Career Exploration Report

Cybersecurity & Game Design

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ABSTRACT

This report explores two potential careers and potential internships that relate to those careers. Using reliable sources of information such as educational institutions, government, and corporate websites were used to gather the information that is compiled in this report. Some of these sources include: the DataUSA website, the Cybersecurity and Infrastructure Security Agency (CISA) website, the Seattle Math Museum website. Multiple internships are located, including YASKAWA and the GRILL which also previously had other appealing job shadowing opportunities, making them preferred over some of those who were not open to shadowing. The next steps are to investigate other options that may be appealing and then finally contact them for the opportunity.

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CAREER EXPLORATION REPORT

OVERVIEW

The purpose of this document is to report the research process of Rio McGillvary during their career exploration in Technical Reading and Writing at the Dayton Regional STEM School during the 2024-25 school year. The following sections document essential questions used to begin the career exploration process, potential career(s) and rationale(s) for choosing those career(s), an overview of the research process used during Rio's career exploration, resources found and used during the process, a resolution, and a reflection of the process as well as a daily logbook of all tasks completed.

The following Driving Question was used to guide this career exploration process: How can I locate a potential internship site, college, potential career by conducting extensive independent research?

ESSENTIAL QUESTIONS

Throughout the career exploration research process, the following questions were asked:

- WHAT KINDS OF MATH COURSES ARE REQUIRED FOR THESE FIELDS?
- WHAT KINDS OF COLLEGE PROGRAMS ARE AVAILABLE FOR THESE CAREERS?
- WHAT DOES A PENETRATION TESTER DO TO TEST WEBSITES?
- DO THESE CAREERS WORK ALONE OR WITH OTHERS?
- WHAT IS A BASIC OVERVIEW OF WHAT THESE CAREERS DO?
- WHAT EDUCATION IS NEEDED FOR THESE CAREERS?

POTENTIAL CAREERS & RATIONALES

This section provides a comprehensive list of potential future careers as well as rationale for choosing those careers.

PENETRATION TESTER

A penetration tester is a section of the cybersecurity field. College Board says that they can find vulnerabilities that need to be fixed. Then they fix it so it cannot be hacked and assess and make it more secure (College Board). They are not to be confused with vulnerability testers, as the Cyber Degrees website says. Vulnerability testers check for weaknesses while making a security system, but penetration tester specifically look for weaknesses in systems already in use.

According to information from the Cybersecurity Exchange site, the point of this job is to make sure that networks for companies with important or confidential information is safe and secure. This will help stop data breaches that could cost lots of money and cause several future technical issues otherwise. This could cause several issues depending on the company. In the modern age, the vast majority of companies use technology daily. This means almost any kind of information could be stolen if hacked. It could be potentially dangerous especially if it is something like a hospitals or bank's network.

Coursera says that on a day-to-day basis, penetration testers have tasks they must accomplish. To name just a few, there are: reverse engineering phishing or spam, documenting security issues and writing reports, and

testing firewalls. They also must review the specific code of the webpage or app as well to make sure there is no way it could get exploited. Another task of theirs is to send social engineering emails and attacks on the company to see if anybody falls for it so they can know if they are at risk for phishing too. Penetration testers also automate some testing and come up with newer methods for testing. This can make testing more efficient (Coursera).

This may sound like a lonely job due to it being full of a lot of one-person tasks. But that is not true. According to the Cyber Degrees website, they may work with other members of the cybersecurity team and/or engineers to try and limit the security risks. This will definitely help them with the main component of their job. They may also work with IT teams to more effectively analyze the security against potential threats (Cyber Degrees). This would help them know more about what parts need strengthened in the security. Then they would apply that knowledge of networking in the future as to other networks or to see if that is still causing problems on the current network.

The math courses that would need to be taken by someone looking for a Cybersecurity degree would be calculus, discrete mathematics, linear algebra, number theory, probability and statistics (Coursera). Looking at Learn.org though, it says someone would need differential equations and Boolean algebra instead of number theory, but all the other courses are still the same. Learn.org also says that I would need the Calculus for analyzing networks, discrete mathematics for logic, linear algebra for cryptography/decoding, number theory for encoding, and probability and statistics to know how dangerous a threat is and the chance of it causing issues. It also says that understanding Boolean algebra would still be important for knowing how to properly use binary, even if I do not take Boolean algebra is a course itself. I can see that these courses would help me get a bachelor's degree in cybersecurity. Using the information on the Cyber Security Guide website, the Cyber Degrees website, and Data USA, I can conclude that a bachelor's degree is the most common level of degree amongst cybersecurity workers. The Cyber Degrees website states that employers generally look for Cybersecurity or Information Technology, Computer Science (Cyber Degrees, Cyber Security Guide). Computer and Information Sciences and Support Services is the most common degree though (Data USA).

The reason why one may be interested in a field such as Cybersecurity or being a penetration tester could be the usage of electronics over the years and a strong love for video games and electronics. It also could be stemmed from a desire to help keep others safe on the internet because having your information stolen online is terrible and a want to help others. Lastly, it might be because of their fascination with robots, technology, coding, and information systems as a whole. Whatever the reason is, this information is critical to making that choice.

POSSIBLE INTERNSHIPS FOR PENETRAION TESTER

Secure Cyber Defense
201 Tyler Way, Moraine, OH 45439
937-388-4405
https://securecyberdefense.com/contact-secure-cyber-defense/

Hrishikesh Vinayak Bhide
694 Rhodes Hall - 2851 Woodside Dr, Cincinnati, OH
(513)-556-7962
bhidehk@ucmail.uc.edu

YASKAWA
100 Automation Way, Miamisburg, OH
shannon.oyler@motoman.com – Employee, Shannon Oyler
miranda.kelly@motoman.com – HR, Miranda Kelly

VIDEO GAME DESIGNER

The second career is a video game designer. According to College Board, video game designers design characters and character bios. They also design storylines. They also help design interactive mechanics, roleplay mechanics, and other main features of video games. They also keep ahold of and update design documentation for the game (College Board).

There are some essential skills that would be needed to become a successful video game designer. Coursera states some of these skills on their page about video game designer: drawing and sketching to make storyboards; understanding of how video games work; collaboration skills; creativity to be able to create well-made game concepts, compelling characters, and a well-though out plot; knowledge of python, C++, and other programming languages to help develop parts of the game; be able to create intricate stories and impeccable character design; and lastly, be able to use design software like Adobe Illustrator and Photoshop to create and show visual designs and ideas. According to the Computer Science Organization website, daily tasks for a video game designer may be fixing bugs, making daily plans, and working on their part of the game (Coursera).

Video game designers also come up with rules, settings, obstacles, and other parts of the game as well. This is a lot to do alone. That is why they do not do it alone. They work along video game developers, a creative team and the technical team. Having strong communication skills is a requirement for them (Computer Science).

The education for video game designers is usually a bachelor's degree (College Board). According to Data USA, the most common degree is the Visual and Performing Arts, despite it not being the most relevant degree to the job. To get a degree more closely associated with the job, it is advised to shoot for either a photography, computer science, or graphic design degree. Learning more about 3D design, user interface design, C++, JavaScript, Python, Character design, plot design, and how to use Unity or Unreal Engine would also be helpful. Another great idea is to learn how to make a proper portfolio to show to employers. Before they even get that far, participating in the video game creation community can help them network with other creators or teams and even potential employers (Coursera). According to the Seattle Math Museum website, to dive further into the education needed to become a video game designer, we can take a closer look at how math is used to make video games. A game designer needs math for improving the game based on the usage statistics, balancing the difficulty levels, animating objects, and animating characters (Seattle Math Museum).

The reason why a job such as video game design may seem appealing is because of a love of video games. An enjoyment of drawing or creativity could drive a passion this way too. Knowing coding and enjoying creativity could develop an interest in this career. Wanting to make something big like a game that makes countless people happy could also be a driving force. Having ideas for stories and games often would also factor into leading one in this direction.

POSSIBLE INTERNSHIPS FOR VIDEO GAME DESIGNER

Tenet3
40 N Main St, Dayton, OH 45423

+1 (937) 280 6402
contact@tenet3.com

GRILL
1706 Woodman Drive, Kettering, OH 45420
internships@af-grill.com

Northrop Grumman
1365 Technology Ct, Beavercreek, OH 45430
+1 (800) 247-4952

RESOURCES

This section provides a list of resources found during the career exploration research process.

- College Board. (2024a). *Penetration testers overview*. Big Future. https://bigfuture.collegeboard.org/careers/penetration-tester
    - Briefly describes what a penetration tester is.
- Coursera. (2024a). *Penetration tester: 2024 career guide.* Coursera. https://www.coursera.org/in/articles/how-to-become-a-penetration-tester
    - Says what penetration testers do on a day-to-day basis.
- EC-Council. (2024, April 1). *What is penetration testing or pentest?: Types, tools, Steps & Benefits: EC-Council*. Cybersecurity Exchange. https://www.eccouncil.org/cybersecurity-exchange/penetration-testing/what-is-penetration-testing/
    - Explains why penetration testing is important.
- Simmons, L. (2022, December 8). *Day in the life of a penetration tester*. Cyber Degrees, https://www.cyberdegrees.org/careers/penetration-tester/day-in-the-life/
    - Talks about daily tasks and who they work with.
- Learn.org. (2024a). *What are the math requirements for cybersecurity?* Learn https://learn.org/articles/math_requirements_cybersecurity.html
    - Lists the math needed to become a cybersecurity major.
- Capella, W. (2022, December 7). *How to become a penetration tester*. Cyber Degrees, https://www.cyberdegrees.org/careers/penetration-tester/how-to-become/
    - Walks through all the steps and certifications that are ideal for a penetration tester.
- Coursera. (2024b, March 22). *Does computer science require math?* Coursera https://www.coursera.org/articles/does-computer-science-require-math
    - Provides a list of math courses that are needed for a Computer Science degree.
- Learn.org. (2024b). *What are the math requirements for information technology?* Learn. https://learn.org/articles/math_requirements_information_technology.html
    - Lists math courses that are needed for an Information Technology degree.
- College Board. (2024b). *Video game designers overview*. Big Future. https://bigfuture.collegeboard.org/careers/video-game-designer
    - Explains basic information about having a career as a video game designer.
- Simmons, L. (2024, August 13). *How to become a video game designer*. Computer Science. https://www.computerscience.org/careers/video-game-designer/how-to-become/
    - Summarizes the education and certification that would be of use on the road to becoming a video game designer.
- Coursera. (2024c, September 13). *How to become a video game designer: Skills, steps, and pay*. Coursera, https://www.coursera.org/articles/how-to-become-a-video-game-designer?msockid=16382533d1026051127d31e8d04d61e2
    - Goes over basics and steps that could be followed to become a video game designer.

- Data USA. (2022a). *Computer & Information Systems Security*. Data USA. https://datausa.io/profile/cip/computer-information-systems-security
    - Displays several helpful statistics about jobs in the category of computer and IT security.
- Data USA. (2022b). *Game & Interactive Media Design*. Data USA. https://datausa.io/profile/cip/game-interactive-media-design
    - Displays lots of stats about game and interactive media designers.
- Denman, S. (2024). *How math is used to build video games*. Seattle Universal Math Museum. https://seattlemathmuseum.org/news/how-math-is-used-to-build-video-games
    - Details how math factors into video game design.
- Indeed. (2024, July 30). *What does a game designer do? (with requirements and salary)*. Indeed. https://www.indeed.com/career-advice/finding-a-job/what-does-game-designer-do
    - Describes what video game designers do and who they work with.
- Cybersecurity and Infrastructure Security Agency. (2024). *Cyber and IT interns: CISA*. America's Cyber Defense Ag. https://www.cisa.gov/careers/work-rolescyber-and-it-interns
    - Contains the internship information for the Cybersecurity and Infrastructure Security Agency.

REFLECTION

This section provides the reflection and resolution to Rio's career exploration.

Through this exploration, I learned that I may be interested in penetration testing for sure, but I may also be interested in vulnerability testing which is apparently different. I also learned that I need to take statistics for the careers I want to be in so it appears that I should take statistics next year and then take Calculus 1 when I get to college. This is because that is part of assessing the danger of certain risks. I found out I am even more interested in penetration testing because of the programs to learn sounding fun and the websites that let you hack them is something I was super interested in. As for being a video game designer, I think I could be interested in that because I know when I do coding and using unreal engine, it has been frustrating but if it is more creativity based than coding based, then I think I may be more skilled in that area. However, game making may just be a hobby instead of my main career. The reason I am interested in these careers is because I have played video games since I have been a child, and I was always fascinated by them. They were a real core part of my childhood and when I found out my eye disease does not like screens, it was like I had lost some part of myself. Even if I cannot play them, maybe I can make them for other people to be happy. My interest in cybersecurity comes from knowing that plenty of people are not the smartest and will just put their info out on the internet, not even trying to hide it. Not because a hacker even got it, just because they outright told their friend over the internet and someone else hacked that person, found their address, added them to a list and then something impacted them negatively. Not to mention that some people are scary and when they get someone's personal info, nobody knows what could happen. With AI also getting smarter and people finding ways around the blockers on them, it is only so much time until those start hacking everyone, and getting better every time it is used because it will learn. Even if you are smart online, there is always a way that they could find your info through possibly a friend who posted something with you being a part of it. To protect people and keep them safe online in the best way I can, starting at the source of the data leaks like servers and apps, hopefully I can protect people and help people in an impactful way.

This career exploration has taught me a lot about penetration testers and game designers. One way that this report had learn, is by looking at how exactly penetration testers tried to hack or test websites. I also learned it's not just websites; they can protect apps and games and other digital aspects too. I also learned that video game designers and video game developers are different careers. I especially found it interesting that the more creative side of video games is created by video game designers.

This was a very new experience. I have never fully looked so far into one, let alone two jobs. Especially not on how they did their jobs and looking into summer programs or internships at corporations. I might have to use a report like this in a similar way to document bugs in code or vulnerabilities. Technical writing is used to create reports on ways someone could get in the network. I may also do a similar report when looking at other careers I may want to pursue to get as much information as possible on those as well.

The next steps here are probably to contact the internships I have, or perhaps find more internship opportunities. I could look into the ones I listed or try to get another one through my cousin who works with Wright State's technology. It would be beneficial to locate as many as possible. Not to mention, I have found other internship opportunities, but I did not have enough time to list all of them on here and gather all of their information. So, a strong next step to investigate those as well.

LOGBOOK

The following logbook was kept during Rio's career exploration process. It details the tasks completed during this process including sources consulted, essential questions asked and answered, as well as any other information collected each day.

9/11	**Reverse-outlined student sample CER.**
9/13	Set up research method and located sources.
9/16	Found five sources for career one.
9/17	Used USAdata,io to get information on Cybersecurity.
9/18	Got answers to 4 out of 5 essential questions by going through previously used sources.
9/19	Found math courses, Started outline for career one.
9/20	Finished outlining.
9/23	Completed first paragraph.
9/24	Completed 2nd paragraph.
9/25	Completed 3rd and 4th paragraphs and started on 5th paragraph.
9/26	Received feedback.
9/27	Revised using the given feedback and wrote the 6th and 7th paragraph for career 1.
9/30	Finding sources.
10/01	Reading and extracting information for career 2.
10/02	Started outlining career 2.
10/03	Finished the outline for career 2.
10/04	Created and 1st Paragraph draft for career 2 and got teacher feedback for career 1.
10/16	Started citing sources.
10/17	Cited more sources.
10/18	Finished citing sources for career 1.
10/20	Wrote entire reflection and finished citing all sources in APA format.