

**2015 SIEMENS COMPETITION IN MATH, SCIENCE & TECHNOLOGY  
National Finalists**

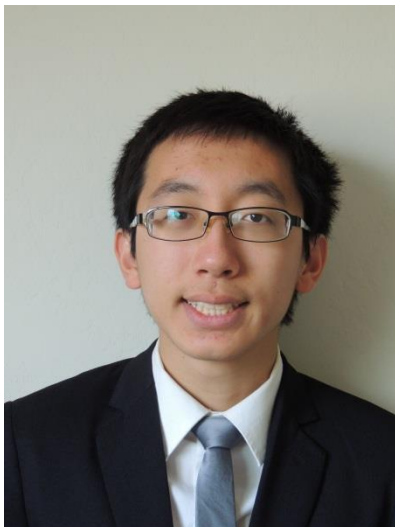
**Individual Winners:**

- [Andrew Chen](#) (Fremont, Calif.)
- [Maria Grimmitt](#) (Jupiter, Fla.)
- [Milind Jagota](#) (Bethlehem, Pa.)
- [Vikas Maturi](#) (Carmel, Ind.)
- [Sanjana Rane](#) (Prospect, Ky.)
- [Dominick Rowan](#) (Armonk, N.Y.)

**Team Winners:**

- [Daniel Chae](#) (Oakton, Va.), [Sidharth Bommakanti](#) (Pleasanton, Calif.) and [Alan Tan](#) (Fremont, Calif.)
- [Emily Cheng](#) (Lansdale, Pa.), [Kelly Jiang](#) (Wayne, Pa.) and [Gerald Liu](#) (Audubon, Pa.)
- [Robert Luo](#) and [Helen Zhang](#) (Dallas)
- [Evelyn McChesney](#) (Golden Valley, Minn.) and [Madeline McCue](#) (Minneapolis)
- [Kimberly Te](#) and [Christine Yoo](#) (Manhasset, N.Y.)
- [David Zhu](#) (Saratoga, Calif.) and [Evani Radiya-Dixit](#) (San Jose, Calif.)

**2015 SIEMENS COMPETITION IN MATH, SCIENCE & TECHNOLOGY**  
**National Finalists – Individual Winners**



**NAME: ANDREW CHEN**

**SCHOOL:** Mission San Jose High School, Fremont, Calif.

**YEAR:** Senior

**HOMETOWN:** Fremont, Calif.

**PROJECT:** Enhancing Imaging Resolution and Depth With Adaptive Optics Focal Modulation Two-Photon Microscopy

**FIELD:** Engineering

**MENTOR:** Dr. Xiaodong Tao, University of California, Santa Cruz, W. M. Keck Center for Adaptive Optical Microscopy

*“With my project, the world can observe the dynamic interactions of live biological tissues and make improvements to medicine and biology.”*

Andrew decided to focus his scientific research on vision and eye care because, as a glasses wearer, he understands just how important sight is to our daily existence. When faced with the prospect of losing his own vision, he decided to search for ways to improve imaging and the visualization of fine structures within biological samples. Andrew was able to develop a new way to carry out *in vivo* microscopy to better see the fine structures in deep tissue. He hopes that this research will help doctors and biologists to diagnose and treat deadly diseases like Alzheimer’s or cancer.

Andrew hopes to combine science and entrepreneurship to develop technologies that can positively impact the world. His childhood hero was James Bond because he admired the way that the agent was able to do the impossible through use of powerful devices.

As president of his high school’s Physics Club, Andrew is able to pursue his interest in STEM through a number of competitions. He likes physics because it helps to show the connections between different phenomena and forms the basis for most technologies. Andrew also founded the Emerald Ensemble, a volunteer band, and plays the trumpet and piano.



**NAME:** MARIA ELENA GRIMMETT

**SCHOOL:** Oxbridge Academy of the Palm Beaches, West Palm Beach, Fla.

**YEAR:** Senior

**HOMETOWN:** Jupiter, Fla.

**PROJECT:** Adsorption of Sulfamethazine from Environmentally Relevant Aqueous Matrices onto Hypercrosslinked Adsorbent MN250

**FIELD:** Environmental Science

**MENTOR:** Dr. Hui Li, Associate Professor of Environmental and Soil Chemistry, Michigan State University

*“For me, science has always been about the excitement of discovering something new.”*

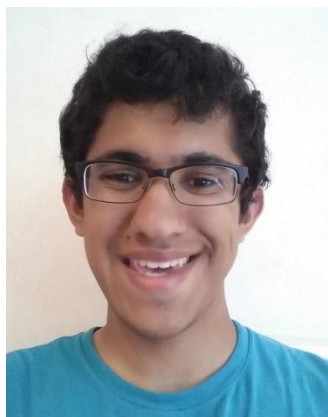
Maria Elena Grimmert’s research found a new method to remove sulfamethazine from water using small plastic beads. Sulfamethazine is the most commonly used veterinary antibiotic to promote both the health and growth of livestock. However, the antibiotic commonly contaminates surface and groundwater, enters the human food chain, and causes both soil and aquatic ecosystem damage. Maria Elena’s beads can be reused, applied at scale, and implemented using delivery systems already in place for treating drinking water.

Maria Elena first became interested in her topic because she wanted to know why her well water was brown. That year, she performed a science project on removing fulvic and humic acids, or color, from water, using three different anion exchange resins. She presented this research at the 2009 Palm Beach County Science Fair where she saw another student’s project describing pharmaceutical contamination of the Florida Everglades, which steered her to her current research on sulfamethazine.

Maria Elena anticipates majoring in engineering in college, and her favorite course right now is computer science. She is also a member of her school’s weekly Computer Science Club. Maria Elena believes computer modeling and programming skills will prove useful in any scientific or engineering discipline.

Outside of the classroom, Maria Elena is a mural artist and Art Club teacher’s assistant at the Weiss Elementary School. In this capacity, she paints murals in the school hallways and helps students with art projects. She also plays clarinet and is a member of her school’s fencing club. In January 2013, she became the youngest author to publish original research in the 43-year history of the Journal of Environmental Quality.

Maria Elena believes that in order to encourage more students to pursue STEM, elementary school science teachers need to make science fun and hands-on.



**NAME:** MILIND JAGOTA

**SCHOOL:** Liberty High School, Bethlehem, Pa.

**YEAR:** Senior

**HOMETOWN:** Bethlehem, Pa.

**PROJECT:** Computational Study of Random Nanowire Networks:  
Optimization of Conductivity through Orientation

**FIELD:** Materials Science

**MENTORS:** Dr. Nelson Tansu, Daniel E. '39 and Patricia M. Smith Endowed  
Chair Professor; Director, Center for Photonics and Nanoelectronics (CPN),  
Lehigh University

*“As I saw smartphones and tablets becoming ubiquitous in daily life, I began to wonder about the touch screen technology that made them possible.”*

Milind Jagota’s project identifies a way to increase the performance of an electronic material. The material could be used in electronic devices from solar panels to smartphones, and increasing its performance can foster innovation in those areas. As he saw smartphones and tablets becoming ubiquitous in daily life, Milind began to wonder about the “magic” behind the touch screen technology that made them possible. His research made apparent the critical role of transparent conductors in touchscreens and their broader use case scenarios.

Far more advanced than his early memories of rock candy crystal experiments, Milind pursued this project because he has a passion for electronics and the potential for Indium Tin Oxide to have a broad societal impact. His favorite subjects in school are physics and computer science. Milind’s favorite part about STEM is the interdisciplinary exchange of ideas between historically distinct fields.

Milind aspires to be an electronics engineer and is interested in both consumer electronics and medical technology. To date, his proudest accomplishments are publishing this research project in the Nature Publishing Group’s Scientific Reports Journal, as well as participating in the Pennsylvania Governor’s School for the Sciences. Milind anticipates majoring in engineering physics or electrical engineering in college. He is interested in attending Stanford University, the Massachusetts Institute of Technology, Cornell University, the University of Pennsylvania, Princeton University, Columbia University, Northwestern University or Lehigh University.

Outside of the classroom, Milind plays varsity tennis, volunteers at the DaVinci Science Center and is a member of the Liberty High School Marching Band. If he could meet any historical figure, it would be Aristotle because of the philosopher’s far-reaching interdisciplinary impact on ideas even into the 21st century.



**NAME:** VIKAS MATURI

**SCHOOL:** Carmel Senior High School, Carmel, Ind.

**YEAR:** Senior

**HOMETOWN:** Carmel, Ind.

**PROJECT:** Engineered Intraocular Injection Guide (IIG): Pain Reduction in Ophthalmic Disease Treatment

**FIELD:** Engineering

**MENTOR:** Dr. Kimberly Vogt, Professor of Biology, Marian University

*“I developed a device that significantly reduces pain during the treatment of major eye diseases.”*

While Vikas Maturi worked a summer job at an eye disease treatment center near his home, he became motivated to develop a product that could reduce or eliminate pain from pre-injection procedures for ophthalmic patients.

Vikas Maturi aspires to be a social designer or design engineer and anticipates majoring in product design and/or biomechanical engineering in college. Vikas is especially inspired by the growing incorporation of engineering in the social design world. Vikas loves his Engineering Design and Development class. The course is a seniors-only team-based capstone project where students design and prototype a product that solves a distinct community need. Currently, Vikas and his partner are modeling and prototyping a product that captures, redirects and filters flood water in developing countries. Vikas especially likes that this project-based subject provides him with an opportunity to utilize his own strengths in product design while teaching others and creating a product that can truly benefit society.

Outside of the classroom, Vikas enjoys playing soccer and piano, and also serves president for TechHOUNDS Robotics, for which he lead a 140-person team and implemented STEM outreach initiatives. If he could talk to any person from history, it would be Leonardo Da Vinci because of his appetite to know every aspect of the world – from technology to art.



**NAME:** SANJANA RANE

**SCHOOL:** duPont Manual High School, Louisville, Ky.

**YEAR:** Senior

**HOMETOWN:** Prospect, Ky.

**PROJECT:** Effects of the Environmental Pollutant Acrolein on Renal Fibrosis

**FIELD:** Biochemistry

**MENTOR:** Shunying Jin; Research Associate; University of Louisville

*"I discovered a novel role of a protein that could be potentially used to detect, as well as treat renal fibrosis preventing progression to end-stage renal disease, which is the incurable total failure of the kidneys."*

Sanjana Rane's research has helped discover how a particular protein could be used to detect and treat renal fibrosis. This discovery helps to prevent renal fibrosis from developing into end-stage renal disease, an incurable total failure of the kidneys.

Sanjana first became interested in pursuing medical research when she read a *USA Today* study ranking Louisville, her hometown, as having some of the worst air quality in the United States. She began to look into the dangers of air pollution and learned about the chemical acrolein, which is found in both cigarette and industrial smoke and can cause kidney damage. As Sanjana delved more into the research, she began to focus on how to shift the chemical's influence on the kidneys through using a particular protein as a therapeutic target.

Looking forward in her career, Sanjana is interested in pursuing medicine. In particular, Sanjana would like to practice regenerative medicine to explore how to use stem cells to treat diseases like cancer, multiple sclerosis and ALS.

Beyond academics, Sanjana is the starting outside back for her high school's soccer team. She also mentors kindergarteners at a local elementary school.



**NAME: DOMINICK ROWAN**

**SCHOOL:** Byram Hills High School, Armonk, N.Y.

**YEAR:** Senior

**HOMETOWN:** Armonk, N.Y.

**PROJECT:** Determining the frequency of Jupiter analogs & the announcement of a Jupiter analog orbiting a Sun-like star

**FIELD:** Physics

**MENTOR:** Dr. Stefano Meschiari, University of Texas at Austin; Mr. David Keith Director of Science Research, Mr. James Gulick Science Research Teacher, Mrs. Stephanie Greenwald Science Research Teacher, Mrs. Megan Salomone English Teacher, Byram Hills High School

*“Having never learned a programming language, developing the skillset to devise my own approach to problems was a challenging, yet rewarding experience.”*

Dominick found his passion for exoplanet detection in an article he read in *Scientific American*. He became fascinated with other worlds and wanted to explore the topic further. For Dominick’s project he detected a new Jupiter-like planet and calculated how many stars host a Jupiter-like planet. His discovery allows the world to evaluate the commonality of the Solar System.

In total, Dominick has taken nine STEM courses in high school. He enjoys the problem solving and independently developing ways to approach problems that STEM courses allow. He is a Cum Laude Society member, the Vice President of a volunteer club and has received the Byram Hills High School Junior Science Research Award.

Dominick plays a variety of instruments: the French horn, piano, guitar and bass guitar. He is also a member of his high school’s track team, running in both the winter and spring seasons. Dominick aspires to be a scientific researcher and would enjoy speaking with Johannes Kepler because he created integration between the studies of Astronomy and Physics.



**2015 SIEMENS COMPETITION IN MATH, SCIENCE & TECHNOLOGY**  
**National Finalists – Team Winners**

**DANIEL CHAE**, Thomas Jefferson High School for Science and Technology, Alexandria, Va.

**ALAN TAN**, Irvington High School, Fremont, Calif.

**SIDHARTH “SID” BOMMAKANTI**, Amador Valley High School, Pleasanton, Calif.

**PROJECT:** A Novel Study on the Effect of Surface Topography of 3-D Printed PLA Scaffolds on Dental Pulp Stem Cell Proliferation and Differentiation in vitro.

**FIELD:** Materials Science

**MENTOR:** Dr. Adriana Pinkas-Sarafova, Adjunct Assistant Professor, Stony Brook University

*“With [our] project, the world can have more cost-effective and improved bone implants.”*

Daniel Chae, Alan Tan and Sidarth Bommakanti’s research project, assesses 3-D printed structures as an alternative to plating dental pulp stem cells (DPSCs) for use as implants. The team found that DPSCs are able to differentiate substantially more on 3-D prints than on currently used structures, suggesting that 3-D printed structures could be a cheaper and better alternative for bone or dental implants. The team was able to convert the challenge of having two different kinds of 3-D printers in the lab into an opportunity by comparing the structures from the two printers, which helped draw conclusions about the reproducibility of 3-D printers.

A common interest in the rapid rise of 3-D printing applications and the potential for stem cells to dramatically evolve the medical field inspired the team to pursue this research.



**DANIEL CHAE**

**YEAR:** Senior

**HOMETOWN:** Oakton, Va.

Daniel’s favorite subject in school is math because of its variety and depth. He first got excited about mathematics in 6th grade, when he began to get involved in his school’s MathCounts team. In college, he anticipates to channel this passion as a biology or chemical engineering major. He ultimately aspires to be a physician.

Daniel’s interdisciplinary mind has led him to pursue a wide range of interests, as he currently serves as the co-president of his school’s Latin Honor Society, is proficient in Korean and also enjoys archery. After school, Daniel serves as the chemistry and biology tutor for students. He believes that if there were to



be a dramatic advancement of society using discoveries in science, then more people would become engaged in science and math.

Daniel's role model is American scientist Linus Pauling, and if he could speak with any person in history, it would be Roman poet Vergil.



**SIDHARTH "SID" BOMMAKANTI**

**YEAR:** Senior

**HOMETOWN:** Pleasanton, Calif.

Sidharth Bommakanti wants to pursue a career in medicine. His interest in the field has been fueled by his passion for biology, and the potential for biological science to impact lives. Similarly, Sidharth also tutors underclassmen in chemistry and biology. He anticipates majoring in molecular and cellular biology.

Sidharth's inspiration comes from a number of sources – his sister's success in a local science fair in middle school originally motivated him to pursue STEM subjects. Her later pursuits in medicine also inspired Sidharth to take an interest in pursuing a future in medicine. One of his earliest STEM memories was when he won first place in Science Olympiad as a 6th grader. His proudest accomplishments to date are a 4th place finish at the California State Science Fair and a 3rd place finish at the International Career Development Conference.

Outside of school, Sidharth participates in Project Wellness Water, a dual filtration system that purifies contaminated water in rural communities. He also serves as Vice President of his school's Environmental Club, and volunteers at Valley Care Hospital.

In his free time Sidharth enjoys tennis and basketball. And though he is a Californian, his favorite player is Dallas Maverick's all-timer Dirk Nowitzki, known for his cool on the court and smooth shot.



**ALAN TAN**

**YEAR:** Senior

**HOMETOWN:** Fremont, Calif.

Alan Tan aspires to be a medical researcher. More specifically, what interested him in his current area of research is the potential for dental pulp stem cells (DSPCs) to circumvent ethical concerns about using stem cells for research. He soon found himself engrossed in the subject, learning that DSPCs are a source of stem cells that could be very useful in the regeneration of various body parts, including bones.

Outside of the classroom, Alan has been recognized for his volunteer service – earning a Presidential Service Award. He is also a mentor in STEM subjects at school, serves as Vice President of his school’s science club, plays the piano, and likes to shoot hoops

Alan anticipates majoring in either chemistry or biochemistry in college. If he could talk to any figure in history, Alan would love to speak with Isaac Newton, the father of early physics and calculus.

**EMILY CHENG**, Methacton High School, Eagleville, Pa.

**KELLY JIANG**, Conestoga High School, Berwyn, Pa.

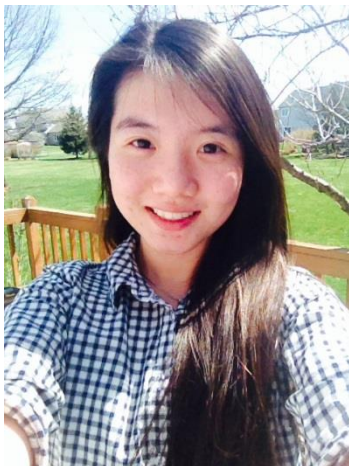
**GERALD LIU**, Methacton High School, Eagleville, Pa.

**PROJECT:** "Simultaneous Detection of Genetic and Epigenetic DNA Modifications by Targeted Next Generation Sequencing for Cancer Screening--Assay and Data Analysis Software Development for the Detection of Hepatocellular Carcinoma"

**MENTOR:** Ying-Hsiu Su, Principal Scientist, Blumberg Institute

*"Our team developed a panel that includes DNA modifications for liver cancer, in addition to creating novel software that bypasses the data analysis bottleneck in next generation sequencing."*

Emily, Kelly, and Gerald developed a panel of genetic and epigenetic DNA markers for the early detection of Hepatocellular Carcinoma, or cancer of the liver, and also created software to analyze the data to create accurate and specific diagnoses that bypasses the pre-existing data analysis bottleneck in next generation sequencing. With their project, the team looks to one day develop a panel to effectively screen for cancer in the early stages and prevent it from becoming life threatening for the many people affected around the world.



**EMILY CHENG**

**YEAR:** Junior

**HOMETOWN:** Lansdale, Pa.

Emily began participating in school science fairs after her mother convinced her in kindergarten, and has participated every year since. Emily's project inspiration came when a close family friend was diagnosed with Stage 4 liver cancer and passed away due to late detection. From there, Emily was determined to find ways to detect cancer early on and to identify other preventative measures. She was also inspired by previous Siemens competition national finalist Benjamin Song, who worked in the same lab as her.

Emily is a member of the National Honors Society and president of the French Club and Academic Decathlon Club. She also enjoys history and geography and learning about ancestry and human evolution, finding it important to understand different cultures, religions, and ethnicities. Outside the classroom, Emily is very involved in her church, plays piano for nursing homes in her free time, and enjoys playing tennis and soccer. Emily's career aspiration is to become an obstetrician.



**KELLY JIANG**  
**YEAR:** Junior  
**HOMETOWN:** Wayne, Pa.

With this project, Kelly hopes to develop a way to detect cancer in the early stages and save lives through prevention. Kelly was inspired to study this area of research while working in her lab and observing a lack of successful methods to ensure the early detection of colon and liver cancer accurately and efficiently.

Kelly's favorite subject in school is history because she loves learning about how human interactions have changed over time and how it affects the world today. She also enjoys biology and chemistry because of the freedom and hands-on experience gained from her lab work. Kelly belongs to the National Honor Society and National Art Honor Society. Outside the classroom, Kelly is a varsity runner on her school cross country and track teams. One of her proudest moments was winning a cross country race. Kelly aspires to be a pediatrician.



**GERALD LIU**  
**YEAR:** Junior  
**HOMETOWN:** Audubon, Pa.

Gerald plays a vital role to the team with his background in bioinformatics and ability to efficiently analyze data. He was eager to pursue this project because it fit his interests revolving around biology

and computers. Gerald was inspired by Ben Song and Jack Chen, former Siemens competition finalists, who work in the same lab as his team.

Like his teammates, Gerald's favorite subject in school is history. He enjoys reading about the past and sometimes finds it silly and entertaining. His earliest memories that piqued an interest in STEM were simple chemistry experiments he conducted at home as a kid. Gerald plans to apply to MIT, Stanford, Carnegie Mellon, and other universities as he gears up for his senior year. Gerald's hero is Bill Gates and if he could meet any person in history, he would meet Aristotle to listen to him lecture and learn about the views of science and philosophy at the time.

Outside the classroom, Gerald likes to cook and play the violin and has played for the Philadelphia Sinfonia Players. At the 2008 Summer Olympics in Beijing, Michael Jordan sat behind Gerald and his family during a soccer match between Brazil and Argentina.

**ROBERT LUO**, Highland Park High School, Dallas

**HELEN ZHANG**, Highland Park High School, Dallas

**PROJECT:** A Novel Therapy for the Treatment of Acute Myeloid Leukemia

**FIELD:** Biology

**MENTOR:** Dr. Mi Deng, Instructor, UT Southwestern Medical Center

*"...students should be exposed to a professional science setting early in their development."*

Robert and Helen's research identified a new potential target for the treatment of acute myeloid leukemia. The combination of family experiences with cancer and the science of the topic piqued the team's interest in this project. With this project, the world can come one step closer to solving the global problem of leukemia.



**ROBERT LUO**

**YEAR:** Junior

**HOMETOWN:** Dallas

It took Robert some time to get used to working with live mice in the lab, but after a few weeks, the nervousness went away and he was able to have a little more fun conducting his research! Robert's interest in stem cells was a major influence in the pursuit of this research, as well as his first-year and sophomore year biology teachers. Robert's father, a cardiologist, also helped pique his interest in STEM.

Outside of the lab, Robert participates in Academic Decathlon, tutors underserved children and plays violin in the Dallas Asian American Youth Orchestra (DAAYO). His very first science project was my 8th grade science fair, which sought to determine the effect of different antibiotics and disinfectants on bacterial growth through zones of inhibition.

Robert aspires to be either a physician, computational chemist or a software engineer at a company like Google and he anticipates majoring in chemistry, biology and/or computer science. If he could talk to anyone in history, Robert would sit down with Isaac Newton because of his influence on physics and mathematics, which still holds weight today.



**HELEN ZHANG**

**YEAR:** Senior

**HOMETOWN:** Dallas

Helen Zhang anticipates majoring in biology in college and aspires to be a physician-scientist. Her father is a researcher, and he piqued her interest early-on when he discussed the TCGA database and the thorough information it contains regarding gene expression and mortality rates of patients. Helen's interest rose and led her to research any high correlation between the expression of a certain gene and the survivorship rate of cancer patients. She later identified the relationship between LILRB4 expression and AML survivorship rate.

Helen is most proud about becoming a co-author of an article published in *Nature*, as well as achieving ninth place in Policy Debate at the Texas University Interscholastic League State Cross-Examination Debate tournament. She has also been recognized as a National Merit Commended Scholar.

Outside of the lab, Helen co-captains the Highland Park High School Debate Team. She also volunteers at the University of Texas Southwestern Medical Center and participates in taekwondo.

This being said, Helen's favorite school subject is English, because she loves being able to write down her thoughts in their purest form. If she could speak with anyone in history, it would be Alexander Fleming, because he unintentionally discovered a substance that would revolutionize all medicine – she'd ask him about his accomplishment and near-impossible luck.



**EVELYN MCCHESENEY**, Breck School, Golden Valley, Minn.

**MADELINE MCCUE**, Breck School, Golden Valley, Minn.

**PROJECT:** Engineering a broad-spectrum antibacterial probiotic via inclusion of antimicrobial peptide-encoding DNA, year two

**FIELD:** Engineering

**MENTOR:** Ms. Lois Fruen, Science Research Instructor, Breck School; Dr. Yiannis Kaznessis, Department of Chemical Engineering and Materials Science, University of Minnesota

The team of Evelyn and Madeline engineered a genetic system that can be used to turn commonplace bacteria into antibiotics. With this project the world can combat the growing amount of antibiotic-resistant pathogenic bacteria that are causing major problems in global health care.



**EVELYN MCCHESENEY**

**YEAR:** Senior

**HOMETOWN:** Golden Valley, Minn.

*“My favorite thing about STEM is that there is always more to discover. No matter how much we think we know about a topic, we will never know everything, which makes STEM so exciting for me as a career.”*

As a child Evelyn’s interest in science and math was first piqued when she started exploring science museums. She now enjoys taking other students to science museums so they can experience her love for the world of science. Evelyn is a leader on her Robotics Team and Lego League Team.

Evelyn has earned a second-degree black belt in karate, been awarded the Science Department Book Award, and is the Robotics Team captain. She plans to major in Biomedical Engineering and has applied to Johns Hopkins University, Stanford University, Yale University, Case Western University, Northeastern University and the University of Minnesota.

Evelyn looks to her mother as her role model and has always been inspired by her mother’s love for work no matter how stressful it may be. If Evelyn could meet one person in history it would be Rosalind Franklin, a female in the world of STEM who faced many obstacles because of her gender yet still contributed to major discoveries of the molecular structures of DNA and RNA.



**MADELINE MCCUE**

**YEAR:** Senior

**HOMETOWN:** Minneapolis

*"I'm fascinated by genetic engineering! I love the idea of augmenting the natural process of evolution to better suit our rapidly progressing society."*

Coming from a pair of doctor parents, Madeline has been hearing about medical updates around the dinner table for many years. Her father taught her about the basic principles of algebra when she was three and she has been hooked ever since.

Madeline speaks English, Spanish, Italian and Vulcan. She has performed in a circus, enjoys playing the piano and dancing. Madeline thinks of Commander Spock from *Star Trek* as her role model and she would love to meet Alexander the Great.

Aspiring for a career with the United Nations or the U.S. State Department, Madeline plans to major in International Relations and has applied to Harvard University, Stanford University, Yale University, the University of Southern California, Brown University, and the University of California at Los Angeles. Madeline has been previously named a National Merit Scholar Semifinalist and received the First Grand Prize at the Minnesota Academy of Science State Science Fair.

**KIMBERLY TE**, Manhasset Senior High School, Manhasset, N.Y.

**CHRISTINE YOO**, Manhasset Senior High School, Manhasset, N.Y.

**PROJECT:** Natural, Cost-Effective Anodes for Optimized Sediment Microbial Fuel Cells: Engineering a Novel Approach to Harvesting Energy and Cleaning Up Oil Spill Regions

**FIELD:** Engineering

**MENTORS:** Alison Huenger and Peter Guastella, Science Educators, Manhasset High School

*“The device we created helps to clean up oil pollution and create a cleaner energy source to power remote sensors.”*

Kimberly and Christine have engineered a device made of natural, sustainable materials that cleans up oil-polluted areas and uses that otherwise unusable oil to generate clean energy to be used to power remote sensors. Kimberly and Christine had previously studied the biological effects of pollution on organisms and wanted to focus their research on cleaning up pollutants, specifically oil. They devised an efficient and cost effective device that could degrade hydrocarbons, while also producing electricity.



**KIMBERLY TE**

**YEAR:** Senior

**HOMETOWN:** Manhasset, N.Y.

Kimberly Te hopes to become an environmental engineer to design solutions to our planet’s environmental challenges. She hopes to help create new green energy technologies and find ways to sustain the Earth. Kimberly currently has a patent pending for a sustainable, cost-effective microbial fuel cell (MFC) designed for energy production and oil spill remediation.

Outside of the classroom, Kimberly is a staff illustrator and reporter for the Kidsday section of *Newsday*, a New York daily regional newspaper. She is also an assistant at the Science Museum of Long Island, teaching children about STEM.

Kimberly is Editor-in-Chief of her school newspaper and plays varsity tennis.



**CHRISTINE YOO**

**YEAR:** Senior

**HOMETOWN:** Manhasset, N.Y.

Ever since she was in eighth grade and was selected to participate in the Science Research Program at her high school, Christine has been hooked on science. She hopes to become a chemical engineer, or even a professor. She was a finalist for the International Science and Engineering Fair. Christine likes that science is constantly changing because it allows us to continually learn more about how the world works.

Outside of the classroom, Christine participates in Science Olympiad. She is also president of the Breast Cancer Society fundraising group and section leader of her school's marching band. Christine plays the flute, piccolo and piano. She is also a tutor through TASSEL, a program dedicated to teaching English to Cambodian children.

**DAVID ZHU**, The Harker School, San Jose, Calif.

**EVANI RADIYA-DIXIT**, The Harker School, San Jose, Calif.

**PROJECT:** Automated Classification of Benign and Malignant Proliferative Breast Cancer Lesions

**FIELD:** Computer Science

**MENTOR:** Dr. Andrew Beck, Professor of Pathology, Beth Israel Deaconess Medical Center, Dana Farber Cancer Center; Mr. Chris Spenner, Physics teacher, The Harker School

David and Evani developed a machine learning algorithm that can robustly diagnose a breast cancer tumor as either benign or malignant from a biopsy image. Their model can help improve breast cancer diagnosis accuracy, thereby reducing under-and over-treatment. The most challenging part of the project for them was designing the algorithm so it would obtain a high accuracy rate of cancer diagnosis and making sure they remained unbiased, so that their results could be replicated.



**DAVID ZHU**

**YEAR:** Junior

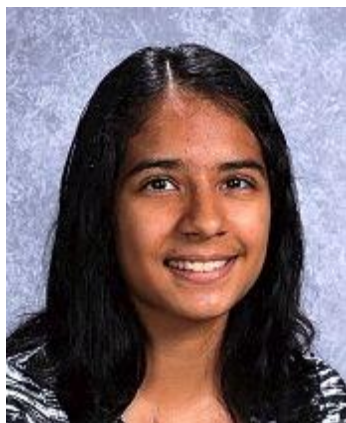
**HOMETOWN:** Saratoga, Calif.

*“STEM influences the daily lives of the common person quite significantly.”*

David is an aspiring computer engineer, and he wants to use his skills to be able to help the world. David has seen breast cancer’s impact up close and personal as he lost a close family friend to the battle. The survival rate for breast cancer patients has a lot to do with early detection, motivating David to develop a system that can detect breast cancer at an earlier stage.

David appreciates STEM education because he sees how it can influence the daily lives of individuals. He coaches the Middle School Science Bowl Team, and encourages his school to have more science experiment demonstrations opposed to traditional classroom exercises.

Outside of school David participates in tennis, basketball and dance. He also plays piano and percussion instruments. David looks to Steve Jobs as his role model and if he could speak to one person in history it would be Alan Turing. David would want to let Alan know that we are very close to passing the Turing Test.



**EVANI RADIYA-DIXIT**

**YEAR:** Junior

**HOMETOWN:** San Jose, Calif.

*"I encourage students to work on hands-on projects and to learn by experimentation."*

Evani has been deeply interested in technology and computer science, as she believes they can bring monumental improvements in human lives. She believes that STEM education can create unimaginable innovations and can accomplish what people thought was unsolvable only a few decades ago.

Evani is inspired by breakthroughs such as Google's low-orbiting satellites intended to beam Internet to the world's remote areas. She is excited to pursue multidisciplinary studies in engineering, medicine, and the humanities.

Outside of school, Evani participates in Future Problem Solving and volunteers at Sacred Heart, a community service organization. She enjoys running and playing tennis as well as writing and singing. Evani once had the opportunity to meet Sally Ride and hear her speak about the challenges and wonder she experienced during space travel. If Evani could meet one person in history, it would be Ardi, the 4.4 million year old human ancestor, to gain insight into the incredible human evolution.