reporting.
- Developed an **adaptive learning mechanism** that monitors plant behaviour, detects data drift or system changes (e.g., due to maintenance or degradation), and **automatically retrains the model** to maintain accuracy.
- Ensured model robustness to missing sensor inputs and statistical changes in plant operation over time.

STAFF DATA SCIENTIST at GE Digital/Power

January 2016 - April 2019

Boiler tube leak solution development (New product development):

- **Led an engineering team** to deliver a software product (Add on to GE APM), using **predictive analytics** for estimating the **remaining lifespan** of a vital power plant subsystem. Successfully implemented on **three customers.**
- Employed a **physics-based model** coupled with an ongoing **machine learning** technique, employing a **Bayesian approach** to continually learn unknown parameters.
- Successfully **integrated the analytics into a user interface (UI)** as a practical solution currently utilized by customers.

Key technologies used: Monte-Carlo simulation, Physics-based modelling, Bayesian learning, remaining life prediction, confidence interval.

CNN model for compressor blade defects:

- Explore **business value and problem formulation** for automating compressor blade defect detection using Deep learning model.
- **Trained a convolutional neural network**-based solution for identifying mechanical irregularities (such as cracks, dents, bends, and missing tips) in compressor blade images captured by handheld cameras.

- Tested the model on unseen field data and **demonstrated value** of the outcome to stakeholders.

Key technologies used: Convolution neural network, DB Scan clustering, Data imbalance and loss function modification, Image segmentation, Fully convolutional network, Mask R CNN

Multivariate Time-Series Anomaly Detection:

- Developed **semi-supervised anomaly detection** for machines using hybrid techniques (data + physics).
- Used **Principal component analysis, neural network(Autoencoder) and similarity-based method** for modelling multivariate data.
- **Implementation of APM-Smart Signal** (Legacy industrial anomaly detection product) at various customer sites.

Key technologies used: Semi-supervised learning, PCA, Similarity based method, Time-series reconstruction

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POSTDOC FELLOW University of Alberta

June 2014 - Dec 2015

- **Engineered a fault monitoring algorithm** for detecting unbalance and dynamic faults in centrifuges
- Developed **anomaly detection and root cause analysis** techniques for multivariate time series data using Kernel-PCA, causality analysis, transfer entropy, and symbolic dynamic filtering
- Conducted independent research on novel algorithms for **vibration-based fault detection** and identification in rotating systems, utilizing signal processing methods like Empirical Mode Decomposition and Fourier transforms.
- Organized and led project update interface **meetings with sponsors (Syncrude).**

Key technologies used: Empirical Mode decomposition, Vibration analysis, PCA, D-Markov Machine, Causality analysis, Transfer Entropy

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SR. DESIGN ENGINEER at Tata Motors Limited

July 2004 - June 2006

- **Design modification** and development of Automobile (Trucks)
- Did **finite element(stress) analysis** of several mechanical components critical to vehicle.
- Responsibility to **document full description of vehicle**, which is sent to ARAI (Automotive Research authority of India) for approval of New Vehicles

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PHD RESEARCH

- Pattern identification in mechanical systems using **Symbolic Dynamic Filtering (SDF)** (A technique based on **Markov modelling**).
- Data driven **remaining life prediction** using **PCA modelling and recursive Bayesian estimation.**
- Optimal **partitioning of Time-series data** for distinct **feature extraction** and its application to damage classification.
- **Vibration based anomaly detection** in complex electro-mechanical system using Symbolic Dynamic Filtering.
- **Fractal and lacunarity analysis** of degrading images (surface interferogram) during crack initiation.

EDUCATION

PHD IN MECHANICAL ENGINEERING
Thesis: Data Driven early defect detection and prognosis in materials
Techniques: Signal processing, Symbolic Dynamic filtering, Data Entropy, Bayesian Learning, Fractal and lacunarity analysis.
Penn State University *July 2011*

MASTER OF SCIENCE - MS IN ELECTRICAL ENGINEERING
Penn State University *Dec 2008*

M.TECH IN MECHANICAL SYSTEM DESIGN
Indian Institute of Technology, Kharagpur *May 2004*

B.E IN MECHANICAL ENGINEERING
M.S. Ramaiah Institute of Technology *July 2002*

PUBLICATIONSANDPATENTS

9 int. journal papers, 5 int conference papers, 1 book chapter, 1 Patent filed and under review.

REFERENCES

References available upon request

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