MODULE 6 Emerging Technology and Artifact Update

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During my job search, I noticed that Nokia posted a job for a Silicon Photonics Design Engineer, and I thought it was an interesting topic to study. Photonics in computer science refers to the use of light instead of electricity to process, store, and transmit data in computing systems. In the article on the future of optical computing (Kovach, 2024), the author reports about a breakthrough in memory computing where engineers developed a resonance-based photonic architecture that exploits the non-reciprocal phase shift in magneto-optical materials to implement photonic computing in memory. Scaling a single memory cell to a large memory array will enable an efficient non-volatile storage solution that can provide unlimited read/write endurance with sub-nanosecond programming speeds, revolutionizing data storage and processing.

Another emerging trend that I want to discuss is a research paper on cellular automata. Plantek et al. in their 2023 paper, presented one of the complex self-organizing systems that create life-like phenomena called Flow-Lenia. Lenia is a family of cellular automata that can generate a wide variety of self-organizing patterns resembling biological organisms. Artificial organisms create patterns with complex behaviors, and with updated rule parameters, this behavior can be optimized to generate complex organisms that exhibit more interesting behavior. The Flow-Lenia study is a valuable research tool for exploring the possibilities of self-organizing and self-replicating artificial systems, which is a topic of research and discussion. Self-replication of AI can accelerate innovations and lead to breakthroughs in various areas such as cybersecurity, robotics, manufacturing, and scientific research. At the same time, it raises critical questions about the control, safety, and ethical aspects of advanced AI systems. One of the main

concerns that Douglas McKee raises in his article is that researchers must ensure that there are no uncontrolled replications of AI systems, which can lead to unpredictable consequences from independent malware and cyberattacks to the manipulation of human decisions and behavior.

Status Checkpoints for All Categories

Checkpoint	Software Design and Engineering	Algorithms and Data Structures	Databases
Name of Artifact Used	**Artifact name:** Travlrs MEAN stack application **Origin:** CS 465 Full Stack Development	**Artifact name:** Travlrs MEAN stack application **Origin:** CS 465 Full Stack Development	**Artifact name:** Travlrs MEAN stack application **Origin:** CS 465 Full Stack Development
Status of Initial Enhancement	Enhancements completed	Enhancements completed	Enhancements completed
Submission Status	Submitted with feedback from the instructor	Submitted with feedback from the instructor	Submitted with feedback from the instructor
Status of Final Enhancement	Completed	Completed	Completed
Uploaded to ePortfolio	Uploaded to GitHub, I started to write the README file	Uploaded to GitHub, I started to write the README file	Uploaded to GitHub, I started to write the README file
Status of Finalized ePortfolio	Planned but not yet completed	Planned but not yet completed	Planned but not yet completed

References

Kovach, P. (2024, October 23). *A Multi-level Breakthrough in Optical Computing.* PITT SWANSON ENGINEERING. https://news.engineering.pitt.edu/a-multi-level-breakthrough-in-optical-computing/

Plantec, E., Hamon, G., Etcheverry, M., Chan, B.W., Oudeyer, Y., Moulin-Frier, C. (2023, July 24). *Flow-Lenia: Towards Open-Ended Evolution in Cellular Automata Through Mass Conservation and Parameter Localization.* FLOW LENIA. https://sites.google.com/view/flowlenia/videos