

## **Women in Cyber Security**

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**Questions posted by Robert Abel of SC Magazine on May 22, 2017 to Dr. Bhavani Thuraisingham of the University of Texas at Dallas and her Answers on May 24, 2017**

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What do you feel are some of the biggest reasons that more young ladies aren't showing an interest in tech and cybersecurity and what can schools do to change this?

There are many reasons. First of all STEM education has to be emphasized from a very young age. I would say as early as K or G1. This will then motivate girls to get into STEM. Second, it is well known that women like jobs that are nurturing like medicine, nursing and teaching. Engineering and Technology jobs are not. So it has to be stressed to the girls that engineering and technology work help humans. For example, you will not have Facebook and Instagram if not for technology. Note that it has been written (e.g., the Atlantic) that majority of the Instagram users are female. Therefore, why not work in areas that will benefit humanity. Unlike hardcore engineering subjects, IT can be made much more appealing to girls especially application oriented subjects like human computer interaction and social media. More importantly, girls need role models. While it has improved a lot, there are still few women at the top – e.g., CEOs and Vice Presidents at Tech companies and senior administration at universities (e.g., dean, provost, president). This could also be keeping girls away from tech.

Do you think a lack of early education in cybersecurity and tech are keeping young girls from pursuing careers in tech, if so how can we address this, and if not what are additional factors that are steer them away and how can they be addressed early on in life?

Every effort must be made to train girls in technology at a very young age. Usually our habits are formed by the time we are 5. So I would say girls should develop an interest in math and science as early as 10. There are now so many coding camps for K1-12. It would also be good for girls to join coding camps for girls. Only reason I am saying this is because they will not be intimidated by the boys. Also, they can focus 100% on their work instead of being conscious of the boys. While some improvements are being made in big cities, we are failing our children, especially girls, in the rural areas. It is frustrating that there is no funding for educating rural America. When there is a lack of resources parents usually tend to favor the sons and spend the money on the boys education. High quality affordable education should be a right of every child.

What are some of the things that got you interested in technology and where there any resources that helped you as a woman that you would have liked to see more of that could have potentially made more women want to pursue the same career path?

I had many advantages. First my mother was studying 1st year London (external) BS in Math and Chemistry when she had to stop her education to get married. So right from the time since I was five I would study Math with her. It became so much fun for me. I would say my interest in science was also due to her. Also, I come from an all-girls family. So my parents did not prioritize the resources. I also went to an all-girls school run by Irish nuns. So there were no boys to distract me. There was never a question that I would not go to university. But most people from where I came from want their children

to do medicine. So the question was would I do bio sciences or physical sciences and I chose the latter (will email you the link to an article I wrote recently). Then in college I chose Math and Physics for my BS and Theory of Computation for my MS and PhD and after working for 5 years as a visiting faculty and in industry doing software development I got a very lucky break in 1985 to work on cyber security at Honeywell. I have always been motivated and my objective has been to maximize on all the opportunities in front of me. So I built my career step by step. Again I cannot stress enough the roles parents and teachers have to play to get the girls motivated. There may be one or two out of 100 who are self-motivated. But many of us need support.

Are there any additional programs that are doing a good job of getting women involved in tech and what are some of the key factors that help them get women interested?

There are now organizations such as Girls who code, Women in Cyber Security, Women in Data Science that work with girls and women. The latter two are for undergrad and grad students while the former is for K-12. Last year we ran a program funded by GenCyber which is a cyber security programming course for both girls and boys. I would say the percentage of girls in the class was around 40% which is a high number. Also we have a high percentage of girls doing MS and PhD from India and China (India for MS and China for PhD). Children's education is the #1 priority for parents on those countries. Unfortunately the drive is not there in the US. Another thing I say when I address girls is that computer science is a high paying field. Why not get that education so that you can be self sufficient and don't have to be in any relationship because you have to. (will send link to a second article on this). Money also could be a strong motivator.

Do you think tech companies have a responsibility to "prime the pipeline" to get more people interested in tech at an early age and if so what should they take into consideration to ensure that they also appeal to girls as well as boys?

While Tech companies are supporting Women in Cyber Security and Grace Hopper events, they have to run a business. Therefore they don't care where you come from provided you can do the job. Therefore the incentive is not there for them to nurture US citizens in tech. This is because there are thousands of highly qualified men and women in tech who can fill the positions they have. Therefore, while I am grateful for what they are doing they have to do more. Many of our US citizen undergraduate students don't pursue graduate degrees (MS level) as they don't want to get loans. Surely if the tech companies can pay for the graduate education of these students including women we can have more students interested in MS education.

Do you think there are any unique challenges to more people of color in tech as well and if so how could we better address these issues?

I would say there are more challenges for women than people of color in tech. I think at least a third of Silicon Valley has Indian men working in tech. It has become very natural now for VCs to expect Indian men to be part of a team. The Silicon Valley culture is not suitable for women. These men work closely, consuming large amounts of coffee and sleep at work. It is tough for women to do this especially if they have families or partners. The good news about tech is that you can stay home and work. This should attract more women. But people want to hire those who look like them. Since there are very few men from the disadvantaged minority groups (usually men of color) and women (any group) in tech it is hard for these people to break in. We have to figure out some way to break the barrier.

If you had unlimited access to resources, how would you go about getting more women and minorities involved in tech?

This is the toughest question you have asked. So far I have done what I could for women by organizing events like Women in Cyber Security, Women in Data Science, and next month Women in Services Computing (this includes Cloud and Web Services). These events have helped us to recruit women who are US citizens into our cyber security scholarship program funded by NSF. But the percentage of women to men is just 10% which is not good. We have established a Center for Engaging Women in Cyber Security as part of our Cyber Security Institute and host some events. I have given talks at public events (e.g., Plano public library). I would like to do more such events. But I have the Cyber Security Institute to direct and have research to do and books to write. But what I would like to do over the next two years is to transition the institute and find new leadership so that I can focus more on educating the public about cyber security and computer science and tell them how important it is for them to motivate the children. That is, in addition to working with girls, I want to work with the parents by forming partnerships with the schools. The groups I would like to target are women, disadvantaged minorities and rural America. I cannot do this alone. I will have to work with the organizations such as Grace Hopper, Women in Cyber Security, etc (will send you the link to a 3<sup>rd</sup> article). Time and resources are the problems right now. But I am hoping I can be ready in 2-3 years to devote most of my time to these causes. I strongly believe that the government should invest in our children's education.