

Davidson Fellow
Matthew Bauerle

\$25,000 Scholarship Recipient



Personal Info

Age: 17

Fenton, Michigan

School, College and Career Plans

Matthew is a homeschooled high school senior. He also attends the University of Michigan as a non-degree, dual-enrolled student. He plans to enroll as a full-time student at the University of Michigan next fall to pursue a degree in numerical analysis and hopes to become a mathematics professor.

Davidson Fellows Submission: Mathematics

In his project, "Reformulating the Newton Direction Computation as a Linear Least Squares Problem for Smoothed Overdetermined ℓ_1 Functions," Matthew outlined how the Newton direction can be computed by solving a weighted linear least squares problem. When fitting a model to data, such as a line to a set of points, the least squares method is currently the most popular technique. Matthew's work focused on minimizing the ℓ_1 norm of the error which is the sum of the absolute values of the individual errors. Matthew's work has potential in the medical imaging and scanning fields, as well as facial recognition and fluid dynamics simulations.

Biography

Matthew received his first electronics kit when he was five years old, and the subject soon became a passion for him. When he was nine, his parents found a mentor from Kettering University to help him learn more about electronics. This interest continued until Matthew first tried to build a hybrid battery charger in his parents' kitchen, and discovered that a computer simulation is much safer to examine the behavior of the circuit. Matthew's interest then shifted to mathematics and simulating real world phenomena, leading to his Davidson Fellows project.

Since he was reading his father's college textbooks when he was five, Matthew has always been homeschooled. He took algebra in the fourth grade, high school chemistry in sixth and Advanced Placement (AP) computer science and calculus in eighth. He has been fortunate to develop mentorships with professionals who taught him about fields such as electronics, computer science, linear algebra, power electronics and acoustics. Matthew was in Kettering University's Sustainable Energy Precollege Program and the University of Michigan's Michigan Math and Science Scholars Program.

Matthew became a Davidson Young Scholar in 2003. He plays classical guitar and has received three superior ratings from the Music Federation. Matthew also enjoys soccer and swing dancing.

Please see next page.



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(cont.)

- 2011 Davidson Fellow
- 2011 Intel International Science and Engineering Fair (ISEF) Mu Alpha Theta, First Place, Best in Category
- 2011 Michigan Science and Engineering Fair, First Place
- 2011 Intel Excellence in Computer Science Award FRSF, First Place Senior Division
- 2010 Intel ISEF Illinois Institute of Technology, \$15,000 scholarship
- 2010 Michigan Science and Engineering Fair, Intel Excellence in Computer Science Award, Third Place
- 2010 Intel Excellence in Computer Science Award Flint Area Science Fair (FASF), First Place Senior Division
- 2009 Davidson Fellow Honorable Mention
- 2009 Michigan Science and Engineering Fair, Best Use of SI Units Award, Fourth Place
- 2009 Senior Division and Intel Excellence in Computer Science Award FASF, Fourth Place
- 2008 Junior division FASF, Scholarship Sustainable Energy Pre-College Program at Kettering, First Place
- 2007 Junior Division FASF, US Navy/Marine Corp. Award, DYSC Semi-finalist, Second Place
- 2006 Junior Division FASF, First Place
- 2005 Elementary Division FASF, First Place

Community Activities

Matthew has volunteered at Camp Barakel, a local religious camp where he washed dishes, mowed lawns and hauled wood. He has also volunteered as a Vacation Bible School worker at his church. Matthew sings in his church choir and is in 4H where he did service projects.