Gavin Hua

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EDUCATION

California Institute of Technology, Pasadena, CA   Expected Jun. 2027
Expected Majors: Electrical Engineering and Computer Science

Beijing No. 4 High School International Campus   Graduated Jun. 2023
Cumulative GPA: 4.60/4.61

TECHNICAL SKILLS

Intermediate: Python, C/C++, Altium Designer, LaTeX
Basic: MATLAB, SOLIDWORKS, Java

RELEVANT EXPERIENCES

Member, Formula SAE   Sep. 2023 - present

Designed a PCB in Altium Designer to read pedal potentiometer data and transmit it via the CAN bus; programmed the STM32 microcontroller. Currently designing and programming a telemetry/data acquisition system using an ESP32 to both store and concurrently transmit vehicle information to ground control over Wi-Fi.

Independent Project, CMatrix: C-based Linear Algebra Library   Jun. 2023 - present

Designed and implemented a documented linear algebra library in C based on the language's standard libraries. Functions include memory allocation/deallocation for matrices and vectors, basic operations such as determinants, inverses, and basis transforms, as well as geometric and algebraic functions such as Euler angle attitude descriptions and matrix decompositions.

Independent Project, Neural Network Implementation in C++   Aug. 2023 - present

Implemented a neural network in C++ using the Eigen linear algebra library. Coded algorithms such as backpropagation, gradient descent, and various optimization methods. Trained it on the MNIST handwritten digits dataset and achieved 98% accuracy.

Member, Caltech Air and Outer Space (CAOS)   Sep. 2023 - present

Designed a motor controller breakout PCB for the CRATER rover project in Altium Designer. Used signal multiplexing and ADC to facilitate communications between the motors, drivers, and a Raspberry Pi over I2C.

Independent Research, Dynamics Analysis of Rebounding Irregular Objects   Apr. 2022 - Sep. 2022

Developed theory based on a mass-spring model to characterize the effects of initial vertical speed, angular speed, surface characteristics, and impact angle on the rebounding behavior of irregular objects. Designed and constructed an electromagnet experiment apparatus. Programmed a video processing utility using Python and the OpenCV library to automate kinematics data analysis for over three hundred videos.

Independent Project, Acceleration-based Braking Lights   Jul. 2023 - present

Designed braking lights that vary in brightness depending on the vehicle's deceleration. Coded an MPU 6050 accelerometer/gyroscope and an Arduino in C++ to detect vehicle deceleration and integrate vehicle attitude changes to automatically calibrate for gravity.

Programming Lead, FIRST Robotics Contest, Team 7591   May. 2021 - Jul. 2022

Coded and assembled a 4-wheel swerve drive for the competition using vector algebra and PID control in Java. Integrated an Arduino-based collision warning and aversion system with ultrasonic sensors in C++.