Davidson Institute
for Talent Development

Davidson Fellow Laureate
Akhil Mathew
($50,000 Scholarship Recipient)

Personal Info
Akhil Mathew
Age: 16
Madison, New Jersey

School, College and Career Plans
Akhil is a rising junior at Madison High School and plans to major in mathematics in college, and aspires to become a research mathematician.

Davidson Fellows Submission *(Mathematics)*
In his project, "Translation - Invariant Binary Representations," Akhil worked on a problem involving the encoding of real numbers into zero-one sequences without reference to an origin. He proved a single filter, or system of weights, can decode only a finite number of rationals. Using analysis and number theory, he connected the representable rationals of one filter with the zeros of its Fourier transform. He also generalized his results to higher dimensions by extending a theorem of Szegö to matrices. Akhil's work is relevant to signal processing, analog-to-digital conversion and representing numbers in an alternative way.

Biography
Thanks to understanding educators and school district administrators, Akhil was placed a year ahead in mathematics in the fourth grade and, for the three following years, he worked with a tutor to cover the equivalent of Pre-Algebra, Algebra I and II and Geometry. In eighth grade, he completed AP Calculus and, in the second semester of that year, he took a multi-variable calculus class at nearby Drew University.

In ninth grade, Akhil took a course in real analysis and a seminar in linear algebra. He will take an independent study course in elliptic curves at Drew University next year.

Akhil enjoys playing chess and tennis. He participated in several United States Chess Federation (USCF) rated chess tournaments and played fourth board for the team that won fourth place at the U.S. Amateur Team East tournament in 2007.

Recently, Akhil has been assisting two professors at Drew University with an analysis textbook they are writing by proofreading their drafts, drawing the figures, formatting the text, creating a website, and providing suggestions for additional material.

Please see next page.

Honors/Awards

- 2008 Davidson Fellow Laureate

- 2008 Intel Science and Engineering Fair (ISEF), Mu Alpha Theta Award

- 2008 North Jersey Regional Science Fair D&B Independent Research Award – Junior Division, U.S. Army Award, Mu Alpha Theta Award – Junior Division, and first place for Mathematics

- 2007 Association of Mathematics Teachers of New Jersey (AMTNJ) Student Exhibits Competition, third place, Division 9-12

- 2007 ISEF third place, Mathematics category

- 2007 North Jersey Regional Science Fair Mu Alpha Theta Award – Junior Division, Ramapo College Mathematics Award, and first place for Mathematics

- 2006 AMTNJ Student Exhibits Competition, first place, Division 9-12

- 2005 AMTNJ Student Exhibits Competition, first place, Division 6-8

- 2005 New Jersey K-12 Chess Championships, eighth grade, first place

- 2005 First Place in the Center for Talented Youth (CTY) Talent Search Mathematics, Exceptional Talent Award for Verbal and Mathematics, and New Jersey State Award

- 2004 Jersey K-12 Chess Championships, seventh grade, second place

- 2004 AMTNJ Student Exhibits Competition, first place, Division 6-8

- 2004 George Lenchner Award, Elementary School Math Olympiads

- 2003 AMTNJ Student Exhibits Competition, first place, Division 6-8

- 2003 President's Student Service Award for volunteering at the YMCA

Community Activities

Since the summer of 2006, Akhil has volunteered at his local library, where he teaches a chess class for children. He is a member of his high school's Key Club. He is also a host at Cogito.org, an online community for academically talented youth.

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