Welcome from Sandra Meditch, SCVSEFA Board President

Hello and Welcome to the Virtual 2022 Synopsys Championship. This has been another year of challenges for everyone and with challenges comes opportunities. The Covid-19 virus has provided interesting opportunities for discovery in many facets of our lives and our world. We have seen how it has evolved over the last year. We have also seen how we humans evolve and adapt to this changing environment. We are reaching out and connecting with others in fun and different ways. New technology is being developed to help us do this, what new technology have you learned about in the last year and how have you applied it? Science is about discovery. What have we discovered about ourselves? With each challenge, we discover and learn about ourselves and our world, that is the beauty of science.

I want to thank our major sponsor, the Synopsys Outreach Foundation, and our many donors and sponsors for their support. My thank you goes to those hard working teachers who have been asked to do so much during this challenging year and still be there for their students. To the parents and family members, providing the encouragement and support these budding scientists and engineers need. This event would not be possible without our judges, stepping up for another year of virtual interviews, we thank you. Finally, the Board of Directors and our staff, these extraordinary people have pulled together another virtual event.

2021 A Year of Scientific Breakthroughs & Learning

While the year started as a continuation of the COVID-19 pandemic and climate change, scientists stepped up to the challenge and marked new advances in medicine, climate science and astronomy. New developments and the distribution of three coronavirus vaccines, the Pfizer-BioNTech, Moderna mRNA and Johnson & Johnson's Janssen vaccine, were able to help reduce transmission rates and minimize the severity of the illness. Scientists also learned about climate change and met up at the United Nations UN Climate Change Conference in Glasgow to take steps to minimize greenhouse gases and to reduce carbon emissions.

NASA's fifth Mars rover, the Perseverance, landed on the 'red planet' and will be searching for signs of microbial life in sediment along the dry, 28 mile-wide valley known as the Jezero Crater. And NASA also flew it's four-pound helicopter named Ingenuity around Mars to map Mars' terrain.

To cap off the end of the year, NASA launched the James Webb Space Telescope (JWST) from French Guinea on Christmas Day. The largest and most powerful telescope ever constructed, housing a 21.3-foot-wide mirror comprised of 18 gold-plated hexagonal segments, the JWST will travel over a million miles and is able to observe a part of space and time never studied before, when galaxies formed over 13.5 billion years ago.

Mission Name: JWST
the 'Transformer Telescope'
Main Job: Observe the first galaxies, study the birth of stars and planets, look for exoplanets potential for life
Primary Mirror: 21.3 ft-wide, hexagonal gold-plated
Launch: December 25, 2021

The James Webb Space Telescope is an orbiting infrared (IR) observatory that complements and extends the discoveries of the Hubble Space Telescope, with longer wavelength coverage and improved sensitivity. The longer wavelengths enable Webb to look closer to the beginning of time and to hunt for formation of the first galaxies, as well as to look inside dust clouds where stars and planetary systems are forming today.
Congratulations to the 2021 Winners!
Which Path Will You Take? Science Research or Engineering?

For a science fair competition, your project will fall into a research or engineering category. Following the Scientific Method or the Engineering Design Process enables you to learn about researching or designing a project from beginning to end. Learning these project based skills will help you in college and beyond!

Our mission is to awaken more students to the wonder and power of science, technology, engineering and mathematics (STEM).
Special Awards and Sponsors of Special Awards

AI Foster Award
American Association for Laboratory Animal Science, N. California
American Chemical Society, Silicon Valley Chapter (SVACS)
American Institute of Aeronautics and Astronautics (AIAA)
Intelligent Systems Award
American Society of Civil Engineers San Jose Branch
American Society of Engineers of Indian Origin (ASEI)
A Society for Materials International (ASM), Santa Clara Valley
ASM Materials Education Foundation
Association for Computing Machinery (ACM)
SF Bay Area Chapter
Association of Women Geoscientists, SF Bay Area Chapter
Broadcom Coding with Commitment
Broadcom MASTERS
Bruce Kawanami Engineering Award
California Association of Professional Scientists (CAPS)
California Botanical Society
Dave Parker Award
Excellence in Computer Science Award
IBM Award
Institute of Electrical and Electronics Engineers (IEEE)
Northern California Institute of Food Technologists
Office of Naval Research
U.S. Navy / U.S. Marine Corps
Regeneron Biomedical Science Award
SAMPE- Society for the Advancement of Material, Process Engineering
Santa Clara Valley Science & Engineering Fair Association - Board of Directors Awards - High School
Santa Clara Valley Science & Engineering Fair Association Board of Directors Award - Middle School
SETI Institute
SPV Market Researchers
Valley Water
Wireless Communications Alliance
Yale Science and Engineering Association
Zeidman Award

Santa Clara Valley Science & Engineering Fair Association (SCVSEFA)

Officers:
President: Sandra Meditch
President-Elect: Heidi Black
Treasurer: Anjaney Kottapalli
Secretary: Praveen Krishna

Board Members:
Ann Burrell, Ph.D., Aparna Sayana, Aulena Chaudhuri, Ph.D., Antonio Gallo, Ph.D., Donna Richardson, Forrest Williams, Heidi Black, John Turner, June Andersen, Ph.D., Kerry Veenstra, Larke Reeber, Lynn Liebschutz, Moenes Iskarous, Ph.D., Praveen Krishna, Sandi Yellenberg, M.A., Srinivas Rao, Ph.D., Vanessa Burbach, Veena Jain, Xi Zhao-Wilson, Ph.D.


Newsletter: Donna Richardson
Staff: Yamel Valdez, Jessica Benak

www.science-fair.org
Friends and family of Robby Beyers have made a generous donation to the Santa Clara Valley Science and Engineering Association (SCVEFA) in his memory. A portion of the donation will be used to fund an annual Robby Beyers Innovation Award. The award will be given to the eight best high school projects that present a practical solution to a scientific or technological problem.

Robby was a long-time supporter of SCVEFA donating both time and money to the fair each year. His generosity to SCVSEFA was just one example of his great, sharing personality.

Robby was born in Ann Arbor, Michigan, in 1958, grew up in the suburbs of Washington, DC and earned his BS, MS, and PhD ('80, '82, '89) from Stanford University in Materials Science. His early career was as a material scientist at the IBM Almaden Research Center, where he had several major achievements, including co-inventing single-walled carbon nanotubes and developing techniques used throughout the semi-conductor industry. He then changed careers, earning both a JD and MBA ('00, '01) from Santa Clara University and becoming a distinguished patent attorney. He authored hundreds of patents, including the Apple iPhone’s user interface.

All the while he was pursuing his studies and career, he also was the unofficial photographer for the Stanford Marching Band, an active mentor for Santa Clara Law students interested in pursuing careers in patent law, and wrote a self-help book. When he was diagnosed with Amyotrophic Lateral Sclerosis (ALS), he allowed doctors at UCSF to operate on his brain as part of a project trying to translate brainwaves into direct communication. For those of us fortunate enough to know him, he was one of the nicest people.

According to a family member, Robby had three goals in life “1. Make good use of your time, 2. Be loyal to the principles and people that matter to you and 3. Leave it better than you found it.”

His presence and guidance will be missed.

My name is Eesha Khare and the Synopsys Science Fair was a critical part of my trajectory into science and engineering research over the past 10 years. I participated at the Synopsys Science Fair from my freshman to senior year in 2009 - 2013, while I was a student at Lynbrook High School in San Jose. My very first science fair project was about studying the effect of various toxins on the microstructure of plant leaves. My science partner and I exposed plants to various chemicals, cross sectioned them with a razor in our backyard, and then brought them to school to look at the structures under an optical microscope after staining. This freshman year project and first exposure to Synopsys cemented my desire to develop and carry out challenging STEM projects, present and answer questions about my work, and most importantly, keep participating in this enriching and supportive community. From this initial freshman year leaf project to my senior year research work on supercapacitors for energy storage, I was propelled into a world of science, research, biology, and materials that ultimately inspired my current work. I continued to participate in science fairs through the remaining years of high school, had the opportunity to attend the CA State Fairs and Intel ISEF, and was even lucky enough to be named the CA State Project of the Year winner, the top Young Scientist Award at Intel ISEF, and Forbes 30 under 30 in Energy.

After high school, I attended Harvard University where I studied Bioengineering and Chemistry and was able to engage in the excitement of the many opportunities the University had to offer. From pursuing research at the University’s research labs in bioengineering and materials science, to interning at QuantumScape energy storage company, to building a snow-melting hydrogel for one of my engineering design classes, I had the opportunity to learn from experts to develop new and interesting independent questions at the forefront of research. I was also lucky to complement this scientific background with experiences in fields that are just as critical to the development and translation of STEM ideas. I worked at the Harvard Kennedy School’s Institute of Politics and California Energy Commission to better understand the role policies play in promoting STEM tech. I also engaged in dance and arts at the college, teaching dance for all four years for the annual Ghungroo showcase. These experiences outside of sciences encouraged me to pursue an MPhil at the University of Cambridge Trinity College in History and Philosophy of Sciences, to learn more about why we do science the way we do it now and how historical factors affect this research work.

I’m now a PhD Candidate in Materials Science and Engineering at MIT where I research bioinspired self-healing materials. I have a lot of fun modeling and experimenting with a special type of bonds, called metal-coordination bonds, to design new proteins and polymers with controlled mechanical properties at research labs in MIT, Tufts, and the Max Planck Institute in Postdam, Germany. During my time at MIT, I’ve also been involved in diversity, equity, and inclusion initiatives, entrepreneurial activities, and have even taken up a new form of dance flamenco! I look forward to continuing exploring science and engineering topics in materials science and energy, and finding new and creative ways to develop, translate, and apply those topics. Happy to welcome more Synopsys Science Fair students into this research community. Happy researching!
We gratefully acknowledge those who support the Synopsys Championship and thank those who support STEM education by allowing their employees time to volunteer at the event. Thanks to the students, parents, teachers, mentors, schools and for making the Synopsys Silicon Valley Science & Technology Championship a premier event.

**Major Sponsors** ($75,000+ annually)
The Synopsys Outreach Foundation

**Benefactors** ($10,000+ annually)
Broadcom Foundation
Robby Beyers Family, in memory of Robby Beyers
Pat Castro, in memory of Peter S. Castro

The Santa Clara Valley Science and Engineering Fair Association needs your support to continue the Championship. Although the Synopsys Outreach Foundation’s donation covers over 40% of our costs, IRS regulations requires at least one third funding from small donations (project registration fees, interest, and t-shirt sales do not count). Here is where you can help. If you think the Synopsys Championship is a worthwhile event, please consider donating. We prefer checks written directly to SCVSEFA because we receive 100% of the donation. You can also donate via our website via PayPal, which charges a fee per transaction. As a 501(c)3 non-profit, donations are tax deductible. Please send checks to: SCVSEFA, Treasurer, PO Box 307, Los Altos, CA 94023-0307.

If you are a volunteer or donor and work for a company that does matching, please take a minute to fill out the company form for hours you worked or any donations you made. If SCVSEFA is not already in your company’s list of qualified organizations for matching, contact us at treasurer@science-fair.org.