

## ***Part One - Trend one: Artificial Intelligence and Machine Learning***

Artificial Intelligence and Machine Learning are very pivotal forces which drive innovation across different industries. ML is technically a branch of artificial intelligence which focuses on enabling computers and machines to be able to imitate the way that humans learn and to be able to perform tasks autonomously. The significance of this trend is that AI involves creating systems that can perform tasks that typically require human intelligence, such as visual perception, speech recognition, decision-making, and language translation. Machine Learning is a subset of AI, which focuses on developing algorithms that enable computers to learn from and make predictions based on data. Now for the impact on the field of computer science, AI and ML are transforming computer science through introducing new paradigms for problem-solving and automation. These technologies are leading to the development of more sophisticated algorithms, which enhances computational efficiency, and enabling the creation of intelligent interdisciplinary research, where we can combine insights from computer science, statistics, cognitive science and other different fields. AI and ML are revolutionary when it comes to the user experience as it can provide personalized services, improving decision-making skills while also automating routine tasks. For consumers, this means more intuitive and responsive applications, like virtual assistants and recommendation systems. Workers benefit from tools that enhance productivity and reduce manual effort, while citizens experience improved public services, like healthcare systems and urban planning turning smarter. For those who are pursuing a career in AI and ML, this trend aligns with my aspirations for the future. The current growing demand for AI and ML expertise presents numerous opportunities for more innovation and impact. Through focusing on this area, I can contribute to developing intelligence systems that can solve real-world problems and improve the quality of life.

## ***Part Two – Trend Two: Quantum Computing***

Quantum computing is an emergent field of computer science that involves quantum mechanics to solve problems. This trend is significant because quantum computing leverages quantum mechanics to perform computations that are infeasible for classical computers. Through utilizing quantum bits and phenomena involved in such, quantum computers can solve complex problems at fast speeds as well. Quantum computing is poised to revolutionize computer science through enabling breakthroughs in cryptography, optimization and stimulation. It challenges traditional computational models and necessitates the development of new algorithms and programming paradigms. This trend drives significant research and investment, where major tech companies and academic institutions lead the charge. While it is still in the early stages, quantum computing holds the potential to be able to transform different industries like finance, healthcare and logistics. Consumers could benefit from more secure communication and faster data processing. For example, workers in fields such as drug discovery and materials science could leverage quantum simulations to accelerate innovation. Citizens may see improvements in areas such as climate modeling and traffic optimization. This could be a place of interest for me as quantum computing stems from its potential to solve some of the most challenging problems in fields like science and engineering. Through gaining expertise in these fields, I could contribute to pioneering research and the development of practical quantum applications. Which can align with my goals of working at the forefront of technological innovations.

## ***Course Outcomes:***

I think that overall, I have been able to *design, develop, and deliver professional-quality oral, written, and visual communications that are coherent, technically sound, and appropriately*

*adapted to specific audiences and contexts, design and evaluate computing solutions that solve a given problem using algorithmic principles and computer science practices and standards appropriate to its solution, while managing the trade-offs involved in design choices (data structures and algorithms) and demonstrate an ability to use well-founded and innovative techniques, skills, and tools in computing practices for the purpose of implementing computer solutions that deliver value and accomplish industry-specific goals (software engineering/design/database).* Firstly, I think I have been able to demonstrate through reports and documentation as I have been able to collect information to effectively convey complex information. And I have tried to achieve designing and evaluating computing solutions by developing and analyzing algorithms to solve specific problems, and I have tried to implement innovative skills and tools in computing practices, which are implemented through projects that apply software engineering principles to create valuable problems. I think the only outcomes that I haven't yet met are the collaborative skills and security mindset. I think I just haven't been going through the motions to find instances where I can actively practice those skills, which I should do before the term ends.

Checkpoint	Software Design and Engineering	Algorithms and Data Structures	Databases
Name of Artifact Used	Animal Shelter Database – web dashboard	Animal Shelter Database – data processing & retrieval	Animal Shelter Databases – MongoDB implementation
Status of Initial Enhancement	Developed a Dash-based interactive dashboard for data visualization	Implemented a search and filter system to have animal retrieval	Designed MongoDB schema to efficiently store data

Submission Status	Submitted	Submitted	Submitted
Status of Final Enhancement	Completed	Optimized the query execution time	Improved the indexing strategies
Uploaded to ePortfolio	Yes	Yes	Yes
Status of Finalized ePortfolio	In-progress	In-progress	In-progress

***Citations:***

IBM. (2021, September 22). Machine learning. Ibm.com.

<https://www.ibm.com/think/topics/machine-learning>

Schneider, J., & Smalley, I. (2024, August 5). Quantum computing. Ibm.com.

<https://www.ibm.com/think/topics/quantum-computing>