Davidson Institute
Fellows Scholarship

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BAY AREA TEENS AWARDED $135,000 IN SCHOLARSHIPS FOR ACHIEVEMENTS IN SCIENTIFIC AND MATHEMATICS RESEARCH

Samuel Yuan to be Awarded $50,000 Laureate Scholarship

Jingjing Liang, Michelle Wei, Vince Wu Each to be Awarded $25,000 Scholarships

Linus Tang to be Awarded $10,000 Scholarship

San Francisco – The Davidson Fellows Scholarship Program has announced the 2024 scholarship winners. Among the honorees are Samuel Yuan, 16, of Sunnyvale; Jingjing Liang, 16, of Cupertino; Michelle Wei, 18, of Saratoga; Vince Wu, 16, of Palo Alto; and Linus Tang, 18, of San Jose. Only 20 students across the country are recognized as 2024 scholarship winners.

"To me, being a Davidson Fellow means joining a group of students who are intently dedicated to their passions, whether it be science, engineering, or music—it gives me confidence to pursue my passions for science even further," said Samuel Yuan. "I will be forever grateful for the generous support the Davidson Institute has provided me to pursue higher education and my passion for science."

For his project, Samuel Yuan used computational physics and generative machine learning to discover new hypothetical superconductors. Superconductors, known for zero resistivity and perfect diamagnetism at low temperatures, have potential applications in power transmission and quantum computing. Due to the difficulty in systematically finding high-temperature superconductors, he employed machine learning models similar to those used in image generation, such as DALL-E 2, to create more than 2 million new hypothetical superconductors, potentially speeding up the discovery of room-temperature superconductors.

For her project, Jingjing Liang developed NeuroHAT, a low-cost, wearable system aimed at democratizing brain wellness monitoring by detecting brain dysfunctions before symptoms appear. The system consists of a miniaturized helmet optimized for comfort and data collection, gathering concurrent EEG and fNIRs (functional near-infrared spectroscopy) signals. Utilizing a human-centered AI-driven technology (HAT) principle, NeuroHAT incorporates cross-inform algorithms and machine learning models to preprocess data and enhance detection accuracy. This innovation addresses the limitations of current brain imaging methods, which are costly and typically used only after symptoms manifest, aiming to prevent life-threatening conditions like strokes and Alzheimer's disease earlier.

For her research, Michelle Wei designed a second-order cone programming (SOCP) algorithm and mathematically proved a bound on its worst-case runtime for her research. SOCP is a crucial class of problems in mathematical optimization, used to optimize linear objective

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functions under specific constraints, with broad applications in industries like energy, transportation, and finance. Her work focuses on enhancing the efficiency of SOCP solutions by creating an algorithm that performs faster and has a provable limit on the maximum time it would take in the worst-case scenario.

For his project, Vince Wu developed a predictive model of honey bee foraging activity based on weather data collected across different seasons, supporting precision farming techniques. By continuously tracking honey bee foraging behavior and climate conditions in his backyard during the summer, fall, and spring, he observed that honey bees lower their weather criteria for foraging after a day of poor conditions. He also found that weather impacts foraging time more than the number of foraging trips, suggesting that foraging time is a better metric for future studies.

For his project, Linus Tang focused on online learning, a type of machine learning where predictions are made from a continuous stream of data. He explored how to adapt online learning models to function effectively even under adverse conditions where the feedback provided to the learner is weaker. By studying various scenarios, he developed methods to modify standard algorithms for these challenging conditions and quantified the difficulty of learning based on the worst-case number of incorrect predictions. This research has applications in areas like weather modeling and social media content recommendation.

"This year's class of Davidson Fellows Scholarship recipients exemplifies the power of innovation and perseverance," said Bob Davidson, founder of the Davidson Institute. "Our Fellows continue to push the boundaries of their educational and research pursuits, striving to solve some of the world's most challenging problems by leveraging creative, outside-the-box thinking and cutting-edge technology to expand their networks, access new sources of information, and deliver an impressive array of diverse projects."

The 2024 Davidson Fellows will be honored during a reception at the Smithsonian National Museum of the American Indian in Washington, D.C. and with a virtual project presentation ceremony in September 2024.

The Davidson Fellows Scholarship program offers $50,000, $25,000 and $10,000 college scholarships to students 18 or younger, who have completed significant projects that have the potential to benefit society in the fields of science, technology, engineering, mathematics, literature and music. The Davidson Fellows Scholarship has provided more than $9.9 million in scholarship funds to 448 students since its inception in 2001, and has been named one of the most prestigious undergraduate scholarships by *U.S. News & World Report*. It is a program of the Davidson Institute, a national nonprofit organization headquartered in Reno, Nev. that supports profoundly gifted youth.

About the Davidson Institute

Founded by Bob Davidson in 1999, the Davidson Institute recognizes, nurtures and supports profoundly intelligent young people, and provides opportunities for them to develop their talents to make a positive difference. The Institute offers support through a number of programs and services, including the Davidson Fellows Scholarship and the Davidson Academy of Nevada. For more information about the 2024 Davidson Fellows, please visit: DavidsonFellows.org.

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High-resolution photos are available at
DavidsonFellows.org