

# Bibek Dhungana

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## Summary

I specialize in architecting scalable cloud infrastructure and building intelligent systems that transform raw data into production-grade solutions. My expertise spans distributed systems, software engineering, algorithm optimization, and ML deployment. As an AWS-certified engineer, I bridge the gap between infrastructure design and advanced machine learning to deliver resilient, end-to-end results.

## Education

**Vanderbilt University, Nashville, TN**

2025 – Present

MS & Ph.D. in Computer Science

GPA: 4.0 / 4.0

Relevant Coursework: Machine Learning, Deep Learning, Artificial Intelligence, Numerical Analysis, Quantum Computing, Big Data

**Texas Tech University, Lubbock, TX**

2019 – 2023

B.S. in Computer Science, Minor in Mathematics

GPA: 3.9 / 4.0

Relevant Coursework: Software Engineering, Operating Systems, Computer Architecture, Computer Networks, Database Systems, Algorithms

## Technical Skills

**Machine Learning & AI:** PyTorch, LangGraph, scikit-learn, Hugging Face, Computer Vision, Natural Language Processing (NLP), Retrieval-Augmented Generation (RAG), Vector Embeddings

**Data Science:** Statistical Analysis, Data Visualization, NumPy, Pandas, SciPy, Matplotlib, ETL Pipelines

**Programming Languages:** Python, TypeScript, JavaScript, C#, C++, C, Java, SQL, Rust, HTML/CSS

**MLOps & Cloud:** AWS SageMaker, Docker, Kubernetes, CI/CD Pipelines, GitHub Actions, Jenkins, Terraform

**Database Technologies:** Relational (PostgreSQL, SQL Server, MySQL), NoSQL (MongoDB, DynamoDB), Vector Databases (Pinecone, Qdrant, S3 vectors), Redis

**Web & Application Frameworks:** React, Node.js, .NET Core, Entity Framework, FastAPI, Express.js, Spring Boot, Tailwind CSS, Zustand

## Professional Experience

**Vanderbilt University, Nashville, TN**

Aug 2025 - Present

Teaching and Research Assistant: Simulation, Optimization, and Learning Lab - advised by Dr. David Hyde

- Developing an AI-first platform ([research.team](#)) that applies LLMs and knowledge graphs to recommend potential grants and collaborators for researchers.
- Teaching assistant for the Algorithms (CS 3250) course, grading assignments and holding office hours.

**St. Jude Children's Research Hospital – ALSAC, Memphis, TN**

Jul 2024 - Jul 2025

Software Engineer (React, .NET, AWS, Entity Framework, SQL Server, Python, MuleSoft, Salesforce, Apache Kafka, Jenkins, OpenShift, Sentry, Docker, Kubernetes)

- Migrated a legacy .NET donation system to a modern React + .NET stack, reducing call handling time by 20%, improving donor satisfaction, and ensuring PCI compliance with faster, secure transactions.
- Implemented a Kafka-based real-time donations pipeline orchestrated with MuleSoft, achieving millisecond cross-service synchronization, accelerating Jenkins/OpenShift releases, and increasing reliability while reducing time to production.
- Developed and maintained React-based frontends for event campaign sites, integrated with .NET APIs and SQL Server, improving data validation and reducing donor entry errors to under 2%.
- Automated AWS ETL Glue jobs to reconcile 11M+ InContact IDs with NICE APIs, resolving missing call recordings, generating interactive reports, and ensuring NACHA compliance.
- Enhanced reliability of real-time services with Polly retry logic, Sentry/Instana error monitoring, and Science Logic dashboards, reducing latency and improving fault tolerance and 99.9% uptime.

**AGCO (Precision Planting), Bloomington, IL**

Jun 2023 - Jun 2024

Software Engineer (React, TypeScript, Node.js, AWS, Express, MySQL, Tailwind, DynamoDB, React Native, GitHub Actions)

- Re-architected AGCO's centralized marketplace, migrating from a monolithic system to a scalable, high-performance platform, improving operational efficiency by 75%.

- Automated nightly 900+ page reports using Puppeteer, cron jobs, and S3 storage, streamlining web scraping and secure data management across Precision Planting sites.
- Integrated 5,000+ resources (PDFs, videos, decision trees) from Brandfolder, Wistia, and Stonly APIs into AWS Aurora with nightly sync, automated categorization and generated PDF/CSV summaries.
- Designed and deployed 15 REST API endpoints in Express for Aurora Serverless, incorporating authentication middleware and React custom hooks to support seamless frontend database updates.
- Strengthened notification workflows by fixing validation logic, ensuring accurate recipient targeting and timely delivery across iOS and Android platforms.

### Heavy Construction Systems Specialists (HCSS), Houston, TX

Jun 2022 - May 2023

Software Engineer Intern (.NET, React, Node.js, Azure, PostgreSQL, Docker, Azure DevOps)

- Built the HCSS Developer Portal ([developer.hcssapps.com](https://developer.hcssapps.com)), integrating APIs across all products, boosting weekly interactions by 2M+, and reducing API response times to under one second.
- Released a custom Azure Marketplace pipeline extension to automate API publishing and validation, cutting deployment time and improving efficiency for 10 internal teams.
- Implemented REST API endpoints with OpenAPI 3.0 and streamlined deployments using multi-stage CI/CD pipelines in Azure DevOps across QA, staging, and production, cutting lead time from 2 days to 6 hours.
- Built a static web app (React + .NET) for NPM/NuGet package scanning with Azure Table Storage and Azure Active Directory, scanning 10k+ packages/week and reducing per-scan time by 50%.

### Mobility Automation Lab, Lubbock, TX

Jan 2021 - Jan 2022

Research Assistant (Python, OpenCV, NumPy, SciPy, Matplotlib, Linux, Bash, Algorithms)

- Implemented ROS-based, ML-driven SLAM with RGB-D sensing and probabilistic fusion, significantly improving mapping accuracy in dynamic environments.
- Designed an edge-to-cloud telemetry pipeline on AWS (EC2/S3) that ingested robot/Android sensor streams, versioned and compacted time-series into a durable S3 lake, powering offline analysis and interactive visualization.
- Integrated NVIDIA Jetson SDK with REST/WebSocket services and mobile/web clients, delivering low-latency live position tracking and sensor-health alerts, enabling proactive intervention during autonomous navigation.

### NSF I-Corps Program, Lubbock, TX

May 2021 - Aug 2021

Intern (Spring Boot, React, Hibernate, MySQL, AWS)

- Delivered secure, cloud-native features end to end with React, Spring Boot, and OAuth2 on AWS (IAM, Lambda, S3), while engineering normalized MySQL schemas, high-performance SQL, and ETL pipelines for data ingestion.
- Conducted customer interviews to shape the MVP and define analytics KPIs, then instrumented the stack and optimized queries to guide product decisions.

## Projects

- **RAG-Based Agentic System:** Built an ML-centric RAG framework integrating embedding models, semantic retrieval pipelines, and custom ranking modules to improve factual grounding and multi-step reasoning in agentic LLM workflows.
- **Intelligent Apparel Classification System:** Developed an end-to-end vision pipeline trained on a curated apparel-image benchmark, implementing a softmax-based multiclass model served via FastAPI and a React interface supporting both file uploads and real-time camera input.
- **The Philosophical Computer – Creative Reasoning System:** Built a fully local Retrieval-Augmented Generation pipeline using Ollama, ChromaDB, and HuggingFace embeddings to ingest technical PDFs and synthesize philosophical poetry that blends computer science concepts with creative expression, ensuring complete data privacy and zero cloud dependency.
- **OpenMarketHub – Full-Stack Marketplace:** Developed a scalable marketplace system with a React frontend and Spring Boot microservices backed by MySQL, implementing behavior-based recommendation logic and deploying the entire stack to AWS.

## Certifications

- **AWS Certified:** Cloud Practitioner, Solutions Architect Associate, Developer Associate
- **HashiCorp Certified:** Terraform Associate
- **Full Stack Developer Nanodegree** (Udacity)
- **React Front End Developer** (Takeo)

[View all certifications](#)