

Hi everyone, welcome to Infinite Women. I'm your host, Allison Tyra, and today we're talking about women who should have won the Turing Award, which is generally regarded as the highest honor in computer science. In more than 50 years, only three women have won: Frances Allen, Barbara Liskov, and Shafi Goldwasser, but plenty of brilliant women computer scientists were overlooked.

U.S. Navy Rear Admiral Grace Hopper was a trailblazing mathematician who was one of the first programmers to work with the Harvard Mark I computer in the 1940s. With a Ph.D. in mathematics from Yale, she was a professor at Vassar College before joining the Navy, where she spent decades doing incredible things that I freely admit I don't fully understand. One of them was developing computer languages that were written in English, rather than mathematical notation — most notably, the common business computing language known as COBOL, which is still in use today. In fact, by the year 2000, it was estimated that COBOL made up about 240 billion of the 300 billion lines of computer code in the entire world. In 1951, she developed the first “compiler”, which automatically translated plain-language instructions into machine code. Obviously, this made programming much more accessible to a broader audience, as well as more efficient. In one test, the previous method took three people over 14 hours - Hopper's compiler turned that into less than one hour for one person. It was, unfortunately, also seen as a threat by many programmers. As Hopper later said, “someone learns a skill and works hard to learn that skill, and then if you come along and say, ‘You don't need that, here's something else that's better,’ they are going to be quite indignant.” Indeed, some programmers who take themselves too seriously even today deride her FLOW-MATIC language because it's simple enough for laypeople to understand. She was also part of the team that developed the UNIVAC I computer, which was the first general-purpose electronic digital computer designed for business use.

She tried retiring twice, and both times was asked to return to active duty because she was just that good at what she did. When she finally did retire, almost 20 years after her first attempt, she was the Navy's oldest active-duty commissioned officer, at just a few months shy of her 80th birthday. She received the National Medal of Technology and the Presidential Medal of Freedom, among other honors.

While some folks may be aware that actress Hedy Lamarr helped design the hardware that would later be used for GPS, you may not know that Dr. Gladys West created the Global Positioning System that most of us use to get from place to place. West was born into poverty during the Great Depression, a black woman in the segregated South. Her academic performance in school earned her the scholarships she needed to attend college, where she chose mathematics because it would be difficult - and graduated valedictorian nonetheless. After earning her Master's, she also went to work for the Navy in 1956, only the second black woman ever hired at the Naval Surface Warfare Center, where she would stay for more than 40 years.

Her contributions to mapping the Earth started in space. In addition to astronomical studies, she began analysing data from satellites. Her work as project manager for the Seasat radar altimetry project led to her being recommended for a commendation, but in the mid-'70s, she shifted focus. For years, she programmed a computer to produce increasingly precise calculations modeling the shape of the Earth. She used intricate algorithms to account for variations in gravitational, tidal, and other forces that distort Earth's shape. That model ultimately became the foundation of GPS.

For her contributions both on this planet and beyond, she was inducted into the US Air Force's Space and Missiles Pioneers Hall of Fame in 2018.

In addition to being a major advocate for gender equality in tech, Maria Klawe's research in computer science is also fascinating. She's done work in a variety of fields, including theoretical computer science, human-computer interaction, gender issues in information technology and interactive-multimedia for mathematics education. Her most-cited publications relate to, among other topics, distributed leader election, which allows one node to coordinate processes to other nodes, the art gallery problem, which has to do with visibility in computational geometry, and the effects of gender on electronic game-playing. She also founded The Aphasia Project to study and develop cognitive aids for the condition, where brain damage results in an inability to understand and/or form words. She is still working in her 70s.

Join us next time on the Infinite Women podcast and remember, well-behaved women rarely make history.