National Women’s History Month

Computer Wonder Women: the mother of the internet
Technology Jobs for Women
Women and Their Role in the Development of the
Modern Computer

Changing Girls' Attitudes About Computers: Technology Jobs for Women

1) Special Edition
2) Computer Wonder Women
3) What you can do to help GRRLS get into technology!
   Here are all kinds of resources, mentoring programs, projects, and
   links for helping girls using science, math, technology, to cross that
digital divide.
4) Best Online Resources For Women and Minorities in Science and
   Technology
6) HERSTORIES Classroom Project
The Educational CyberPlayGround founded by a woman provides many wonderful resources to help you discover the important contributions, discoveries, and achievements made by women throughout our history. We hope you will find information to use all year round and for a lifetime of learning.

Hedy Lamarr's Invention Finally Comes of Age

By Gary Chapman
Director of the 21st Century Project at the University of Texas at Austin.
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The obituaries for movie actress <strong>Hedy Lamarr</strong>, who died at her home in Florida on Jan. 19, 2000 at age 86, all mentioned the fact that <strong>she co-invented</strong> an important technology for radio communications called “<strong>frequency hopping</strong>”; But none of the obituaries described the significance of her invention for current and emerging technologies, or the fact that her intellectual breakthrough will fuel the next great boom in Internet use. What was called “frequency hopping” in the 1940s, when <strong>Lamarr</strong> and her friend George Antheil developed the idea, is now generally called "<strong>spread spectrum</strong>" wireless communication. Looking around my house, I can see that it's rapidly filling up with spread spectrum devices dependent on Lamarr's and Antheil's innovation.

There are my cordless and wireless phones, for example. Just about every digital wireless phone uses a version of spread spectrum techniques. For Christmas I
got a hand-held global positioning satellite device, a little box that tells me exactly where I am; GPS uses spread spectrum too. I expect to be using a lot more spread spectrum tools in the future. Dale Hatfield, director of the Office of Engineering and Technology of the Federal Communications Commission, told me last week, “Spread spectrum appears to be the technology of choice for the next generation of mobile data devices.” As everyone knows by now, wireless is where everything related to the Internet is headed.

If Lamarr had been able to retain her patent rights, she would possibly have become the richest person of all time. But she struggled with finances for most of her later years -- she was even arrested for shoplifting twice. Her story highlights the weird tragedies of the patent system when an inventor develops an idea decades ahead of its time.

The tale of Lamarr's technical contributions is familiar to many engineers, but largely unknown among the general public. It's possibly the oddest and most ironic story in recent technological history.

Hedy Lamarr was born as Hedwig Kiesler in Vienna in 1913, and she was famous before she left her teens because of a scandalous nude scene in her first movie, the Czech film “Ecstasy” released in 1932. She married a wealthy Austrian industrialist, Fritz Mandl, when she was 19. Mandl was so jealous of her beauty that he tried to prevent her from leaving the house, which meant that Hedy sat through many dinner conversations and some technical meetings where she apparently absorbed a remarkably advanced education in radio technology.

Lamarr eventually escaped this loveless marriage and made her way to London, where she was discovered by Louis B. Mayer, the head of MGM. Mayer brought her to Hollywood, installed her in his stable of studio actors and billed her as “the most beautiful woman in movies”

Lamarr met George Antheil at a Hollywood party. He was an equally unlikely candidate for technical innovation -- he was a pioneer in avant-garde music in the 1930s, and his specialty was composing mechanistic pieces for player pianos.

Lamarr explained her ideas to Antheil about developing a method for communications that could not be intercepted or jammed, by "hopping" radio signals over different frequencies. Antheil provided the mechanical means to do this by using his knowledge of player pianos. Their invention used a paper tape, like player piano rolls, to synchronize radio communications that would jump from one frequency to another. They shared the patent for this device in 1942.

Lamarr's and Antheil's invention was not used by the military until 1962, when it helped secure communications between ships involved in the Cuban missile crisis. By then, their patent had expired. Patents last only 17 years. Even though Lamarr's work became crucial to military communications through the most intense period of the Cold War -- eventually embedded in the country's entire nuclear command and control system -- she never made any money from her technical work, nor did Antheil. Throughout the 1950s, '60s and '70s,
spread spectrum technologies were highly classified and available only for military applications. But in 1985, the Federal Communications Commission began to relax its rules, and spread spectrum was opened for commercial development. The first applications were for commercial satellite services, but the technology quickly became the bedrock for mobile telephones. Qualcomm, for example, the booming San Diego-based mobile telephone company, was built on spread spectrum applications.

In recent years the FCC has released segments of the radio bandwidth for unlicensed radio communication, and this bandwidth is being used by spread spectrum applications. Spread spectrum radio communication has the advantages of getting more digital bits into a segment of radio bandwidth, of reducing device interference, and increasing security. Without this innovation, wireless phone users would be talking to and hearing each other without wanting to, or else the number of phone users in a given area would be very limited. Think about all the cell phones in Los Angeles, and thank Hedy Lamarr.

There is a handy match between the way spread spectrum works and the way the Internet works, because Internet data packets can be “hopped” over many frequencies and reassembled at their destination, providing very fast data transmission rates. Cisco Systems, the giant Internet routing company, already offers a fixed wireless, point-to-point spread spectrum network connection at 45 million bits per second.

The real promise of spread spectrum technologies is in rural areas, neighborhoods, schools and Third World countries, where relatively inexpensive wireless devices can substitute for expensive ground wire networks. Wireless Internet activist Dave Hughes of Colorado Springs, Colo., has used spread spectrum networks to connect people in the jungles of Puerto Rico, in the remote woods of Wisconsin and Montana, and in the plains of Mongolia. A presentation Hughes gave in Austin, Texas, in 1998 led to a change in the state’s Telecommunications Infrastructure Fund, the country’s largest public fund for wiring communities. Now rural Texas towns can apply for grants to network their communities with spread spectrum wireless devices.

Paul Hughes successfully lobbied for Hedy Lamarr to be honored with a special “Pioneer Award” from the Electronic Frontier Foundation in 1997.

Hedy Lamarr also reportedly took some comfort in her knowledge that she had produced an idea of great use to people all over the world. She did live long enough to understand the impact of her invention. As Dale Hatfield said, her invention was a “fundamental breakthrough.”

Hedy Lamarr once said, with some ironic bitterness, “Any girl can be glamorous. All you have to do is stand still and look stupid.”; She was glamorous, all right, but she was anything but stupid.

Message to Peter Antheil
Many years ago, on the eve of World War II, a well-known actress of the day and my father, an avant-garde American composer, while at a dinner party, thought up an interesting scheme to control armed torpedoes over long distances
without the enemy detecting them or jamming their transmissions. While they had the foresight to patent their invention, the term of the patent lapsed without either of them realizing any money from their invention, which formed the basis of what was to later become spread-spectrum communications.

**If you would like to see a remarkable US Patent filed by the 'the most beautiful woman in the world' of 1940, actress Hedy Lamarr which first described 'frequency hopping' - the basis of many advanced spread spectrum radios today click on [Hedy](http://example.com)**

![1970 Wang Computer used by the computer club @ Cheltenham High School, PA](http://example.com)

In the interest of historical accuracy and completeness...

"Typing" as a skill was, at the end of the 19th and beginning of the 20th century, one of the barriers to entry for women in secretarial positions (At the time, being a secretary (a male job) was a career path to the job you were a secretary to...so, the secretary to the President could reasonably be expected to become President eventually). Typewriters were difficult to use and the knowledge was arcane enough that both physical strength and a unique, technical, skillset were used as arguments why women could never be secretaries.

Secretarial schools (most prominently, the Katherine Gibbs School) were founded by feminists to give women the skills and experience that would enable the to break into these valuable -- and male -- career paths.

"Secretary" almost immediately lost its value as a career stepping stone, and the job became a female ghetto. It's worth noting that executive secretaries were still doing very similar work to what they'd done when the jobs were held by men.

The typewriter -- and the skill set necessary to use it -- became associated with women, and in particular with a job that invariably appeared in the "Help Wanted - Female" section of the classifieds. But then came computers...

Computers (originally a term that referred to people who did computing, [a women's job] that is mathematical calculation) eventually became interactive, but that required the horrifyingly "feminine" skill of using the keyboard. Which looked and operated like a typewriter.

Hence: "keyboarding".
In fairness, the term keyboarding was also developed in response to the fact that “typing” is largely a text-oriented task and computer keyboards were used for a wide variety of tasks having nothing to do with text manipulation. It wasn’t until dedicated word-processors started to fade away that the term “keyboarding” started to gain real currency. All of this makes the work associated with a keyboard a primary example of the “feminization” of previously valuable (and predominantly “male”) work. In fact, one of the reasons research on similar historical developments is so difficult is precisely because of the changes in terminology as the perception of certain work changes gender. Not surprisingly, this is happening a lot in technology..."keyboarding" is just one example.

RESOURCES

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WOMEN'S HISTORY

EVERYTHING NEEDED BY WOMEN ENTREPRENEURS

MORE WOMEN PIONEERS NASA'S Female Frontiers Project

ALL ABOUT WOMEN'S HISTORY

NATIONAL WOMEN'S HISTORY PROJECT

AUSTRALIAN WOMEN'S

LIVING THE LEGACY The Women's Rights Movement1848 - 1998

HISTORY CHANNEL'S WOMEN'S HISTORY

WOMEN'S SOCIAL HISTORY

SCHOLASTIC'S WOMEN'S HISTORY

In celebration of the 85th anniversary of women's right to vote in the United States, the Library of Congress is pleased to announce the online release of Women of Protest: Photographs from the Records of the National Woman's Party. This presentation is a selection of 448 of the approximately 2,650 photographs in the Records of the National Woman's Party.
Women in Broadcasting History

Dr. Mae C. Jemison
the world's first woman of color to go into space, started DJF in honor of her late mother.

CYBERFEMMY AWARD
Given each year to an individual (or group) demonstrating unique vision and commitment to the transformation of the net culture through cyber feminist intervention.

White House Project
The men and women of the White House Project are working to change the US political climate so that women from all walks of life can launch successful campaigns for the US Presidency and other key positions. This group purports to change the political climate so that one day, we can have a woman president. You can cast your vote for the next woman VP.

Chief Wilma Mankiller
Wilma Mankiller won the 1990 Henry G. Bennett Distinguished Service Award. This site presents a short biography of this Cherokee Nation Chief.

Women Leaders Online
Women Leaders Online and Women Organizing for Change empower women in politics, society, the economy, the media, and cyberspace by sending e-mail alerts on important issues to a growing network of activists.

4000 Years of Women in Science
Brief description of the occupation and/or accomplishments of women included here.

Women's History Month in March at the Smithsonian Institution

Smithsonian Center for Education and Museum Studies
900 Jefferson Drive S.W. A&I 1163 Washington, DC 20560-0402
phone (202) 786-2403
Deborah Thomas National Digital Library Program Library of Congress
202/707-5963 deth@loc.gov

Wisconsin Educational Communications Board's March Surf Report
Find information about women artists, writers, physicists, mathematicians, athletes or composers. Learn about the history of women's suffrage or how many women are serving in governments around the world today.

Ancient Sites
In 1999, dozens of members of created dozens of web sites (for many, their first web sites) and held two weekends of online chats on women in history. All the transcripts and most of the web sites created for this conference are still up.... and some that have been taken down have been reposted in honor of Women's History month. These are a marvelous source of information about women in history.

**Women in Uniform**

Did you know that the Marine Corps was founded in Philadelphia? Among the earliest American women's casualties, during the Civil War: In 1863, at age 19, a woman known only as Emily, ran away from home and joined the drum corps of a Michigan Regiment. The regiment was sent to Tennessee and during the struggle for Chattanooga a minnie ball pierced the side of the young soldier. Her wound was fatal and her sex was disclosed. At first she refused to disclose her real name but as she lay dying she consented to dictate a telegram to her father in Brooklyn. "Forgive your dying daughter. I have but a few moments to live. My native soil drinks my blood. I expected to deliver my country but the fates would not have it so. I am content to die. Pray forgive me...... Emily."

And the more recently: Major Marie T. Rossi was killed 1 March 1991 in Saudi Arabia in Operation Desert Storm. She was flying a CH-47D CHINOOK Cargo Helicopter when it crashed into an unlit Microwave Tower in bad weather. Major Rossi was 32 and a native of Oradell, NJ. [more casualties]

**The Women's Memorial** At the gate's of Arlington.

**National World War II Memorial**
First privately-funded national monument, for men and women who served. You can contribute.

**Women in the Marine Corps** History of women Marines.

**American Women in Uniform** Great women's military history site.

**The Army Nurse Corps:** A Commemoration<

**One Woman's Army: A Black Officer Remembers**

**World Trade Center Crisis Curriculum** contains more links that empowers girls who want to be able to protect the country by learning to be ham radio operators and acting as the first line of defense.

**BEAUTIFUL WOMEN**

*Boost another woman's self-esteem*
Did you know that if shop mannequins were real women, they’d be too thin to menstruate?

There are 3 billion women who don't look like supermodels and only eight who do.

Marilyn Monroe wore a size 14.

The average woman weighs 144 lb. and wears between a 12 to 14.

One out of every four college aged woman has an eating disorder.

The models in the magazines are airbrushed -- not perfect!

A psychological study in 1995 found that three minutes spent looking at a fashion magazine caused 70% of women to feel depressed, guilty, and shameful.

Put down the stupid magazines!!

Models twenty years ago weighed 8% less than the average woman. Today they weigh 23% less

http://www.edu-cyberpg.com