CS BITS & BYTES
National Science Foundation

CS Bits & Bytes is a bi-weekly newsletter highlighting innovative computer science research. It is our hope that you will use CS Bits & Bytes to engage in the multi-faceted world of computer science to become not just a user, but a creator of technology. Please visit our website at: http://www.nsf.gov/cise/csbytes.

March 12, 2012
Volume 1, Issue 7

Women in Computing

In celebration of March: Women's History Month, CS Bits & Bytes is featuring stories of contributions by women to computing.

Women have significantly impacted computing throughout history!

The very first computer programmer was a woman born in the 1800s! In 1842, Ada Lovelace, an English mathematician, wrote notes on a newly invented machine by Charles Babbage called the Difference Engine and later the Analytical Engine. The engine is now recognized as an early model for a computer, so early that it was entirely mechanical and used no electricity. The notes included a method for calculating a sequence of Bernoulli numbers. Her method is recognized as the world's first computer program. To see a video of the Difference Engine in action, go to: http://www.wired.com/gadgetlab/2008/05/exclusive-video/.

Ada Lovelace.
Photo courtesy of Wiki Commons.

The ENIAC and some of it's "programmers."
Photo courtesy of Wiki Commons.

During World War II, six women were hired to "program" the ENIAC (Electronic Numerical Integrator and Computer), the first general purpose electronic digital computer developed to compute tactical trajectories. Previously, these trajectories were computed by hand and required doing thousands of mathematical calculations. These "Women of ENIAC" were the first professional programmers. Programming then was very different than it is now as the machine was controlled by electrical cables that were plugged into boards in different configurations.

By the 1960s, computers were controlled not by changing their wiring, but by changing software, that is instructions stored within a computer itself. These instructions were very detailed and difficult for humans to use. Rear Admiral Grace Hopper (1906-1992) is credited for inventing the first compiler, a computer program that translates programming language (something easy for humans to understand) into machine language (instructions the computer understands). She also co-invented the computer programming language COBOL (Common Business-Oriented Language). In 1973, she became the first person from the U.S. and the first woman of any nationality to be made a Distinguished Fellow of the British Computer Society. She is believed to have coined the term "debugging" after she removed a moth that was caught in her computer. Rear Admiral Hopper was the oldest commissioned Officer in the Navy when she retired in 1986.

Rear Admiral Grace Hopper.
Photo courtesy of Wiki Commons.

Frances Allen.
Photo courtesy of Wiki Commons.

Frances Allen was the first female recipient of the Association for Computing Machinery (ACM)'s Turing Award (often considered the Nobel Prize of computing) in 2006. She was a pioneer in the field of optimizing compilers, compilers that translate programming languages to machine languages for really fast, efficient programs. Her work established the feasibility of modern machine and language independent optimizers that enable computer code to run on multiple platforms. Allen worked at IBM for 45 years and was the first female IBM Fellow. She also was involved in intelligence work on programming languages and security codes for the National Security Agency.

Women continue to make a difference in computing!

Below are a few examples of women who have recently been recognized for their contributions to computing:

Yoky Matsuoka and the Robotic Hand.
Photo courtsey of University of Washington College of Engineering.

Yoky Matsuoka won the MacArthur award in 2007 for her work on creating advanced prosthetic limbs controlled by human thought. In the picture to the left, Yoky holds an anatomically correct robotic finger. This finger has eight degrees of freedom, or ranges of motion. Today's most sophisticated prosthetic hands have only one.

Chieko Asakawa won the Anita Borg Women of Vision Award in 2011. Her work at IBM has led to breakthrough technologies including Japan's first computer based Braille library system and Home Page Reader that has helped individuals who are visually impaired to easily surf websites. Chieko's most recent innovation, a Designer, is used today by Web designers across the globe to help build pages that are accessible to those with poor sight.

Chieko Asakawa.
Photo courtesy of IBM.

Andrea Grimes Parker.
Photo courtesy of Andrea Grimes Parker.

Andrea Grimes Parker was honored by the Computing Research Association (CRA) as the Top Female Undergraduate in 2005. She received a Ph.D. in Human-Centered Computing from Georgia Tech in 2011. Andrea's research includes designing and evaluating the impact of software tools that help people manage their health and wellness. She uses knowledge from in-depth fieldwork to examine the intrapersonal, social, cultural, and environmental factors that influence a person's ability and desire to make healthy decisions in order to make supportive technologies to achieve this outcome.

Ivanna Gutierrez won the NCWIT Aspirations in Computing Award for High School Students in 2011. She has held a summer internship at her school fixing over 200 computers and configuring the school's computer network. She is most proud of her work in visual basic. Ivanna is an IT delegate and student ambassador who helps teachers and students with technical questions.

Ivanna Gutierrez.
Photo courtesy of NCWIT.

Helen Hastings.
Photo courtesy of Helen Hastings.

Helen Hastings won the NCWIT Aspirations in Computing Award for High School Students in 2012. Helen found her passion for computing due to a required course in computer science during her freshman year of high school. As a senior, she is researching the effect of different types of noise on channel capacity. Helen also serves as the student body president at her school.

Links:

To learn more about women in computing, please visit:
The National Center for Women & Information Technology: http://www.ncwit.org.
Dot Diva: http://dotdiva.org/.

The Coalition to Diversify Computing: http://www.cdc-computing.org.
The Anita Borg Institute for Women and Technology: http://anitaborg.org.

Activity:

To expose students to more women in computing and STEM related fields, ask students to visit http://www.gscnc.org/womeninstem.html and to read through the bios of the 30 women in STEM. Then, have each student select the woman that they most identify with or find most inspiring and share that person's story and why they chose them with a partner.