Software Engineering Module

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"To produce a short (2-4 page) biography of a key software engineer, discussing the work and impact of the individual."

One software engineer who inspires me is Radia Perlman. Perlman inspires me because of her impactful technical achievements, her efforts to make it easier to understand computer networks by eliminating jargon, and her insights about being a woman in tech.

Perlman is best known for her creation of the Spanning Tree Protocol (STP) that allows Ethernet networks to identify paths between machines while preventing the creation of loops, which could bring down the whole system.[1] It took her less than a week to devise the algorithm and the protocol for STP; but the invention gained her the title "Mother of the Internet" -- a claim that she loathes because she believes that "the Internet was not invented by any individual."[2] Still, STP remains in use today and has had a significant impact on the scalability of the Internet.[3]

In addition to creating STP, Perlman worked on its replacement, TRILL (TRansparent Interconnection of Lots of Links), to allow Ethernet to use bandwidth more optimally.[4] Additionally, she has contributed a variety of algorithms and trust models to help applications decide what connections are trustworthy as part of her network security efforts.[5] Perlman also

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[1] https://en.wikipedia.org/wiki/Spanning_Tree_Protocol

[2] https://www.theatlantic.com/technology/archive/2014/03/radia-perlman-dont-call-me-the-mother-of-the-internet/284146/

[3] https://science.howstuffworks.com/innovation/big-thinkers/mother-of-internet.htm

[4] https://searchnetworking.techtarget.com/definition/Transparent-Interconnection-of-Lots-of-Links-TRILL

[5] https://www.scribd.com/doc/14790526/Trust-Models

has over 100 issued patents and has received many awards including being inducted into the Internet Hall of Fame in 2014.[6]

Furthermore, Perlman has worked to eliminate unnecessary jargon from the computer networking world to show others that overly complicated explanations don't have to define the tech space. In an interview for the Atlantic, Perlman states, "My designs were so deceptively simple that it was easy for people to assume I just had easy problems, whereas others, who made super-complicated designs (that were technically unsound and never worked) and were able to talk about them in ways that nobody understood, were considered geniuses."[7] I have found that there are many acronyms in tech that make it hard to understand quite simple topics, possibly to create feelings of superiority and exclusivity in the tech world. Usually, however, this over-complication simply leads to feelings of imposter syndrome. Through her textbook, *Interconnections,* on how parts of computer networks work, Perlman is working to transform the field from being "murky" and "full of jargon and hype" into an area of study that is "conceptually thought-provoking" and yet "easy to understand."[8] The jargon overcomplicates the problems and scares people away, people who could have a tremendous impact on the field just as Perlman has.

While Perlman's technical achievements are impressive, what I find more inspiring is her humility and honesty about navigating the world of tech as a woman. At MIT in the early 1970s, Perlman was one of 50 or so women in a class of 1,000. As an undergraduate at MIT, her first programming job was at an MIT AI lab working on a system for teaching young children how to program using tactile controllers and buttons. Through this system, she

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[6] https://internethalloffame.org/inductees/2014

[7] https://www.theatlantic.com/technology/archive/2014/03/radia-perlman-dont-call-me-the-mother-of-the-internet/284146/

[8] https://www.theatlantic.com/technology/archive/2014/03/radia-perlman-dont-call-me-the-mother-of-the-internet/284146/

invented tangible computing, but she admits that she abandoned this path because she worried that she would not be taken seriously as a software engineer if she was creating systems for children.[9] Even though her work created a new field of computing, she is open about how often being the only woman in her classes and at work made her feel like she had to prove her worth.

Additionally, too often we hear about the successful software engineer who built their own computer as a child and always knew that they wanted to study computers; Perlman is an excellent antidote to that narrative because she clearly has had a high impact on computer networks, but she stumbled upon software engineering unintentionally. When describing herself as a child, Perlman helps dismantle the stereotype that all successful software engineers played with computers as children and have always been interested in taking things apart. She says, "I found math and science classes in school effortless and fascinating. However, I did not fit the stereotype of the 'engineer.' I never took things apart or built a computer out of spare parts."[10] She was introduced to programming when a teaching assistant in one of her physics classes recruited her to be the programmer on his project because she didn't know how to program so he figured he wouldn't have to pay her.[11] Like myself, Perlman did not start dead-set on studying computers because she had played with them as a child like many noteworthy people in tech say they did. Instead, she viewed computer science as an extension of her interest in math, and her path in college happened to lead her to making vital contributions to the Internet.[12]

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[9] https://www.lennyletter.com/story/broad-band-excerpt

[10] https://www.theatlantic.com/technology/archive/2014/03/radia-perlman-dont-call-me-the-mother-of-the-internet/284146/

[11] https://www.tynker.com/blog/articles/ideas-and-tips/radia-perlman-a-pioneer-many-times-over/

[12] https://www.tynker.com/blog/articles/ideas-and-tips/radia-perlman-a-pioneer-many-times-over/

Also, one of the most relatable stories Perlman tells in an interview is of having to walk downstairs to get to the women's restroom. She once put up signs in the bathroom at the MIT AI lab declaring it gender-neutral -- "saying something about, 'this bathroom does not discriminate based on gender, height, or any other irrelevant properties'." But she was forced to take the sign down and continue to waste her time walking down a floor to get to the women's restroom.[13] To this day, one of the engineering buildings at my home university[14] has levels where there is only one bathroom -- and it is always just a men's bathroom, never just a women's. I teach Girls Who Code on one of these floors, and I, like Pelman, have labelled bathrooms as being open to all during the class so the students don't have to adjust to the idea that my university still hasn't figured out how to give them the same access to bathrooms that men have.

Finally, to highlight the lack of women in senior positions in tech, Perlman, as a fellow at Intel in 2010,[15] would "truthfully tell visitors that she had her own private restroom. They'd be impressed, until one saw her walk into the women's restroom. 'The more senior you get, the fewer women there are,'" she would say.[16] Wow.

Overall, I find Perlman inspiring not only because she has had a tremendous technical impact on the Internet through her contributions to networking protocols and network security, but also because she has worked to rid computer networking of overly complicated jargon and has instead focused on explaining material in an exciting yet straightforward manner. As a result, Perlman is an example of a software engineer who has achieved greatness without adopting a pompous attitude. Finally, her frankness about the experiences of women in tech is quite refreshing.

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[13] https://www.lennyletter.com/story/broad-band-excerpt
[14] I am a visiting student.
[15] https://newsroom.intel.com/news-releases/radia-perlman-named-intel-fellow/#gs.99ur8m
[16] https://www.lennyletter.com/story/broad-band-excerpt