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University Honors Program Portfolio

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From Threads to Tapestry: My Journey at NC State

In the tapestry of my academic and personal journey at NC State, each thread represents a distinct experience, or in the case of this reflection essay, a distinct "artifact" that contributes to the intricate design. This paper explores a diverse collection of artifacts from my undergraduate career at NC State, whether academic, professional, or personal, that collectively narrate a story revolving around four central themes: innovation, ethical responsibility, creativity, and personal development.

Innovation

The journey to become a computer scientist is inherently paved with innovation. My initiation into this difficult field was more than just learning programming languages or understanding algorithms; it was about adopting a new way of thinking. I was not only allowed but encouraged by my professors and employers to not just seek solutions but to redefine problems, to not follow existing trails but to create new paths. This innovative mindset was nurtured through several projects, assignments, essays, and professional experiences that I took part in during my undergraduate career.

One of my favorite computer science projects I made was a blackjack simulator. As someone who enjoys gambling in my free time, another student and I developed a blackjack game as part of my CSC422 course on machine learning. The purpose of this project was to utilize various machine-learning techniques to explore the effectiveness of card-counting strategies in blackjack.

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The creation of this blackjack game was extremely fun for me. It required a solid foundation in programming principles and algorithms, which I had a basic understanding of at that time. However, what set this project apart was the incorporation of machine learning to analyze game data. My partner and I employed different techniques such as Principal Component Analysis and the Isolation Forest algorithm to reduce dimensionality and detect anomalies in gameplay, which could indicate instances of card counting.

This project went beyond a mere academic exercise; it was an introduction to what I may come across in a professional work setting. I have a great interest in machine learning and artificial intelligence, and creating this blackjack game challenged me to apply what I learned in a potential real-world scenario. The iterative process of creating, analyzing, debugging, and refining my algorithms highlighted the dynamic nature of computer science, where innovation is not just about writing new lines of code, but also about revising and applying existing ones in impactful ways. This experience prepared me for the challenges I was about to face in a professional software development setting.

The real testament to my growth as a computer scientist came during my web development internship at Prometheus Group. Finally having transitioned from academic projects to real-world applications, I soon realized innovation was not just encouraged, but required. This internship required me to not only use my previous knowledge of Java, a backend programming language I have experience in but also a plethora of new skills and tools that must be learned while working. These skills included frontend languages I had absolutely no experience with, namely Javascript, HTML, and CSS, backend languages that I had never even

heard of (Kotlin), and a wide variety of tools and resources that were new to me as well: PostgreSQL, Jira, Gitlab, to name a few. Being thrust into a dynamic environment of new technologies was both daunting and exhilarating. Each day presented new challenges that pushed me out of my comfort zone and to adapt and grow.

By working closely with a team of experienced web developers, I gained insights into these new technologies I originally had trouble with, as well as learned the importance of collaboration and teamwork in a professional setting. Most importantly, I learned innovation is not just about using the latest tools or technologies; it's about how you use available resources to solve problems, meet client needs, and constantly grow and become a better computer scientist. My experience at Prometheus Group solidified my passion for doing software development in the future and set a strong foundation for a future where innovation is the key to success.

Building on the lessons learned during my internship, during the fall semester of my senior year of college, I collaborated with two other students to create InkLink- a progressive web application that aimed to allow people from all over the country to create, view, and share images of graffiti. Software engineering is all about creating products that can positively impact other people, and I believe InkLink was a great opportunity to not only do that but also build upon my previous web development experience at Prometheus Group.

My team and I aimed to create a space where the often misunderstood world of graffiti could be showcased and appreciated in a new light. This required not just technical prowess, but also a creative approach to how we presented content. I understood that graffiti enthusiasts were artistic and creative individuals themselves; therefore, it was only natural for the platform where

they shared graffiti to be as well. There is no doubt that this project improved my technical skillset; however, I think that the most important lesson it taught me was how much power a computer scientist can hold. Through InkLink, I realized that my creations can significantly influence thousands if not millions of people around the world, for better or worse. It was a vivid reminder that behind every line of code is the opportunity to shape human creativity and experiences. This project has since guided my perspective on software development to code with thoughtfulness and ethicality.

Ethical Responsibility

The above realization served as a bridge to the next crucial theme explored in this essay: ethical responsibility. One of the required classes I took as a junior in computer science was CSC379: Ethics in Computing, which examines the role of the computing professional in modern society, focusing on the ethical and moral responsibilities of the profession. With great power in writing lines of code, comes great responsibility in making sure the code is put to good use. CSC370 was a crucial class in which I learned this concept of ethicality.

Other than weekly lectures on different aspects of software ethics, I engaged in two compelling case studies to deepen my understanding of a real-world situation in where ethics may come into play. The first case study centered on a hypothetical entity specializing in predictive policing. In this case study, I conducted an analysis of the ethical quandaries of said entity- balancing public safety and user privacy, repercussions of algorithmic bias, and the moral responsibility of software engineers when creating code that may seem to be beneficial on the surface. This case study allowed me to understand that while most software is created to help people, there can and

will always be ethical considerations and potential negative impacts on society. The second case study I analyzed shifted focus to the integration of sexbots into the prostitution industry. In this case study, I juggled the potential of technology to benefit society while being detrimental to human workers. The potential for sexbots to alter human behavior, the economic and emotional impact on human sex workers, and the ethical considerations surrounding consent and objectification in the context of AI were all interesting topics that broadened my perspective. As someone who has an interest in a career in artificial intelligence, these case studies allowed me to prepare for a world where the pace of technological advancements may surpass the development of ethical guidelines and standards. All in all, CSC379 was arguably the most influential class I have taken in my undergraduate career, allowing me to understand the true power of being a software engineer in the future, and shaping my understanding of ethicality and responsibility inherently found in the role.

Creativity

While my experiences as a computer science major have definitely grounded me in innovative skills and ethical considerations, it was UHP classes that allowed me to explore another critical theme of my undergraduate career- creativity. Often underestimated in STEM fields, creativity is essential as it fuels the ability to create unique solutions to complex problems. This realization became apparent through an essay I wrote in my HON310: The Creative Process in Science class titled “Creativity and Diversity- A Domino Effect”. This essay explores the relationship between diversity and creativity within the realms of science and technology. I metaphorize diversity as the first domino in a long chain leading up to creativity, and then

creativity as the spark for technological innovation. Through this essay, I hope to realize that my understanding of diverse perspectives will allow me to create technology that is user-friendly, accessible, and culturally sensitive. I believe that this ethical consciousness will help me become more and more creative, shaping a future where technology serves humanity in all its diversity.

Building on my discussion of creativity in the essay, I also constructed a board game for my ENG265: American Literature class that was quite frankly my favorite project of my entire undergraduate career. In this board game, I brought Mary Rowlandson, a colonial American woman captured by Native Americans in the 17th century, and her journey as a hostage to life. Because her excerpts are written in twenty removes, I thought it would only make sense to create a board game highlighting the obstacles and challenges she faced during each stage of her captivity. The game requires players to navigate through a series of historical events and decision-making scenarios. In the process of creating this board game, I felt like I fell in love with the creative aspect of the project. It motivated me to add more to the board game and build it to my wildest imagination. I added a point system called “Fear Factor Points”, where the players can gain or lose points based on the tiles they land on, each corresponding to a positive or negative experience. The winner at the end would be the player with the least points. This illustrated the uncertainty of Mary’s story and the possibility of peril or safety at every corner. Even the name of the board game, Hell or High Water, required immense creativity. The phrase “hell or high water” captures the essence of Mary’s journey, symbolizing the determination to overcome extreme difficulties “come hell or high water”. “Hell” also metaphorizes the “living

hell" that Mary went through, and "High water" refers to the river in the middle of the board that the player must cross at their own risk.

As you can tell, I had a lot of fun letting my creativity run wild with this board game, which is why I can comfortably say this was my favorite project of all time. The freedom to create within the constraints of Mary Rowlandson's narrative not only deepened my appreciation for storytelling but also inspired me to integrate creative thinking into my other endeavors, such as computer science projects and assignments. If I can be so creative in making a simple board game, what are the limits to what I can make through lines of code? This project was a reminder that creativity is not bound by discipline. Whether it be creating board games in a literature class, writing thousands of lines of code for my senior design project, or crafting a presentation for my business administration minor elective, I found that the essence of creativity lies in how one approaches and reimagines the task at hand. I am confident that this board game, along with my many past and future projects, will always remind me to approach each challenge with an open mind and creative spirit.

Personal Development

Academics aside, there have been plenty of personal experiences that have contributed significantly to my growth. Among these, the support and inspiration from my girlfriend, the lessons learned through working at a Korean barbecue restaurant, and regularly going to Carmichael Gym to lift weights have been pivotal in shaping my personal development.

My girlfriend has been a constant source of encouragement and motivation ever since my sophomore year. As a psychology major herself, she would remind me of the importance of

mental health and maintaining a balanced lifestyle, often when I found myself struggling against the rigorous assignments of my classes. Her belief in me has become a cornerstone in my undergraduate career, and I am so glad we can motivate and push each other to be better versions of ourselves, whether it be academically, physically, or mentally.

Working at Seol Grille, a Korean barbecue restaurant, as a server has introduced me to a fast-paced, team-oriented environment where I have learned many crucial workplace skills, including teamwork, time management, customer service, and financial responsibility. I learned to thrive in an environment with coworkers, managers, and customers from many different backgrounds, as well as the importance of adaptability to customer demands. This will prepare me for a future in computer science, as software engineers often will have to adapt to a client's requirements.

I go to Carmichael Gym to lift weights almost every day. What began as a hobby soon became an addiction; I found myself going not only for my physical health but also for my mental discipline and perseverance. I found that staying in the gym for two hours a day is a great way to relieve stress, practice dedication, and have the motivation to eat healthy and sleep well. Sometimes I would be too tired to go to the gym but still go, which teaches me the importance of discipline and a strong work ethic; hopefully, this translates to future academic success as well. Going to the gym has also taught me the value of setting goals, tracking progress, and comparing myself to nobody else but my past versions.

Conclusion

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Together, these artifacts have woven a colorful tapestry of my undergraduate journey, with each thread representing an aspect of my growth and development at NC State. Innovation has been the bedrock of my growth as a computer scientist, challenging me to not only seek solutions but to redefine the problems. Ethical responsibility has grounded me to reality, making me understand that with the power to create something great, comes the ethical responsibility to do the right thing for all. Creativity, often overlooked in fields like STEM, has proven to be a vital skill, allowing me to bring innovative ideas to life. Finally, personal experiences have shaped me to become who I am today, whether they alter my mindset or guide my future endeavors. As I reflect upon these artifacts, I would also like to thank the University Honors Program for providing me with a unique educational environment that has nurtured my curiosity and passion. It is my firm belief that we can do something great with the world, to dye the canvas with our colors, and create something beautiful. As I stand at the beginning of a new chapter in my life, I am excited to continue to weave this tapestry with threads of innovation, ethics, creativity, and personal growth.