

**Davidson Fellow**  
**Marian Bechtel**

\$25,000 Scholarship Recipient



**Personal Info**

Age: 16

Lancaster, Pennsylvania

**School, College and Career Plans**

Marian is a rising junior at Hempfield High School. She is deciding where she wants to attend college and what she will study, although she knows it will be some form of science.

**Davidson Fellows Submission: Science**

In her project, "A Stand-Off Seismo-Acoustic Method for Humanitarian Demining," Marian designed a seismo-acoustic method for detecting landmines. Approximately 70 million landmines plague 80 countries worldwide, claiming one victim every 22 minutes. With Marian's method, two high-sensitivity, non-contact microphones are swept above buried landmines that resonate in response to a remote seismic source. The recorded sound is noise-cancelled in real-time, creating a characteristic, audible null in the noise-cancelled waveform that isolates the mine's location. This efficient and inexpensive method could make important contributions to humanitarian demining.

**Biography**

Marian credits her parents with teaching her mathematics at a very young age. They taught her to add, subtract, multiply and divide using chocolate chips, which led to a lifelong love of math, science and chocolate. Although Marian was bright in math, her teachers were unable to accelerate her in the subject, so she took matters into her own hands. During the summer between seventh and eighth grades, she borrowed high school textbooks, and over the course of a year and a half, independently worked her way through algebra I and II, geometry, trigonometry and pre-calculus. By the time she began high school, she was able to take AP calculus AB.

Marian came to her Davidson Fellows project through her extended family who live in Africa and have to deal with the dangers of landmines daily. She also has friends who live in mine-infested countries, such as Egypt and Macedonia. Several years ago, she met a group of international scientists who are developing a holographic radar device for detecting landmines, and was inspired after hearing them talk about their work. Based on these factors, she developed the idea of combining her love of music and science into a meaningful project.

Marian has grown up with music and takes lessons in violin, trumpet and piano, and she enjoys learning new instruments. She plays in her school's marching, symphonic, and jazz bands, orchestra, and sings in the choir. Marian also participates in county music festivals. She enjoys traveling, camping and being outdoors, kayaking, hiking, tie-dying, reading unusual books and playing with puppies and lizards.

*Please see next page.*



**Davidson Fellow**  
**Marian Bechtel**  
(cont.)

- 2011 Davidson Fellow
- 2011 Intel Science and Engineering Fair (ISEF), Third Place in Engineering Category, American Intellectual Property Law, U.S. Army and Society of Exploration Geophysicists Awards
- 2011 I-SWEEEP Gold Medal in Engineering Category and U.S. Navy Award
- 2011 PJSHS First Place in Engineering and Technology Category and Second Place Overall Awards
- 2011 NMSEF, Senior Champion, First Place Engineering U.S. Army, Overall U.S. Army, and Second Place U.S. Navy Awards
- 2010 National Latin Exam, American Classical League and National Junior Classical League, Cum Laude
- 2010 ISEF Earth and Planetary Sciences Third Place, Acoustical Society of America First Place, Society of Exploration Geophysicists Third Place, and Air Force Awards Second Place
- 2010 I-SWEEEP Gold Medal in Engineering category
- 2010 PJAS (state fair) First Place, Perfect Score and Orlein Award
- 2010 PJAS (regional fair) First Place, Ninth Grade High Achievement and Region 4 Excellence Awards
- 2010 NMSEF Grand Champion, Naval Science, Mu Alpha Theta, and First Place Engineering Army Awards
- 2009 I-SWEEEP Silver Medal in Engineering, and Houston Urban Network for Science, Technology, Engineering, and Math Award
- 2009 NMSEF Junior Reserve Champion, Pennsylvania Council of Professional Geologists, and Society of Manufacturing Engineers Awards
- 2009 St. Leo the Great President's Award for Educational Excellence
- 2009 St. Leo the Great Highest Average in Computer, Creative Writing, Language Arts, Social Studies, Science, Algebra, and Spanish Awards
- 2009 American Legion Award
- 2009 MathCounts (local) Second Place and MathCounts (regional) Tenth Place
- 2007 Lancaster Catholic High Marching Band Outstanding Rookie Marcher Award

**Community Activities**

Marian enjoys volunteering to judge middle school science fairs and helping younger students develop a love of science. She has also been a People to People Student Ambassador in Australia.