

Yugank Mishra

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Education

Coppell High School

Senior (12th grader)

August 2024 – Present

Expected GPA: 5.4

- **Relevant Coursework:** Computer Science 1-3, AP Computer Science A, AP Physics 1 & 2, AP Physics C: Mechanics, AP Physics C: E&M, AP Calculus AB & BC, AP Literature & Composition, Calculus III, Linear Algebra (to be completed in spring semester)
- **Honors:** National Merit Semifinalist, Placed 2nd in Regional UiL for Mathematics

Extracurricular Activities

Coppell Game Developers

President

August 2022 - Present

- Taught a community of 20+ students the basics of game development. Concepts like 2D/3D game design, coding games using Unity Engine & C#, and 3D art through 3D modeling software like Blender were taught.
- Participated in 3 club-wide game jams, in which the entire club participated to form games for submissions to game jams (game competitions with a theme). These games were published to the platform itch.io, where people from across the world could play them.

Physics Club

President

August 2023 - Present

- Helped 30+ struggling students learn physics concepts through tutoring.
- Offered competition opportunities to interested students through exams like $F=ma$ (USAPhO qualifying exam) and formal physics competitions like Physics Bowl (international physics competition for high schooler teams).
- Provided research opportunities in the form of CERN BL4S, in which teams must design an experiment which involves one of the 2 available beams at the CERN facility. Last year, the Coppell Team, which I was a part of, won an outreach award.

Math UiL

Member

August 2023 - Present

- Honed competition math skills like Number Sense and general Mathematics through practice.
- Placed 2nd in Regional UiL competition for the Mathematics competition

Projects

Yope3D | Java, LWJGL

October 2023 - Jan 2024

- A 3D game engine made entirely in Java with LWJGL. The 3D graphics engine has many capabilities: 3D model loading, easy model transformation, a scripting interface for creating games/demos with the engine, and physics.
- The engine's physics component is capable of simulating spring-mass systems (allowing for softbody/cloth simulations), modeling rigid body interactions, and features an acceleration structure in the form of a BSP (Binary Space Partitioning) tree: a major optimization considering it took collision detection of pairs of objects from an $\mathcal{O}(n^2)$ problem to a $\mathcal{O}(\log n)$ problem.
- The engine also has both rasterization & ray tracing capabilities for graphics. The rasterization pipeline is forward lighting. The ray tracing allows for object shadows, recursive reflection with variable depth, and other optical phenomenon.
- The project's development was documented through GitHub, YouTube videos showing demos, and Medium articles describing the features added.

MNIST generator | Python, Keras, Tensorflow, Numpy

May 2024

- Created a generative neural network capable of producing recreations of digits using the MNIST dataset & Keras. This model is a version of β -VAE (similar in architecture to U-Net). The model is able to create human-readable digits from random noise.
- The model was trained & generated images on Google Colab service.

Technical Skills

Languages: Python, Java, C/C++, C#

Libraries: Tensorflow, Keras, Pytorch, LWJGL, OpenGL, Unity Engine