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# Sheaffer '24 Unwinds Protein Networks in Brain with Computer Science

July 26, 2023

BLOOMINGTON, Ill. — [Eckley Summer Scholar](#) Anna Sheaffer '24 is on a mission to combine her computer science major and psychology minor to delve into the mysteries of the human brain.

“There’s a lot that we don’t know about the brain, so thinking about how a computer might be able to help us explore further, even if it might not be able to create a perfect representation, is exciting to me,” Sheaffer said.



Anna Sheaffer '24 is combining her computer science major and psychology minor to complete research as a 2023 Eckley Summer Scholar at IWU.

Sheaffer, through her research project “Web-Based Application for Visualizing Protein-Protein Interaction Network Alignment,” is creating a new software tool that will enable others to more efficiently and effectively research one of the most vastly complex and important aspects of neurology — molecular protein interactions.

The idea for her project began when Sheaffer first spoke to Assistant Professor of Computer Science Brian Law about switching her major from psychology. Law has a background in computational biology, and he explained to Sheaffer [the utility of interdisciplinary computer science](#). Sheaffer first started doing research with Law in the summer of 2022.

“The point [of computational biology] is to take something that’s really difficult and time-consuming for biologists, like collecting and studying all the necessary evidence on their own, and automate it using computation,” Sheaffer explained.

In this case, she plans to help researchers determine the biological purpose of proteins by identifying their molecular partners.

“Proteins that interact with one another carry out similar functions, so, if you don’t know what a particular protein is supposed to do, you can interpret the function of an unknown protein by finding known proteins that it interacts with,” Sheaffer said. “It’s a topic within computational biology that a lot of biologists and computer scientists are looking at.”

The application that Sheaffer is programming will create visual representations of “protein interaction networks” and the “alignment of networks between multiple [protein] species.” Sheaffer plans to construct it as a useful tool for visually organizing and exploring protein interactions in the brain, where there are countless vital and sensitive protein interactions.

Ideally, Sheaffer would be able to finish the summer with a working product for public use by any interested neuroscientists, though doing so in that time is an ambitious goal.

“Right now, I’m working on creating a pipeline from the back-end, where all the data is stored, that will bring the interpreted data to the front-end display,” she said.

Sheaffer has gone through several iterations of a visual network, with hopes of avoiding what she refers to as “the hairball problem.”

“You have hundreds of thousands of proteins, and if you try to visualize all of them, you get a giant hairball of connections that’s not useful,” she said.

The novelty Sheaffer hopes to achieve is in unraveling the hairball to help researchers find useful patterns of alignment within a system that’s almost as complex as the brains it will help us understand.

[Established by the late IWU President Emeritus Robert Eckley and his wife Nell](#), the Eckley award provides a stipend of \$4,000 for each scholar to spend the summer conducting academic research or artistic activity under the mentorship of a faculty member. The program is designed to develop and deepen a student’s creative and research competencies.

*By Chris Francis '13*