

Hardik Goel

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EDUCATION

Georgia Institute of Technology
Bachelor of Science in Computer Science

Atlanta, GA
Graduating Spring 2024

WORK AND RESEARCH EXPERIENCE

Research Assistant - Mixboard: AI Music Generation

June 2022 - December 2022

Robotic Musicianship Lab - Georgia Tech

Atlanta, GA

- Created a Web & iOS app for creating and sharing musical mashups generated with artificial intelligence.
- Developed a full-stack Web application using REST API, Flask, and VueJS to serve mixboard.
- Maintained AWS EC2 instance and S3 data bucket to serve multiple users and store mashups.
- Tuned Demucs, audio source separation model, to improve server performance by x8.3 times.

Research Assistant - Forest (HRI)

August 2021 - May 2022

Robotic Musicianship Lab - Georgia Tech

Atlanta, GA

- Developed a live trajectory path planner for robotic arms to interrupt trajectory instantaneously.
- Create a body tracker with computer vision using Human Pose Estimation (POSENET Model) to track human.
- Programmed real-time interactions between robots & musicians using MIR algorithms for beat tracking, and chord detection.
- Merged and contributed 5K+ lines code from multiple projects into a Python class for ROS support.

PROJECTS

Semantic Segmentation for Computer Vision | *Python, PyTorch, ResNet, Data Augmentation*

- Built a object detection and classification system for self-driving vehicles.
- Utilized ResNet architecture for semantic segmentation of 11 categories with deep learning approach.
- Preprocessed and augmented images of Camvid dataset with OpenCV to increase mIoU from 0.132 to 0.4097.
- Developed baseline of a pretrained ResNet-50 with a final 1x1 convolutional layer for class prediction.

Kite Flying Assistive Interface | *Java, Processing3, Sonification, Assistive Devices*

- Developed an assistive kite flying sonification system in Java, providing auditory feedback to users.
- Implemented position radar, altitude and wind sway detection simulation, and user control through a joystick.
- Conducted a study with 3 novices, demonstrating the effectiveness of the sonification system in a research paper.
- Explored the potential impact of the assistant on the experience, resulting in positive feedback from participants.

Cellular Automaton - Game of Life | *C, Time Complexity, Data Structures, Simulation*

- Implemented the Game of Life simulation in C, utilizing linear algebra concepts for efficient state calculation.
- Designed and implemented a 2D grid data structure for storing cell states with Priority Queues.
- Implemented cellular automaton algorithm for updating cell states based on rules by John Conway.
- Conducted thorough testing to validate simulation accuracy.

LEADERSHIP AND VOLUNTEERISM

Board Member - Web and Technology Officer

May 2020 - October 2021

Fesser and Friends - Nonprofit Orphanage

Remote (Democratic Republic of Congo)

- Won initial venture funding at the Blackstone LaunchPad Entrepreneurial Competition.
- Developed React website and managed social media channels to build a network of over 2000 people.
- Successful fundraising of \$11,000 in 8 months to provide foster care for 15 children.

TECHNICAL SKILLS

Languages: Java, Python, C++, JavaScript, HTML/CSS, Scala, Assembly

Frameworks: React, Node.js, Flask, JUnit, PyTorch, TensorFlow, OpenGL

Libraries: Matplotlib, NumPy, OpenCV, Pandas, Plotly, P5.js, ROS

Developer Tools: Git, Docker, GCC, GDB, CMake, CUDA, AWS, Jupyter, Ableton

Other Skills: DSP, MIR, Accounting, ESP32, Arduino, I2S, I2C