

Manish Acharya

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EDUCATION

Vanderbilt University <i>BS in Computer Science and Mathematics, Electrical & Computer Engineering (Minor)</i>	Nashville, TN <i>Aug. 2023 – May 2027</i>
<ul style="list-style-type: none">• GPA: 4.0/4.0• Honors:<ul style="list-style-type: none">– Chancellor’s Scholarship (awarded to <1% of incoming students for outstanding leadership, character, academic achievement, and commitment to diversity and social justice)– Dean’s List (all semesters for academic excellence with a 4.0 GPA)• Relevant Coursework:<ul style="list-style-type: none">– Computer Science: Algorithms, Data Structures, Discrete Structures, Computer Architecture, Intermediate Software Design– Mathematics: Probability and Statistics, Advanced Linear Algebra, Linear Algebra, Multi-variable Calculus, Calculus I-II	

TECHNICAL SKILLS

Languages: Python, Java, C/C++, SQL, JavaScript, HTML5/CSS, MATLAB
Frameworks: PyTorch, Tensorflow React, Node.js, Flutter, Spring, Django
AI/ML Expertise: Machine Learning, Reinforcement Learning, Deep Learning, Neural Networks
Developer Tools: Git, Unix, Docker
Libraries: NumPy, SciPy, Pandas, Scikit-Learn, Matplotlib, OpenCV, D3JS

RESEARCH EXPERIENCE

Undergraduate Research Assistant <i>Huang Lab, Vanderbilt University</i>	March 2024 – Present <i>Nashville, TN</i>
<i>Context-Aware Retrieval-Augmented Generation System</i>	<i>March - November 2024</i>
<ul style="list-style-type: none">• Engineered AUTOPATCH Framework: Designed a context-aware system integrating Retrieval-Augmented Generation (RAG) with Control Flow Graphs (CFG) to optimize code execution, achieving a 7.3% runtime efficiency improvement over baseline methods.• Advanced Program Optimization Techniques: Enhanced LLM-driven optimization by incorporating CFG-based analysis, identifying inefficiencies, and generating targeted refinements for complex code structures.• Utilized Historical Patterns for Performance Gains: Built a retrieval pipeline utilizing historical optimization examples to guide program restructuring, improving adaptability and scalability of automated code refinement.	
<i>Designing Novel Models for Mathematical Reasoning and Problem Solving</i>	<i>November 2024 - Present</i>
<ul style="list-style-type: none">• Developing Novel Models: Creating custom models designed specifically to address mathematical problem-solving and reasoning tasks by leveraging problem-specific datasets and innovative architectures.• Establishing Performance Benchmarks: Designing and implementing benchmarks to evaluate the effectiveness of models on tasks such as theorem proving, symbolic algebra, and logical reasoning.• Integrating AI in Education: Exploring applications of reasoning-driven AI models in educational and research tools to solve complex mathematical problems.	
Undergraduate Research Assistant <i>Vanderbilt AI Negotiation Lab, Owen Graduate School of Management</i>	September 2023 – Present <i>Nashville, TN</i>
<ul style="list-style-type: none">• Oversaw Website Development: Led the website development project for the Vanderbilt AI Negotiation Lab, utilizing Django and Python.• Integrated and Enhanced AI Model: Successfully incorporated the AI negotiation model into the website for public access, while contributing to its development by proposing performance improvements.• Optimized Website Performance: Enhanced website performance by 30%, reduced loading speed by 50%, and lowered latency by 40% using DjangoQ.	

Researcher

Incubate Nepal

July – September 2022

Kathmandu, Nepal

- **Developed Algorithm:** Engineered a Fourier Transform-based algorithm to analyze breathing patterns, achieving a 92% accuracy rate.
- **Collected Data:** Conducted data acquisition from 10+ individuals in various breathing states, evaluating the app's performance and calculating a mean error rate.
- **Led App Development:** Directed the integration of the algorithm into a mobile application, designed for accessible health monitoring in regions with high pollution levels in Nepal, where COPD cases are on the rise.

TEACHING EXPERIENCE

Undergraduate Course Assistant

MATH 2300: Multivariable Calculus, Vanderbilt University

October 2024 – Present

Nashville, TN

- **Conduct Group Learning:** Mentor 80+ students across two sections, reinforcing multivariable calculus concepts and guiding collaborative problem-solving.
- **Design Teaching Resources:** Collaborate with the instructional team to review materials and plan activities that enhance understanding.
- **Mentor Individual Students:** Mentor students through one-on-one sessions and facilitate external study groups to ensure engagement and success.

Student Mentor and AI Project Lead

Uunchai Summer Program

May – July 2024

Nepal

- **Led Student Team:** Mentored a group of 10 students to promote and preserve folk stories from marginalized and underrepresented ethnic communities in Nepal.
- **Taught AI and Technical Skills:** Trained students from diverse backgrounds in fine-tuning AI models, using GitHub for collaboration, and collecting and processing data for storytelling applications.
- **Developed Storytelling AI:** Guided students in creating AI model that generates folk stories based on prompts in Nepali, supporting accessibility and cultural preservation for local communities.

INDUSTRY EXPERIENCE

Associate Software Developer

Gurzu Inc.

August 2022 – March 2023

Lalitpur, Nepal

- **Engineered Advanced Medical Detection Tools:** Collaborated with a team of 5 developers to create breast cancer detection software for DeepLook Medical.
- **Enhanced Imaging Accuracy:** Designed an algorithm to detect multiple cancer types, increasing detection accuracy by 17%.
- **Documented Project Deliverables:** Created comprehensive project documentation, user manuals, and product manifestos for stakeholders.

Software Developer

E-Digital Nepal

December 2021 – July 2022

Kathmandu, Nepal

- **Developed School Management System:** Collaborated with a team of 4 developers and 4 designers to create a system adopted by 150+ schools and colleges, improving educational management across Nepal.
- **Designed Mobile Application:** Designed and maintained key features of E-Digital Nepal mobile apps, ensuring robust functionality and seamless user experience.
- **Mentored Junior Developers:** Guided interns and junior developers in building Examination Management Modules using Java and Spring, ensuring high-quality code and fostering professional growth.

LEADERSHIP EXPERIENCE

Co-Founder

NPL Coder

March 2023 – Present

Nepal/USA

- **Spearhead Competitive Programming Initiatives:** Direct a team of 10 to design contests and training sessions, preparing high school students for national and international Olympiads.
- **Cultivate a Programming Community:** Organize events and initiatives to cultivate a competitive programming culture in Nepal, engaging high school and university students in coding and data challenges.
- **Design Training Curriculum:** Oversee the creation of a structured curriculum and syllabus, coordinating resource collection to provide comprehensive mentorship in computer science and mathematics.

Co-Founder

January 2024 – Present

Uunchai Summer Program

Nepal

- **Empower Underserved Students:** Co-founded Uunchai, a 6-8 week program mentoring 40-50 low-income students from remote areas of Nepal with multidisciplinary guidance from professionals.
- **Guide Local Impact Projects:** Mentor students in developing projects that address local needs and challenges, fostering practical problem-solving skills.
- **Establish Internship Partnerships:** Secure partnerships with companies to offer students internship opportunities upon program completion, enhancing real-world experience.

PUBLICATIONS

R. Friedman, J. Cho, J. Brett, X. Zhan, N. Han, S. Kannan, Y. Ma, J. Spencer-Smith, E. Jäckel, A. Zerres, M. Hooper, K. Babbitt, **Manish Acharya**, et al. *An Application of Large Language Models to Coding Negotiation Transcripts*. *arXiv preprint*, arXiv:2407.21037, 2024. <https://arxiv.org/abs/2407.21037>

PAPERS IN SUBMITTING & UNDER REVIEW

Manish Acharya, Yifan Zhang, Kevin Leach, Yu Huang: *Optimizing Code Runtime Performance through Context-Aware Retrieval-Augmented Generation*. Under Review at the 33rd IEEE/ACM International Conference on Program Comprehension (ICPC 2025) – ERA Track.

PROJECTS

Brain-to-Art Interface | *Python, Raspberry Pi, EEG Sensor, Spotify API* August - November 2024

- Developed a system that converts EEG sensor data into dynamic visual art displayed on an LED matrix.
- Programmed in Python to process brain signals and extract insights about mental states.
- Integrated Spotify API to generate personalized music playlists based on mental state analysis.
- Designed a real-time data pipeline for acquisition, processing, and visualization, ensuring responsiveness and accuracy.

Bookem | *React, TypeScript, MongoDB, Next.js* October 2023 – April 2024

- Collaborated in a team to design and develop a full-stack website for an NGO called Bookem.
- Led the backend development efforts, creating APIs and server-side functionality using Node.js and Express.
- Utilized MongoDB for efficient data storage and retrieval, ensuring seamless integration with the backend.
- Designed and implemented admin and user portals to manage content and user interactions, enhancing usability and accessibility.

Project Saas | *Flutter, Python, Flask, Firebase* July – September 2022

- Developed a mobile app to detect human breathing rate using smartphone sensors (accelerometer and gyroscope).
- Setup Firebase for long-term tracking and analysis of respiratory patterns.
- Designed a Fourier Transform-based algorithm to analyze breathing patterns
- Implemented a Flask REST API to process and analyze collected breathing data.

Project Yatri | *JavaScript, Node.js, React* March – May 2022

- Developed a web platform using React to provide real-time information on bus routes, fares, and vehicle availability in Kathmandu, Nepal.
- Designed and implemented algorithms to calculate the fastest routes and nearest bus stops, optimizing travel plans based on local traffic and road conditions.
- Built server-side functionality with Node.js to process real-time user requests and retrieve transportation data efficiently.
- Improved public transportation accessibility by leveraging computational methods to address real-world routing challenges.

FUNDS & AWARDS

Fellowships

- SyBBURE Searle Undergraduate Research Program (Top 20 students annually) (\$12,500/year)

Awards

- Best Project Award (Brain-to-Art Interface), SyBBURE Research Program: Recognized for innovation in real-time data processing and visualization.
- Second Place, Public Choice Adult Individual - MIT Appathon 2022
- Global Finalists Honorable Mention/Galactic Problem Solver - NASA Space App Challenge 2022
- All Nepal Rank-1, National Informatics Olympiad