SUBMISSION **CATEGORIES**

Davidson Fellows are outstanding young people who demonstrate the development of their talents with a prodigious piece of work in one of the following submission categories:

Science
A project in a specific area of science, such as physics, biology, chemistry, engineering, earth science, space science, environmental science or medicine.

Technology
A project in a specific area of technology, such as artificial intelligence or computer programming.

Mathematics
A project in a specific area of mathematics, such as calculus, fractals or number theory.

Music
A portfolio that is representative of the applicant's talent as a composer, vocalist, classical instrumentalist or other instrumentalist.

Literature
A portfolio displaying a number of literary styles and genres.

Philosophy
A portfolio presenting analyses of fundamental assumptions or beliefs relating to human thought or culture.

Outside the Box
A project that is university graduate-level or comparable and completed with the supervision of an expert or experts.

Davidson Fellows are awarded scholarships of $50,000, $25,000 or $10,000 and are recognized for their achievements at a special awards reception in Washington, D.C.

Davidson Fellows are encouraged to make a personal commitment to support others in the development of their talents by serving as role models and mentors to other profoundly intelligent young people.

WHO SHOULD **APPLY**

Davidson Fellow applicants are individuals who recognize wisdom in the adage, "It's the journey, not the destination." They are passionate about their work and value the opportunity to learn. If you see these qualities in yourself and have been pursuing the development of your talents for an extended period of time, we encourage you to apply.

HOW TO BECOME A DAVIDSON FELLOW

Applicants must submit:

- A detailed project or portfolio that is considered a significant piece of work as outlined in each category's application.
- Essays about the work, such as why and how the work was pursued, the challenges that were encountered, and a description of why the submission is significant.
- A 15-minute DVD, narrated by the applicant, describing and showing the work.
- Three nominating forms: one from a mentor and/or supervising scientist; one from a teacher, tutor or school administrator; and one from a professional in the field who is familiar with the applicant's work.
- A statement of commitment that, if named as a Davidson Fellow, the applicant and a parent/guardian will attend the awards reception in Washington, D.C. in September.

Applicants must be under the age of 18 as of October 1 of the year in which they are applying.

To download an application, please visit **www.DavidsonGifted.org/Fellows**.

The Davidson Institute must receive Davidson Fellows applications by 5 p.m. Pacific Standard Time on the first Wednesday in March.

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ABOUT THE **INSTITUTE**

OUR MISSION
The mission of the Davidson Institute for Talent Development is to recognize, nurture and support profoundly intelligent young people and to provide opportunities for them to develop their talents to make a positive difference.

OTHER PROGRAMS AND SERVICES

Davidson Young Scholars
If you know of a profoundly intelligent student between 5 and 16 years old who could benefit from our FREE, individualized services, visit www.DavidsonGifted.org/YoungScholars.

The Davidson Academy of Nevada
If you would like to study with your intellectual peers, consider The Davidson Academy of Nevada. On the campus of the University of Nevada, Reno, the Academy is a public school offering an individualized learning program for each profoundly gifted student. Please visit www.DavidsonAcademy.UNR.edu.

THINK Summer Institute
If you are searching for a challenging summer educational opportunity, consider the THINK Summer Institute - a three-week residential college program for 13 to 16 year olds. Find out more at www.DavidsonGifted.org/THINK.

Educators Guild
If you are an educator or professional working in the gifted education field and are looking for a place to ask questions, share ideas and connect with other educators who are excited about meeting the needs of gifted students, take a moment to look at www.DavidsonGifted.org/EdGuild.

Davidson Gifted Database
Access free online articles and resources about the gifted population, in addition to gifted education state policies by visiting www.DavidsonGifted.org/DB.

Genius Denied: How to Stop Wasting Our Brightest Young Minds
Learn about this award-winning book that has been praised as "a manifesto for change" for gifted education, in addition to what you can do to help gifted students, by visiting www.GeniusDenied.com.

2010 Davidson Fellows




10th Anniversary

Davidson Institute for Talent Development

2010 Davidson Fellows

$50,000 Scholarship Recipients

Kyle Loh *(Science)*
A 16-year-old young man from Piscataway, New Jersey, Kyle Loh screened chemical libraries and identified compounds that can help convert human and mouse skin cells into pluripotent stem cells. Pluripotent stem cells have many applications for regenerative medicine, such as cell replacement therapies and disease modeling. The chemical compounds he identified obviate the need to destroy embryos. Kyle's studies provide insights into the molecular mechanisms that underlie the conversion of skin cells into pluripotent stem cells.

Yeeren Low *(Music)*
A 13-year-old young man from East Stroudsburg, Pennsylvania, Yeeren Low explored and experimented with sound in various aspects of music through five compositions. In his portfolio, *Art of Sound*, Yeeren's goal is to enrich the body of the contemporary classical music genre, and create new musical expressions and listening experiences. Yeeren is particularly interested in promoting greater awareness and exposure to the richness of the classical music genre, thus contributing to its wider recognition, appreciation and overall advancement.

Jonathan Rajaseelan *(Science)*
A 17-year-old young man from Millersville, Pennsylvania, Jonathan Rajaseelan synthesized six new carbene complexes of the metal Rhodium. Rhodium complexes act as catalysts in multiple organic synthesis reactions, including the manufacturing of pharmaceuticals and industrial chemicals. The catalytic effects of his complexes make these processes safer, inexpensive and less environmentally hazardous by eliminating the need for large quantities of hydrogen gas, a dangerous explosive. Jonathan's work has the potential to contribute to greener methods of making medicines, pharmaceuticals, and other chemical products.

$25,000 Scholarship Recipients

Eric Brooks *(Science)*
A 16-year-old young man from Hewlett, New York, Eric Brooks studied the genetic factors affecting metastatic progression of prostate cancer. Approximately 30 percent of men with prostate cancer will die from it, but it is difficult to predict who will get the metastatic diagnosis. Eric developed models based on evolutionary selection to identify genes that may affect metastatic potential either positively or negatively. His observations may be used to design better clinical predictors to indicate who must undergo painful treatment and for whom the treatment is unnecessary.

John Michael Colón *(Literature)*
A 17-year-old young man from Wayside, New Jersey, John Michael Colón's portfolio, *Art as Empathy: A Study of the Syncretic Potential of Literature*, demonstrates the utility of literature and art in society. He writes that although human beings want to communicate their fundamental experience, this worldview is too ineffable to express directly; art and literature articulate this on a visceral level. John Michael proposes through art and literature, the expression of ideas can help tame the tendency to dehumanize others by helping us see their ideas the same way we see ours, inspiring empathy.

Damien Jiang *(Mathematics)*
A 17-year-old young man from Raleigh, North Carolina, Damien Jiang studied the parallel chip-firing game (PCFG). Though not a game, the PCFG is played on a graph, or network of nodes and edges, and is closely related to a variety of mathematical models for complex phenomena such as earthquakes, avalanches and forest fires. By running computer simulations of randomized PCFGs, Damien studied their tendency to reach a cycle of repeating configurations, and mathematically proved a theorem about its behavior on a graph. Damien's work has broad applications in disaster preparedness.

Meredith Lehmann *(Science)*
A 14-year-old young woman from La Jolla, California, Meredith Lehmann researched the spread of epidemics. Using trip data from all 3,076 counties in the continental United States, she found long distance auto travel, which accounts for five times as many passenger-miles as air travel, governs simulated epidemic evolution. Large hub airports near population centers are not disproportionately more important in contrast to existing research. Meredith's findings suggest epidemic models should incorporate automobile and air travel data, but transportation network restrictions are unlikely to be effective.

Laurie Rumker *(Science)*
A 17-year-old young woman from Portland, Oregon, Laurie Rumker investigated the susceptibility of organoclay to biodegradation by microorganisms within river sediments. Organoclay is a chemically-modified clay material used to prevent hydrophobic pollutants from rising into the water ecosystem. Through spectrophotometric analyses and oxygen uptake tests, Laurie found biodegradation of the chemical structures within organoclay which could impair the ability of the organoclay to adsorb and retain pollutants. Laurie's work has important implications for the treatment of contaminated sediments.

Anna Kornfeld Simpson *(Technology)*
A 17-year-old young woman from San Diego, California, Anna Kornfeld Simpson developed a chemical-detecting robot. She used porous silicon, a material that changes color in the presence of chemicals like alcohols or nerve gas, and simple, low-cost circuit elements to detect color change. The robotic microcomputer then "sees" the chemical instead of "smelling" it. Prototypes had a 100 percent response rate. Anna's work has applications in security and counterterrorism, monitoring industrial settings for toxins, and exploring locations too hazardous for humans.

Benjamin Song *(Science)*
A 16-year-old young man from Audubon, Pennsylvania, Benjamin Song researched colon cancer biomarkers in urine. Colon cancer is the second leading cause of cancer death in the United States, even with the sensitive but invasive colonoscopy. Benjamin designed and tested polymerase chain reaction assays targeting a known colon cancer epigenetic marker. His work shows potential for a urine test for colon cancer that is noninvasive, fast, affordable and sensitive. In addition, his method could be adapted to virtually any cancers with known DNA alterations.

Merry Sun *(Science)*
A 16-year-old young woman from Chappaqua, New York, Merry Sun studied therapeutic ultrasound's potential in treating recurrent and metastatic cancers. Traditional therapies like radiation, chemotherapy, and surgical resection are ineffective in immune responses against tumor cells. Merry found that therapeutic ultrasound causes stress and light damage to tumor cells, which alerts the immune system to respond and target the tumor. Her results demonstrate the possibility of a novel, non-invasive, non-toxic cancer therapy that treats solid tumors as well as systemic metastases.

James Ting *(Science)*
A 17-year-old young man from Holmdel, New Jersey, James Ting synthesized bismuth nanowires which demonstrate quantum confinement, the reduction of electrons to a one-dimensional axis. By using physical vapor deposition, he created lawns of bismuth nanowires as well as isolating single nanowires to add to silicon chips. James' research focuses on the creation of single electron transistors, which are useful in the new field of spintronics. The spins of these electrons could then be harnessed and used for information storage and act as the building blocks for quantum computers.

$10,000 Scholarship Recipients

Scott Boisvert *(Science)*
A 16-year-old young man from Chandler, Arizona, Scott Boisvert demonstrated a link between amphibian aquatic environments and the growth of a pathogenic fungus, *Batrachochytrium dendrobatidis*, which has contributed to the loss of over 32 percent of amphibian species worldwide. Using ion chromatography and ion-coupled plasma spectrometry, Scott studied how the water chemistry of a habitat affects the growth of the microorganism. Scott's project has broad implications for understanding the pathogen's propensity to infect an amphibian host and controlling the spread of infection, benefiting conservation efforts.

Alexander Gilbert *(Technology)*
A 16-year-old young man from McLean, Virginia, Alexander Gilbert developed a computer algorithm which improves contrast in magnetic resonance imaging (MRI). His program has been successfully applied to brain MRI images, enabling more accurate image definition of tissues, such as areas of demyelination, or plaques, which are often present in patients with multiple sclerosis. Alexander's work is pertinent to MRIs of the spine and other areas, and offers the potential for better diagnosis and monitoring of multiple sclerosis and other neurological diseases including Alzheimer's disease.

Janie Gu *(Science)*
A 16-year-old young woman from Morganville, New Jersey, Janie Gu researched noise reduction of atomic magnetometer systems, advanced devices that measure magnetic fields with extreme precision. To increase the signal-to-noise ratio, she tested the loss factors, such as measurements of magnetic noise produced, of various ferromagnetic materials for use in the magnetic shield around the system, improving the precision by more than 44 percent. Janie's work has applications in the military, medicine, information storage, mineral and oil detection, space exploration and fundamental physics experiments.

Kevin Hu *(Music)*
A 16-year-old young man from Naperville, Illinois, Kevin Hu musically traverses the globe and explores cross-sections of humanity in his violin portfolio, *Sociomusicology: Exploring and Sharing the Worlds of Music*. His portfolio includes selections of music that at times, were repressed by political regimes or conversely, celebrated for their heartbreaking beauty, all while representing an array of raw humanity. Kevin's goal is to present music as a tangible and dynamic tool in human healing, self-discovery and dignity.

Rebecca Jolitz *(Science)*
A 15-year-old young woman from Los Gatos, California, Rebecca Jolitz examined whether hypolithic cyanobacteria, a photosynthetic organism found under rocks in climatically extreme environments, could theoretically have enough sunlight to survive on Mars. Using an original computer program that simulated a million individual beams of sunlight hitting a Martian rock, Rebecca found that there was enough light for cyanobacteria to survive on Mars, indicating that Mars may not be a dead world. Rebecca's research could help to discover the means through which life on Mars may exist.

Sahil Khetpal *(Science)*
A 17-year-old young man from Plano, Texas, Sahil Khetpal developed a carbon nanotube-based drug-delivery system for tumor targeted chemotherapy and photo-therapy of cancer, a dual therapy. This versatile platform attacks tumors on two fronts and mitigates the severe side effects associated with conventional chemotherapy. He also investigated a gadonanotube for the development of a new drug delivery system. Sahil's system has the potential to both diagnose cancer at an earlier stage and provide the dual therapy mechanism to efficiently combat it.

Jonathan Li *(Mathematics)*
A 17-year-old young man from Laguna Niguel, California, Jonathan Li developed a mathematical model and computer simulation to analyze tumor growth and is the first to study motility and contact inhibition, a mechanism that limits cell growth when pressured by neighboring cells. His research also revealed an inherent flaw of the Cellular Potts Model, used to simulate cellular structure behavior. Jonathan's work provides a method to predict the effects of motility on tumor development and can be used to identify cancer phenotypes that chemotherapy drugs can target, potentially improving treatment.

Gavin Ovsak *(Technology)*
A 16-year-old young man from Hopkins, Minnesota, Gavin Ovsak designed a device to allow disabled individuals more efficient access to computers. His device, known as the CHAD, Circuit Head Accessibility Device, is a circuit board integrated onto a baseball hat to replace the functions of a computer mouse through head movements and a bite sensor. Gavin's work is less expensive, more efficient, and uses fewer complex software interfaces than are currently available in the assistive technology market, equalizing access to the social, occupational and global significance of the Internet.