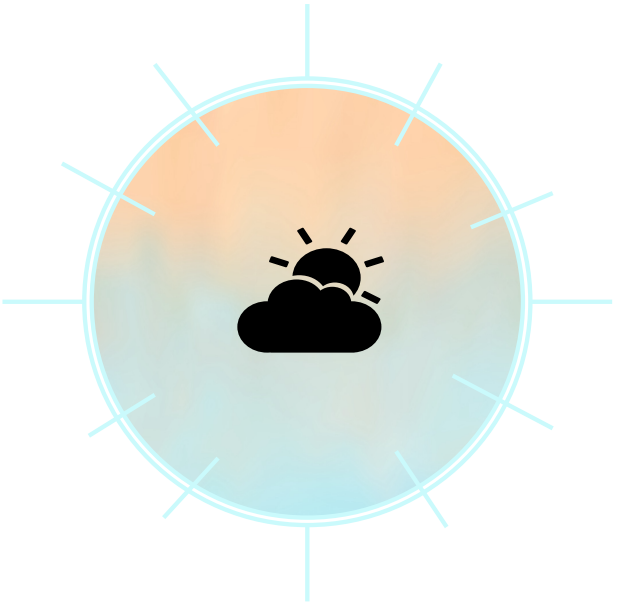
A Brief History of (Women in) Computer Science at Vassar

Nancy Ide
Professor of Computer Science



The Beginning

Grace Murray Hopper

Née Grace Brewster Murray

Born December 9, 1906, New York, New York, U.S.

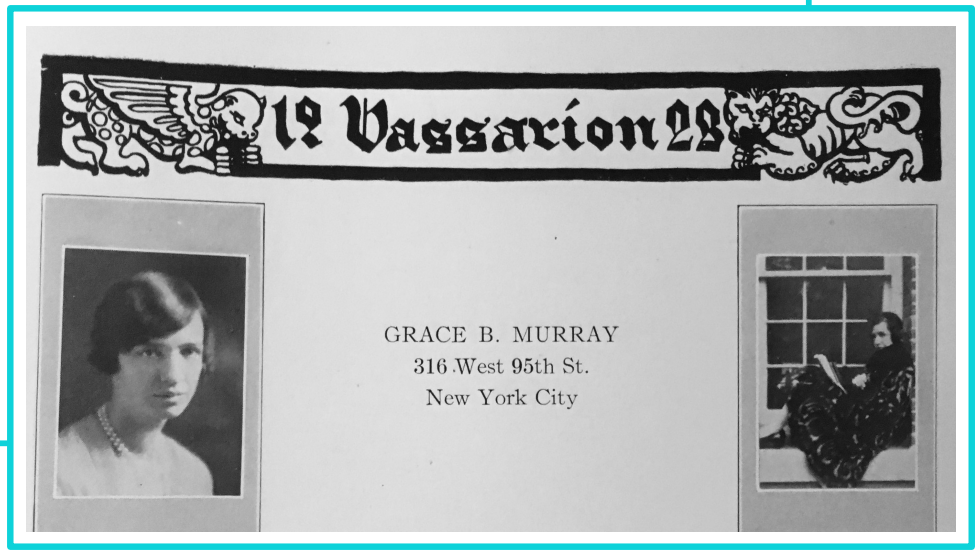
Hopper was very curious as a child; this was a lifelong trait. At the age of seven, she decided to determine how an alarm clock worked and dismantled seven alarm clocks before her mother realized what she was doing (she was then limited to one clock).

Grace Murray Hopper, VC'28

Initially rejected for early admission to Vassar College at age 16 because her test scores in Latin were too low

Admitted the following year

Graduated Phi Beta Kappa from Vassar in 1928 with bachelor's degrees in Mathematics and Physics



Early Career

- Earned a Master's Degree in Mathematics from Yale in 1931
- Returned to Vassar as a member of the Mathematics faculty
- During this time
  - Took courses in other sciences
  - Taught herself several languages
  - Earned a Ph.D. *in absentia* from Yale in 1934
- Became a mentor and, eventually, close friend of her student, Winifred Asprey

World War II

Changed the course of Grace's career and life

- Initially rejected from the U.S. Navy, later joined as a lieutenant junior grade in 1943
- Immediately assigned to Howard Hathaway Aiken's Bureau of Ordinance Computation Project at Harvard
  - Aiken was the inventor of the **Mark I,** also known as the IBM Automatic Sequence Controlled Calculator
  - Said to be a monument in the development of the art of computing
  - Marked the beginning of the era of modern computing and "Babbage's dream come true"

Cmdr. Howard Aiken, Lt. J.G. Grace Hopper, and Ens. Robert Campbell in front of the Harvard Mark I in August 1944, shortly after Hopper came to the project. The sailors in the background demonstrate the operating procedure of the Mark I, where enlisted personnel were operators and officers were programmers.

The Mark II

Aiken and Hopper worked together to program and build the Mark II

- Commissioned by the Navy as a successor of the first large-scale digital computer
  - Had built-in hardware for several functions such as the reciprocal, square root, logarithm, exponential, and some trigonometric functions
  - Each function took between five and twelve seconds to execute

Grace Hopper, 1946

Lt. Grace M. Hopper, USNR. She considered her service to the U.S. Navy the greatest of the honors bestowed upon her.

The Mark II

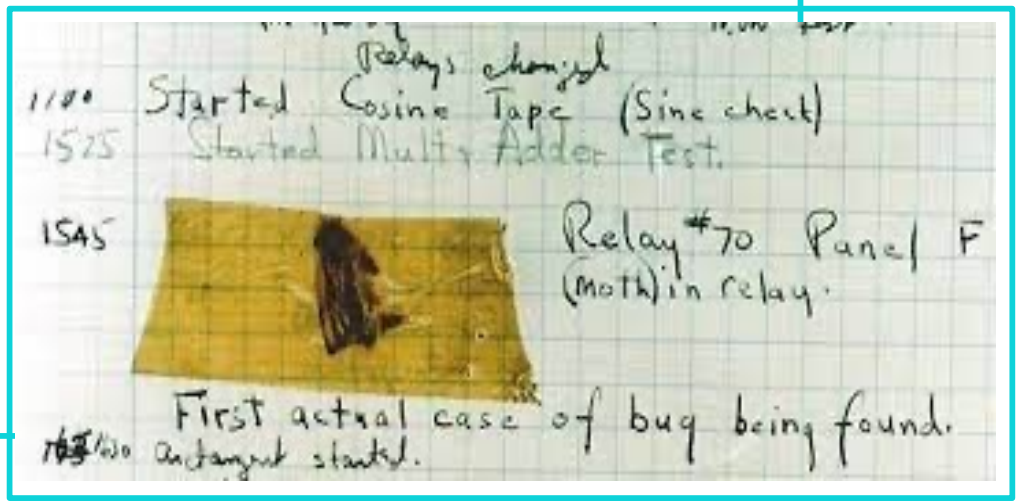
Grace wrote the first computer manual, *A Manual of Operation for the Automatic Sequence Controlled Calculator* (1946)

- Described how to operate Mark II
- The first extensive treatment of how to program a computer

The Mark II

The Mark II is known as the first computer to have an actual "bug"

- On September 9, 1945, the Mark II stopped working
- The team found and removed a *moth* from one of its relays
- The moth was taped into the log and noted "First actual case of a bug being found"
- Grace Hopper coined the term "computer bug"



In 1946 Hopper spoke at Vassar about her experience working on the Mark II

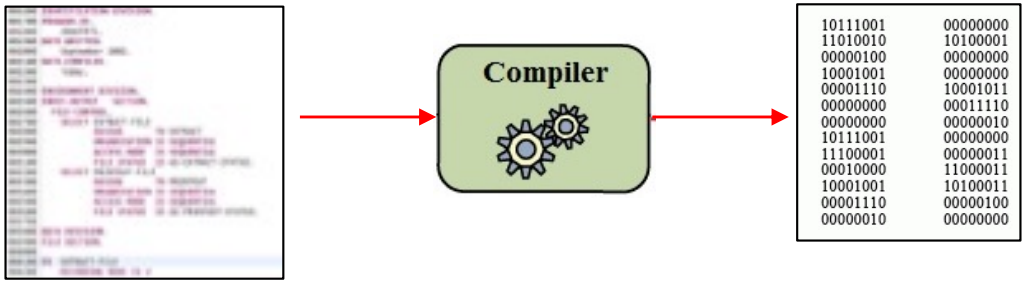
- She noted that in two years, the machine had completed “32 computations”
- One computation amounted to 235 pages of figures
- Hopper estimated “that it would have taken over 300 years to compile the results without the calculator”

Post-World War II

- Remained in the Naval Reserve
- Joined the Sperry Rand Corporation
- Worked on UNIVAC
  - First commercial large-scale electronic computer
- **Invented the “compiler”**

Hopper's Compiler

- A-0: First version
  - Translated higher-level computer code into machine code
- B-0: Second version
  - Allowed the computer to recognize English commands
  - Put to use in businesses for payroll calculation and automated billing



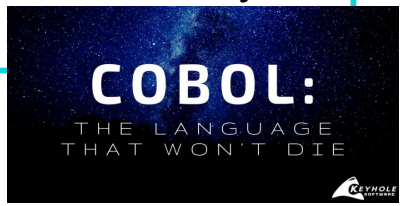

code
I HAD A RUNNING COMPILER AND NOBODY WOULD TOUCH IT. THEY TOLD ME COMPUTERS COULD ONLY DO ARITHMETIC.
GRACE HOPPER
COMPUTER PROGRAMMING PIONEER

COBOL

- **Work on compilers eventually led Hopper to invent COBOL**
  - “Common Business-Oriented Language”
  - A universal computer programming language
  - Released in 1959
  - Primarily used in business, finance, and administrative systems for companies and governments

- Still in use!
  - In April 2020, New Jersey's unemployment insurance system got overwhelmed by a surge of COVID-19-related unemployment claims
  - It ran 40-year-old COBOL applications, and there weren't enough people familiar with what most assumed was an antiquated programming language

- BUT: there are a billion lines of new COBOL code being written every year!



Later Years

Hopper's pioneering work for the Navy earned her promotion to Rear Admiral and a destroyer named the USS Hopper

In 1986, Admiral Grace Hopper was awarded the Defense Distinguished Service Medal

- The highest non-combat medal awarded by the U.S. Department of Defense

Later Years

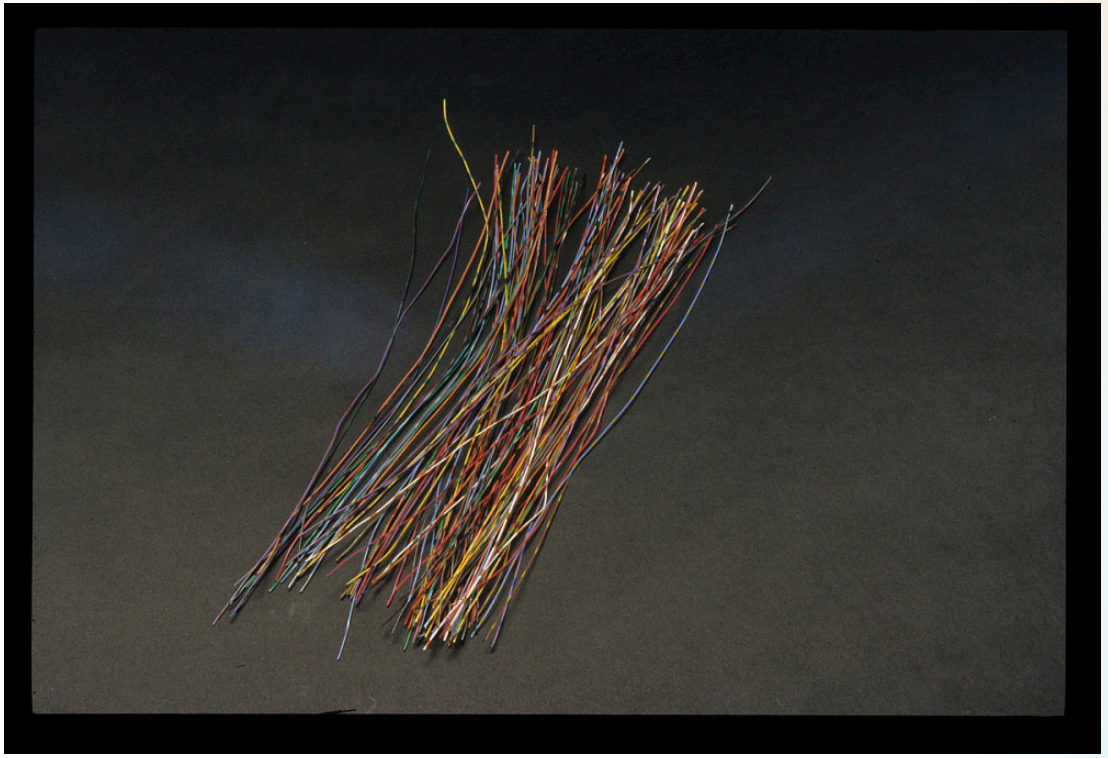
- Retired from the Navy in 1986
- Worked for Digital Equipment Corporation (DEC)
- Gave lectures describing her work on early computers, known for her witty presentations
- Last spoke at Vassar in early 80s
  - I sat next to her at lunch in ACDC!
- Disowned Vassar for allowing men to enroll

Grace Hopper in the Aula

The Grace Hopper nanosecond

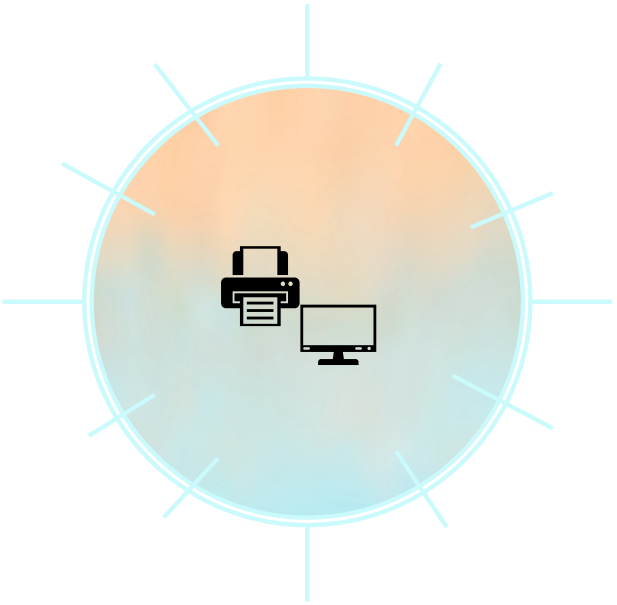
Represents how fast electricity can travel in one billionth of a second

The name comes from the foot-long lengths of telephone wire that Admiral Hopper used to give out at lectures



Grace Hopper Explains Nanoseconds to David Letterman

Full Interview with David Letterman, October 2, 1986



Computers Come to Vassar

Winifred "Tim" Alice Asprey, VC'38

Born April 8, 1917

Died October 19, 2007

Mother (Class of 1905) and grandmother (Class of 1882) went to Vassar

Earned her MS and PhD degrees from the University of Iowa in 1942 and 1945

- One of only around 200 women to earn PhDs in mathematics from American universities during the 1940s

Asprey and Hopper

As a student at Vassar, Asprey met Grace Hopper, the "First Lady of Computing," who taught mathematics at the time

> “I didn't meet Grace Hopper until I was almost a junior, and then the first class I took of hers I got to know who she was and what she was. Something just clicked, I don't know what, and we became not only friends, but I called her almost immediately junior year by her first name. At that time you did not call a member of the faculty by her first name…We were good friends, but when I left Vassar I didn't expect to see her again. As life had it, I've seen her a great deal.”

From an interview with Winifred Asprey on July 30, 2007, by S. Riane Harper ‘09
http://vcencyclopedia.vassar.edu/interviews-reflections/winifred-asprey.html

Return to Vassar

Like Grace Hopper, Asprey returned to Vassar College as a professor after receiving her PhD in 1944

Taught mathematics and, later, computer science for 38 years

Chair of the mathematics department from 1957 until her retirement in 1982

Bond with Hopper

Friendship between Asprey and Hopper strengthened after Asprey returned to teach at Vassar

Asprey even moved into the house that Hopper and her husband built at Vassar when Hopper went to Philadelphia to work on UNIVAC

- Remained there until her death

Origins of Computing at Vassar

One night in the late 1950s Asprey called Grace Hopper to chat:

> “We talked about computers and she said, ‘Well, why don't you come down and visit me for a weekend, and I'll show you what they are and what they do.’”

At the time Asprey knew very little about computers

> “In the phone call with Grace that night, I said, ‘What do you think about Vassar getting into computers,’ and I never forgot her answer, she said, ‘**I've been waiting for you to wake up**.’”

Computers Controversial at Vassar

Asprey then set out to learn everything she could about computers

Came to believe that computers would be an essential part of a liberal arts education

- A radical idea at the time!
- Vassar faculty, except for the science faculty, were totally opposed
  - Felt it had nothing to do with liberal arts; “it's just a machine”

She Persisted…

Asprey connected with researchers at IBM and other research centers

Lobbied for computer science at Vassar

Began a long fight to convince the College to acquire a computer

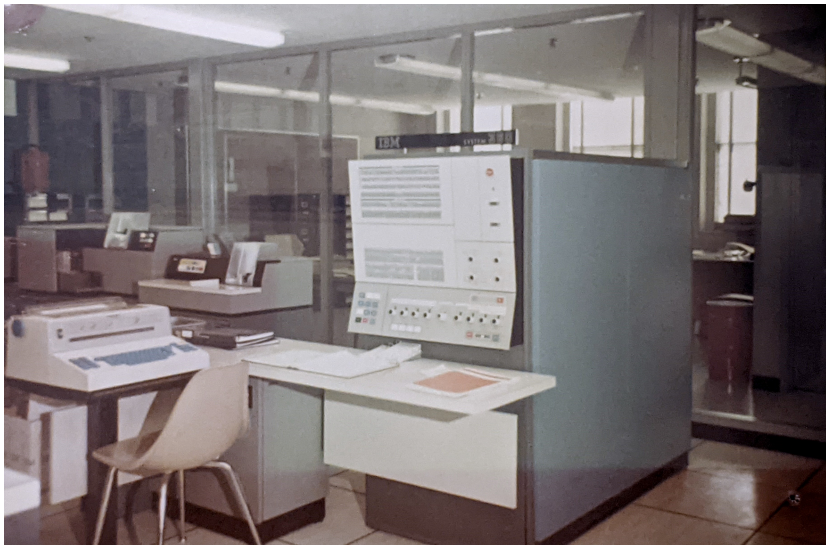
Under her leadership, in **1963** Vassar became one of the first liberal arts colleges to establish a computer center and offer courses in computer science

Established a Math/Computer Science major

Vassar's First Computer

1967: Finally secured funds for the college's first computer

Vassar was the second college in the nation to acquire an IBM System 360 computer



IBM 360/30

Maximum memory size of 64 kilobytes

Came equipped with a card reader and punch, a console, a printer, and a tape drive

Programming mainly in COBOL, RPG, Assembler languages

Fortran used for scientific work

Asprey a big fan of APL

Reaction at Vassar

Vassar Quarterly article on “Vassar’s Newest Jewel” quoted Miss Asprey:

> “On January 11, 1967, Vassar became the proud, though awed, owner of an IBM System 360, Model 30E, a high-speed electronic computer. We are pioneering.”

According to Miss Asprey, faculty and students in the sciences rejoiced about the new acquisition, but others "could see no beneficial relation of a computer to their disciplines.”

The IBM 360 was housed in the basement of Old Laundry Building

Served for both academics and administration

Computer Science Studies was moved from the basement to the first floor of the Old Laundry Building in 1982

Computer Science Comes of Age at Vassar

Change of the Guard

1982

- Winifred Asprey retires
- Vassar acquires a VAX-11780 superminicomputer for academic use

- In the spring of her last semester, Asprey hired two new faculty
  - Brought the number of tenure lines faculty in Computer Science up to four
  - One of these new hires was…me!

- Still no major or department, many courses taught by adjuncts
  - Often, IBMers Asprey had become friendly with

Age of Personal Computers

- In the early 1980s personal computers began to appear
- In the mid-80s Vassar established a small "Microcomputing Center" in the third floor (attic) of the Old Laundry Building
- Computers becoming ever more prevalent
  - Used especially for word processing etc.
  - Some remaining opposition among the faculty
  - One Anthropology professor refused to accept papers that were typed on a word processor

Asprey Computing Lab

1989

The Winifred Asprey Advanced Computation Laboratory is dedicated in Old Laundry Building

Computer Science Gains Ground

- In the later 1980s Computer Science Studies began to be swamped with students wanting to take courses

- **1989**
  - I get tenure, previous chair leaves, I become chair by default (no other tenure-line faculty at the time)

- **1990**
  - With the strong support of then-Dean Nancy Dye, we undertake a departmental review to determine the future of Computer Science at Vassar

Computer Science Becomes Independent

1991

Computer Science major and Department officially established at Vassar!

New curriculum developed to support the full major

1994

Moved to renovated space in the basement of Old Laundry Building

The Building Years

- Throughout the 1990s the Computer Science Department was developing
  - Still only 4 tenure lines
  - In some cases hard to retain faculty, as Computer Scientists were increasingly in demand
- 2001: Height of the dot-com boom
  - Computer Science is a “hot” major
  - Graduated a record 25 seniors

New Millenium

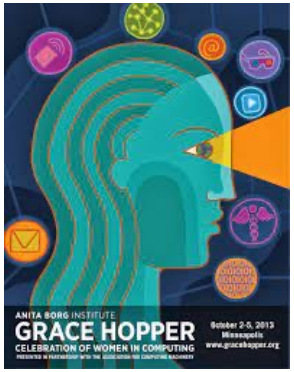
- Early 2000s
  - Got another tenure line
  - Dot-com bust!
- Mid-2000s
  - Faculty stabilizing
  - Hired a second woman CS faculty member: Jenny Walter

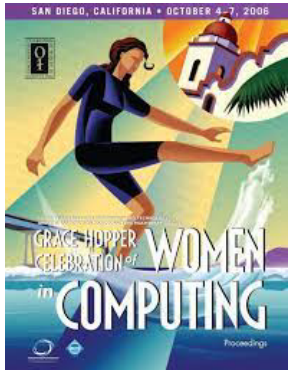
BUT: student numbers in Computer Science plummet across the nation

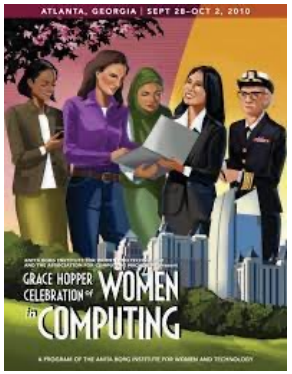
  - Support for CS at Vassar weakens

Grace Hopper Celebration of Women in Computing

- Starting in 2007, largely under the impetus of Jenny Walter, Vassar sends a contingent of women CS majors to the annual Grace Hopper Celebration of Women in Computing







Early attendees

Interest Increases Over the Years

Asprey Center for Collaborative Science

Prior to her death, I worked with Miss Asprey to determine how the funds she planned to leave to Vassar would be best used

Came up with the idea of a Center for Excellence in Science

Shortly after her death, the **Winifred A. Asprey Center for Collaborative Science** was established

- Supports creation and teaching of cross-disciplinary courses
- Funds student research opportunities in the sciences

The Big Move

2014

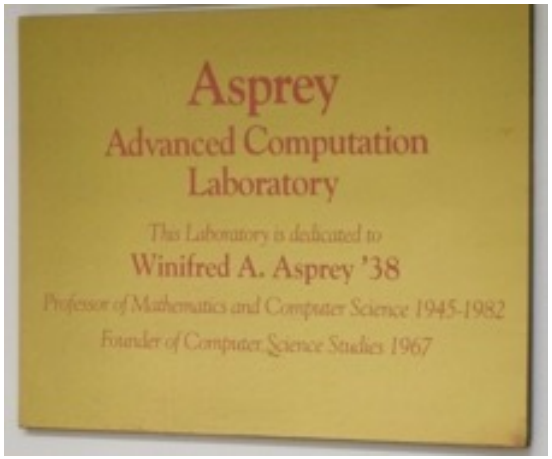
- After years in the basement of OLB, Computer Science is moved into Sanders Physics as a part of the new science complex

Display outside the department office

New, spacious faculty offices

Dedicated classroom with computers at each station

A New Asprey Lab



Temporarily re-configured with fewer stations during the pandemic

2010s to Now

Computer Science has regained popularity as a major after the downturn in 2006-9

Solid uptick in interest, likely due to increased presence of computing in our lives (smart phones, internet, gaming, social media…)

As time goes on, CS is becoming increasingly interdisciplinary

- Use of “big data”, machine learning, etc. in other sciences is sky-rocketing
- Computers are used in art, film, language and literature study, history, etc.

Now

2019: Hired a third woman faculty member, Hannah Gommerstadt

2021: Both Jenny Walter and Nancy Ide retire

We hope to continue the tradition of women leaders in Computer Science at Vassar, all started by Grace Hopper!!

Thank you