

Biografien

www.frauen-informatik-geschichte.de

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Danke an Monika Lanzenberger für die Verwendung der ENIAC Folien!

Warum ist immer nur die Rede von den Männern?

Frauen, wie Ada Lovelace, Edith Clarke, Rózsa Péter, Thelma Estrin, Grace Murray Hopper, Adele Goldberg, Jean Sammet, Dana Angluin oder Nancy Lynch – um nur einige Namen zu nennen – haben ebenso an der Entwicklung der Informatik mitgewirkt.



Hypathia von Alexandria

- Um 370 – 415 n.Chr.
 - Tochter eines griechischen Philosophen und Mathematikers, lehrte als erste Frau an der Universität von Alexandria Philosophie, Mathematik und Astronomie.
 - Bedeutende Leistungen in Algebra, Berechnung des Verlaufs von Sternbahnen und Entwicklung von Messinstrumenten wie etwa Hydrometer.
- Wurde wegen ihrer unabhängigen Lebensweise brutal ermordet.

Ada Augusta Lovelace 1815 – 1852



- Ihr Hauslehrer war ein engl. Cambridge Professor, der sie in Mathematik und Astronomie lehrte.
- Interesse für Maschinen (Webstuhl)
- Mary Sommerville führte sie in die wissenschaftlichen Kreise Londons ein, wo sie 1834 zum ersten mal von Babbages Idee der Difference Engine hörte.
- 1935 Heirat -> Mutter dreier Kinder und Hausfrau.
- Kein Zugang zu Bibliotheken -> Briefkorrespondenz mit Augustus de Morgan.
- 1842 übersetzte sie einen ital. Artikel über Babbages Analytical Engine, dem sie viele Erläuterungen beifügte. Die Arbeit stößt auf Anerkennung, die ihr aber verschwiegen wird.
- 1952 stirbt Ada Augusta Byron Countess of Lovelace im Alter von 36 Jahren.

Ada Lovelace

Prüfungsrelevante Literatur:

- <http://www.agnesscott.edu/liddle/women/ada-love.htm>
- <http://www-groups.dcs.st-and.ac.uk/~history/Biographies/Lovelace.html>

Zum Weiterlesen für Interessierte: Texte zur "Analytical Engine" und die Kommentare von Ada Lovelace:
<http://www.fourmilab.ch/babbage/contents.html>

Die Analytical Engine

Wesentlichste Neuerung ist ihre Programmierbarkeit!

Besteht aus:

- Store, als Arbeitsspeicher, in dem Speicherplatz für bis zu 1000 Werte mit maximal 50 Dezimalstellen sein sollte,
- Mill, die CPU, die im wesentlichen aus der difference engine bestehen sollte.
- Eine Eingabeschnittstelle für Lochkarten, unterschieden nach *operation cards* für die Befehlseingabe und *variable cards* für die Eingabe von Variablen und ihrer Speicheradresse, sowie den *number cards*.
- Eine eigene Bibliothek, die die Analytical Engine sich aus den errechneten Tabellenwerten aufbaut
- Eine Ausgabeschnittstelle entweder für einen Drucker oder für Lochkarten, die in die Bibliothek eingereicht werden

Grace Murray Hopper 1906 - 1992

- Lehrte als Mathematikerin am Vassar women's college und promovierte in Yale.
- Trat während des 2. WK in US Naval Reserve ein und wurde 1944 dem Mark I-Computerprojekt als Coder zugeordnet.
- Wechselte 1949 in Computerfirma und entwickelte UNIVAC I
- 1951 Wörter standen stellvertretend für Unterprogramme, die dann von einem speziellen Programm automatisch in Maschinencode umgewandelt wurden.
- Entwickelte 1956 FLOW-MATIC (Programmiersprache) Geistige Mutter von COBOL

Computer

- So hat man die Leute genannt, die in den Computerlabors der 40er und 50 Jahre ballistische Berechnungen durchführten.
- „Computer“ waren in der Regel Frauen!

Die ersten Computerprogrammiererinnen machten:

- Programmwurf auf der Ebene von Algorithmen und mathematischen Gleichungen.
- Die Umsetzung der Maschinensprache (die Stellung der einzelnen Schalter).
- Überwachung und Bedienung der laufenden Rechenmaschine.

Notwendige Programmier-Fähigkeiten wie Geduld, Ausdauer und Detailliebe wurden Frauen zugeschrieben.

ENIAC

ENIAC (Electronic Numerical Integrator And Computer)

2. ENIAC Women:

- **Kathleen** McNulty Mauchly **Antonelli**
- **Jean** Jennings **Bartik**
- Frances **Betty** Snyder **Holberton**
- **Marlyn** Wescoff **Meltzer**
- **Frances** Bilas **Spence**
- **Ruth** Lichterman **Teitelbaum**

ENIAC

- Electronic Numerical Integrator And Computer
- Constructed by John Mauchly and John Eckert in the Moore School of Engineering
- First large-scale, electronic, digital computer capable of being reprogrammed to solve a full range of computing problems
- ENIAC construction: 1942 - 1946
- In operation until 1955
- Designed and built to calculate artillery firing tables for the U.S.Army's Ballistics Research Laboratory
- Used for design of the hydrogen bomb



ENIAC

- Contained 17,468 vacuum tubes, 7,200 crystal diodes, 1,500 relays, 70,000 resistors, 10,000 capacitors
- Weighed 27 t, 2.4 m by 0.9 m by 30 m, took up 167 m², and consumed 174 kW of power
- 40 units working in parallel
- Input was possible from an IBM card reader, an IBM card punch was used for output
- Used ten-position ring counters to store decimal digits, each digit used 36 tubes
- ENIAC simulation: <http://page.mi.fu-berlin.de/~zoppke/eniac/>



ENIAC

- 5000 simple addition or subtraction operations every second
- 385 multiplication operations per second (special Multiplier unit)
- 40 division operations per second or 3 square root operations per second (special Divider/Square-Rooter unit)
- Some electronics experts predicted that tube failures would occur too frequently
- This prediction turned out to be partially correct: several tubes burned out almost every day, leaving it nonfunctional about half the time
- Longest continuous period of operation without a failure was 116 hours



[Wikipedia]

Kathleen Antonelli

- Born Kathleen Rita McNulty in Ireland
- February 12, 1921 – April 20, 2006
- Emigrated to the United States in 1924
- Chestnut Hill College for Women in Philadelphia
- Studied mathematics and graduated in 1942
- Additional courses in accounting, money and banking, business law, economics, and statistics
- Army's call: Wanted: Women With Degrees in Mathematics
- In 1942, employed as a mathematician by the Moore School of Engineering, University of Pennsylvania (Team with Frances Spence)
- Computing ballistics trajectories used for artillery firing tables, "sub-professional" pay grade, official civil service title: computer



[Wikipedia, WWT]

Kathleen Antonelli

- A total of about 75 young female computers were employed at the Moore School
- Taking courses from Adele Goldstine, Mary Mauchly, and Mildred Kramer
- Moved to work on the differential analyzer, largest and most sophisticated analog mechanical calculator of the time, invented 1931 by Vannevar Bush of MIT and made more precise with improvements by the Moore School staff
- A single trajectory computation - about 40 hours of work on a mechanical desk calculator - could be performed in about 50 minutes
- Together with Frances Spence she led the teams of women doing the calculations



[Wikipedia, WWT]



[Wikipedia]

Kay McNulty, Alyse Snyder, and Sis Stump operate the differential analyzer in the basement of the Moore School of Electrical Engineering, University of Pennsylvania, Philadelphia, circa 1942-1945.

Kathleen Antonelli

- In June 1945, she was selected to be one of ENIAC's first programmers
- Received 3 months training at Aberdeen Proving Grounds, Maryland
- The ENIAC completed the same ballistics calculations in about 10 seconds
- Took one or two days to set the computer up for a new set of problems, via plugs and switches
- Programming the ENIAC involved discretizing the differential equations
- Having devised a program on paper, the women physically program the machine
- Much of the programming time of the ENIAC consisted of setting up and running tests



[Wikipedia, WWT]

Kathleen Antonelli

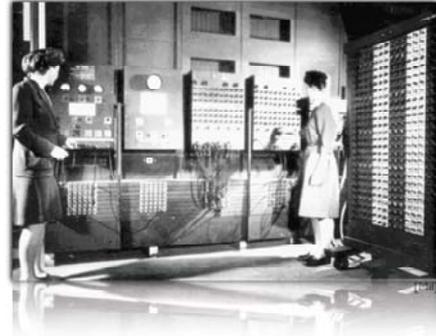
- In 1947 the ENIAC was moved to Aberdeen Proving Grounds's Ballistics Research Laboratory
- Married John Mauchly in 1948, resigning her post at Aberdeen, had five children
- Worked with her husband on program designs and techniques for many years including the BINAC and UNIVAC
- Married photographer Severo Antonelli in 1985
- Honorary Doctorate from Chestnut Hill College in 1997
- Medal in computer science is named in her honour



[Wikipedia, WWT]

Frances Spence

- Born Frances Bilas in Philadelphia March 2, 1922
- Majored in mathematics with a minor in physics and graduated in 1942 at Chestnut Hill College
- Hired in 1942 by the Moore School of Engineering to compute ballistics trajectories as a computer
- Moved to work on the differential analyzer
- Joined the team of ENIAC programmers at the Moore School
- Moved to Aberdeen Proving Ground's Ballistics Research Laboratory
- In 1947, she married Homer Spence, an Army electrical engineer from the Aberdeen Proving Grounds and resigned to raise a family



Jean Bartik

- Born Betty Jean Jennings in Gentry County, Missouri in December 27, 1924
- Grew up on a farm, the 6th of 7 children
- She was playing softball, becoming a local star
- Attended Northwest Missouri State Teachers College, majoring in mathematics in December 1944, the only female Math major at Northwest
- In 1945, she was hired by the University of Pennsylvania working, World War II
- About three months after she moved to the ENIAC team together with Betty Holberton
- They were given block diagrams of the ENIAC and told to learn how to program it (No manuals, no teachers, and no ENIAC.)



Jean Bartik

- Married 1946, was almost fired after she got married because the director of the Moore School thought she would leave as soon as she became pregnant
- Working for Eckert-Mauchly Computer
- Became part of a group charged with converting the ENIAC into a stored program computer, making it easier and faster to program larger and more sophisticated problems
- Programmed the BINAC
- Designed logic and an electrostatic memory backup system for UNIVAC I
- Took 16 years off to have three children and came back in 1967



Jean Bartik

- Worked in publishing about minicomputers and communications, marketing minicomputers, providing market support, running users' groups, doing competitive analysis
- In 1985, she changed to selling real estate
- Gives talks and interviews
 - "We were down at the system level," said Bartik, "a physicalization of if/then statements".
 - "One of my goals in life was not to have kids and not get married. I used to see all these farm women with these kids hanging off their skirts and women who said they couldn't do something because of their husband."



Jean Bartik

- Jean Jennings Bartik Computing Museum at Northwest Missouri State University
- Honorary Doctor of Science Degree from Northwest Missouri State University in 2002



Betty Holberton

- Born Frances Elizabeth Snyder in Philadelphia in 1917
- March 7, 1917 – December 8, 2001
- Daughter and granddaughter of astronomers, who encouraged her ability in mathematics
- Hoped to major in Mathematics at the University of Pennsylvania but was discouraged by a professor who thought that women belonged at home
- Majored in English and Journalism and worked initially for the Farm Journal (doing statistics)
- In 1942 she began as a "computer", moved to the ENIAC team 1945



Betty Holberton

- Took responsibility for the central unit that directed program sequences, the ENIAC was a parallel processor that could execute multiple program sections at once
- Joined the company of Eckert and Mauchly and worked on the first commercial computers
- Wrote the C-10 instruction code for BINAC and UNIVAC I, which was described as "the basis for all subsequent programming languages"
- Designed the control console for UNIVAC I and its computer keyboards and numeric keypad



Betty Holberton

- In 1952, she designed the first sort merge generator for UNIVAC I
- Was responsible for much of the first model's software, which the U.S. Census bureau used to process 1950 data
- Served on the COBOL committee to design the first business language to operate across computer platforms
- Wrote standards for FORTRAN and served on national and international computer standards committees for decades



Betty Holberton

- Married John Vaughan Holberton, had 2 daughters
- 1942-1947 The Moore School and continued this work at the U.S. Army Ballistics Research Laboratory, Aberdeen Proving Ground
- 1947-1950 the Eckert-Mauchly Electronic Control Company to help with the development of the UNIVAC
- 1950-1953 Remington-Rand
- 1953-1966 Applied Mathematics Laboratory, David Taylor Model Basin
- 1966-1983 National Bureau of Standards



Betty Holberton

- Retired from the bureau, now the National Institute of Standards and Technology, in the 1983
- Came up with commands that made sense to non-experts (e.g., A for "Add")
- "I spent half my time trying to figure out what people needed in computers, and the other half convincing an engineer it was his idea, so the work would be done."
- Late credit for her efforts to make the language and equipment of programming user-friendly
- In 1997 she received the Augusta Ada Lovelace Award



Marlyn Meltzer

- Born Marlyn Wescoff
- Graduated from Temple University (Philadelphia, Pennsylvania) in Mathematics 1942, minored in business education
- Hired by the Moore School of Engineering later that year to do computations for the project they had for the Weather Bureau
- In 1943, she was hired to perform calculations for ballistics trajectories (Team with Ruth Teitelbaum)
- Moved to ENIAC team in 1945
- Resigned in 1947 to get married before ENIAC was relocated to the Aberdeen Proving Grounds



Ruth Teitelbaum

- Born Ruth Lichterman
- 1924 - 1986
- Graduated from Hunter College (New York) with a B.Sc. in Mathematics
- Hired by the Moore School of Engineering to compute ballistic trajectories
- Starting 1945 she worked with the ENIAC
- Relocated with the ENIAC to Aberdeen, Maryland and stayed for 2 years
- Taught the next generation of ENIAC programmers



Women of the ENIAC An Oral History

- WITI New York, February 23, 2005
- Online: http://www.witi.com/center/aboutwiti/eniac_video.php
 - Introduction with Robin Raskin (Video 03:35)
 - Kay Antonelli (Video 13:36)
 - Jean Bartik (Video 32:21)
 - Discussion with Antonelli and Bartik (Video 33:25)



Rózsa Péter 1905-1977

studierte ab 1922 an der Universität Budapest zunächst Chemie, wandte sich dann aber der Mathematik zu. 1927 machte sie ihren Abschluss und unterrichtete als Lehrerin. Nachdem sie von Göbels Theorem gehört hatte, entwickelte sie einen eigenen Zugang mit rekursiven Funktionen, über die sie auf dem Internationalen Mathematikkongress 1932 in Zürich vortrug.

1935 „summa cum laude“ in Budapest promoviert.
1937 Mitherausgeberin des Journal of Symbolic Logic.
Ab 1939 als Jüdin Lehrverbot und war auch kurze Zeit im Ghetto von Budapest.
1945 wurde sie Dozentin an der Pädagogischen Hochschule in Budapest.
1951 erschien ihr Buch „Rekursive Funktionen“, das viele Auflagen erlebte und ihr den Kossuth-Preis des ungarischen Staates einbrachte.
1955 vereinfachte Péter die erste bekannte nicht-primitiv-rekursive Funktion (Ackermannfunktion) bei gleichen Eigenschaften zu deren heutigen Form, seitdem wird diese auch Ackermann-Péter-Funktion genannt. Im selben Jahr wurde sie Professorin an der Universität Budapest, wo sie bis zu ihrer Emeritierung 1976 blieb.

Erst in den 60er Jahren verschwanden die Frauen zunehmend aus dem Bereich der Computer-Programmierung und aus dem Bewusstsein der ZeitgenossInnen als tragende Mitarbeiterinnen einer grundlegenden Entwicklung.