

# Dhruv Goel

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## EXPERIENCE

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### Biomedical AI Research Assistant

University of Central Florida

April 2025 – Present

- Developed a deep learning model to predict enhancer-promoter interaction by in long range DNA sequences.
- Leveraged Mamba's selective state space design to efficiently model long-range genomic sequences and regulatory relationships across chromosomes
- Achieved SotA performance in both short range and long range genomic sequences, beating other models like HyenaDNA and DNABERT.
- Achieved 4-5% improvement in AUROC/MCC metrics over existing methods in datasets like Human OCR Ensembl and cell lines such as K562.

### Distracted driver-detecting AI Team Lead

Inspirit AI

August 2023 - August 2023

- Headed the development of a computer vision system to detect distracted driving behaviors, presented to 100+ professionals and peers at Inspirit AI
- Trained a Convolutional Neural Network (CNN) using transfer learning techniques to achieve 94% accuracy in classifying driver distraction states.
- Led a 5-person team through the full machine learning pipeline, from data collection and cleaning to model training, evaluation, and web deployment.

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## SKILLS

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Programming Languages: C++, C, Python, JavaScript/TypeScript, C# (Unity), Java, SQL

Web Development: React/Next.js, Node.js, WebSockets, REST APIs, Databases (MongoDB/PostgreSQL), Authentication

AI/ML: TensorFlow/PyTorch, Genetic Algorithms, Deep Reinforcement learning, Transfer Learning, Computer Vision

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## PROJECTS

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### Full-Stack Developer (Freelance)

LiveInStyle

- Built and deployed a full-stack platform for a retail business, serving 3,000+ monthly active users with NextJS.
- Engineered a responsive frontend with dynamic product displays and admin dashboards for inventory management, order tracking, and analytics.
- Integrated Clerk authentication, a payment processing system with Stripe, and Convex for efficient product data storage and retrieval.
- Optimized platform performance, reducing load times by 40% through caching, CDN image delivery, and frontend lazy-loading techniques.

### Evolutionary Simulation System

- Architected a large-scale biological simulation system to model natural selection using GPU-accelerated compute shaders for parallel processing.
- Implemented GPU-parallelized algorithms in Unity, enabling real-time simulation of over 500k+ interacting agents with mutation mechanics.
- Researched academic papers on evolutionary algorithms to design custom mutation and fitness-based selection systems from scratch.
- Extended the project to include procedural 3D terrain generation using Worley noise algorithms, enhancing the simulation's functional complexity.

### 2D Auto-driving AI with Custom Neural Network

- Developed a neuroevolutionary AI from scratch without relying on standard machine learning libraries, focusing on a custom implementation of NEAT.
- Designed custom path editor using Bezier curves and continuity of splines for custom tracks.
- Designed a custom NEAT (Neuro Evolution of Augmenting Topologies) implementation with backpropagation, gradient descent, and activation functions.
- Achieved supreme performance on all tracks (drifting, perfect sharp comers, etc.) through generational training.

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## EDUCATION

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### University of Central Florida- Burnett Honors College

Orlando, Florida • B.S. in Computer Science • Expected May 2029

- Member: KnightHacks, Hack@UCF

### High School

Lake Nona High School • Orlando, Florida • 2025 • 3.9

- SAT- 1570 (800- Math, 770-Reading and Writing)
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