Shrinking the Diversity Gap with the Raspberry Pi

Diversity in the Cybersecurity Workforce

A Thesis Prospectus

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By

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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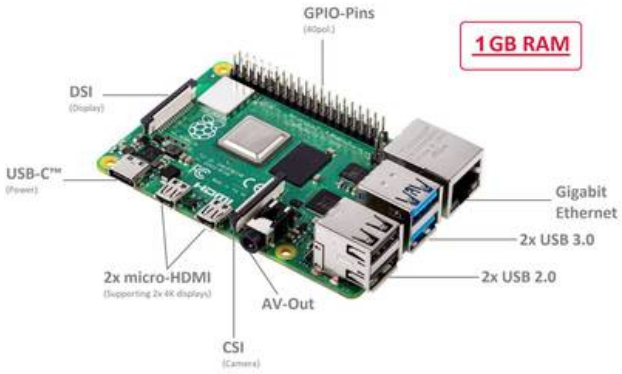
Introduction

At sixteen I understood what it meant to be a mixed race engineer. My discovery was bitter-sweet; I applied to and was accepted into an engineering program at my high school called the Math Engineering & Science Academy, or M.E.S.A. After my acceptance, a classmate mentioned that some students were saying I had only been admitted to fulfill a diversity quota. Was I upset? Of course, but I was more confused about why my skin tone had become a scapegoat for my success. Throughout my academic career studying engineering I have always felt the need to have to justify myself. It always has felt as if I needed to work ten times harder than the average student in order to be taken seriously. Since being in university, I decided to do a full on research paper on why there is a lack of diversity in engineering. I plan to add onto this topic and focus more towards the field of cybersecurity. The question that will be dissected is "*Why is there a lack of diversity in engineering, primarily in cybersecurity?"*

Like myself and other aspiring engineers who are minorities, this topic that I am discussing is something that POC deal with on a daily basis. With this research and investigation I plan to better help you, the audience, understand what actually is the root of this problem, and how we, as a community, can move forward to better solve this diversity issue as a whole. After analyzing all of the given information I have hypothesized that the lack of educational support from school systems nationwide is the cause of these racial disparities. Going through this process I also plan to help myself while learning how to navigate a field that lacks representation for upcoming aspiring engineers.

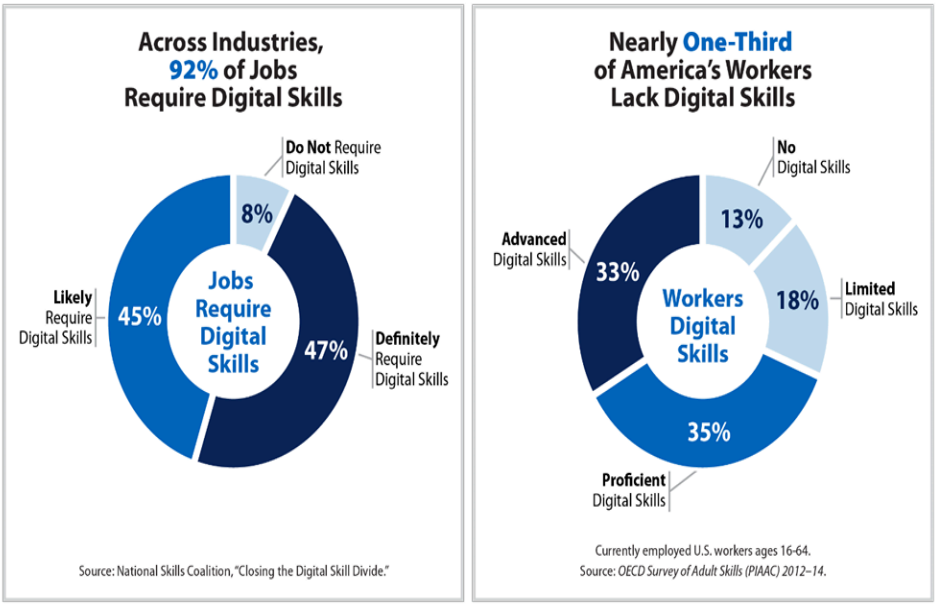
Technical Project

To further diversify the cybersecurity workforce, implementing raspberry pi's into our school system this will allow free access and resources for people to be able to hone in on their technical skills. These devices (Figure one) are small hand held processing machines that can be purchased at a relatively low cost. By implementing these Pi's into our school system this will allow free access and resources for people to be able to hone in on their technical skills. From my own personal experience with attending public school from K-12, there is a lack or if any, positive reinforcement for students learning any computational problem solving skills. The raspberry pi would change this. By using this machine as a teaching device for school curriculums this would enable school systems to "train educators who can guide other people to learn" (Nuttall, n.d.). The root cause of the lack of diversity is because of exposure in the United States educational system. This has a primary impact on institutions with a large minority population. If children come from a background that is non-technical, it will be harder for them to pursue or explore a career field like cybersecurity. "Higher education isn't entirely to blame for this disproportionate gap" (Webster, 2017), the issue stems from the younger generation not receiving exposure. By incorporating these technological skills early in children's education, there will be a higher chance of them exploring and experimenting more with technology; which would help encourage the increase of diversity in the cyber workforce.



STS Project

The lack of diversity in the cybersecurity workforce stems from children not being exposed to learning technological skills. The impact of these concepts not being taught has left many of these careers unfilled. How do we expect people to do a job when they do not have the proper toolkit? Better yet, how do we expect to close the diversity gap if people do not even know if these career paths are even an opportunity. This is a current issue that has received a lot of attention. During the Biden administration an Act, National Cyber Workforce and Education Strategy, was released in order to address the diversity disparity. This document goes into detail for why this issue is important and how essential it is for America's workforce. Displayed in Figure 2, there is a huge gap between industries needing digital skills compared to our current workforce who are not able to fill these positions. Further, it discloses plans and actual future steps to help reduce this diversity disparity. Just like this Act, there are other papers that have been made to dissect the same issue. Another qualitative analysis discovered that putting emphasis on earlier stages of learning to help diversify the workforce would in return help people of color (Osman, 2023). In this analysis numerous questionnaires



were distributed among URM's in order to better help with the authors findings. There are numerous references and pages relating to these citing. To build off of my technical project, another research paper had similar findings regarding the raspberry pi. Using a raspberry pi will help with technical skills for children in school. This device provides a hands-on, practical learning environment for students to develop skills in network security, penetration testing, and defense strategies. It even went further into discussing actual labs that can be implemented in the classroom and taught by teachers.

What we do not know is what all of the other factors contribute to the lack of diversity in the workforce. To answer this question I will be doing an extensive meta-research from previous academic, peer-reviewed research articles published from 2010 to now. Additionally I feel like comparing other countries' cyberwork force and how tech skills are taught would be a great way to aid my research and discoveries. One place that I do want to look into is the engineering department at UVa. From just talking and looking online, current and former alumni students who are computer science major rarely decide to pursue the cybersecurity focal path provided. I found out about the cybersecurity track in my third year of engineering. As cybersecurity being a huge part of our society, why was it not promoted as an important topic. I want to be able to conduct interviews with current UVa students who are in computer science and know their thoughts on cyber as a whole. Once this research is complete I hope to see if I can come up with a formal answer to help answer my research question.

Conclusion

You are probably wondering, okay so what? You should care about this because having diversity in the workforce is important. Having people from different backgrounds work together will help enhance creativity and better productivity when completing tasks. Especially given that

cybersecurity is a crucial part of our world, the security of our technology needs to consistently be updated and maintained in order to keep our information secure. The raspberry pi will make learning technology easier and more accessible for black/brown students, this exposure will help children be able to experiment with other ideas or devices, helping them dream and also aspire for an occupation that needs technical skills.

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