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10-31-2022

Computer science student, professor collaborate on 'pursuit-evasion' video game

Lucy Waskiewicz
University of Dayton, waskiewiczl1@udayton.edu

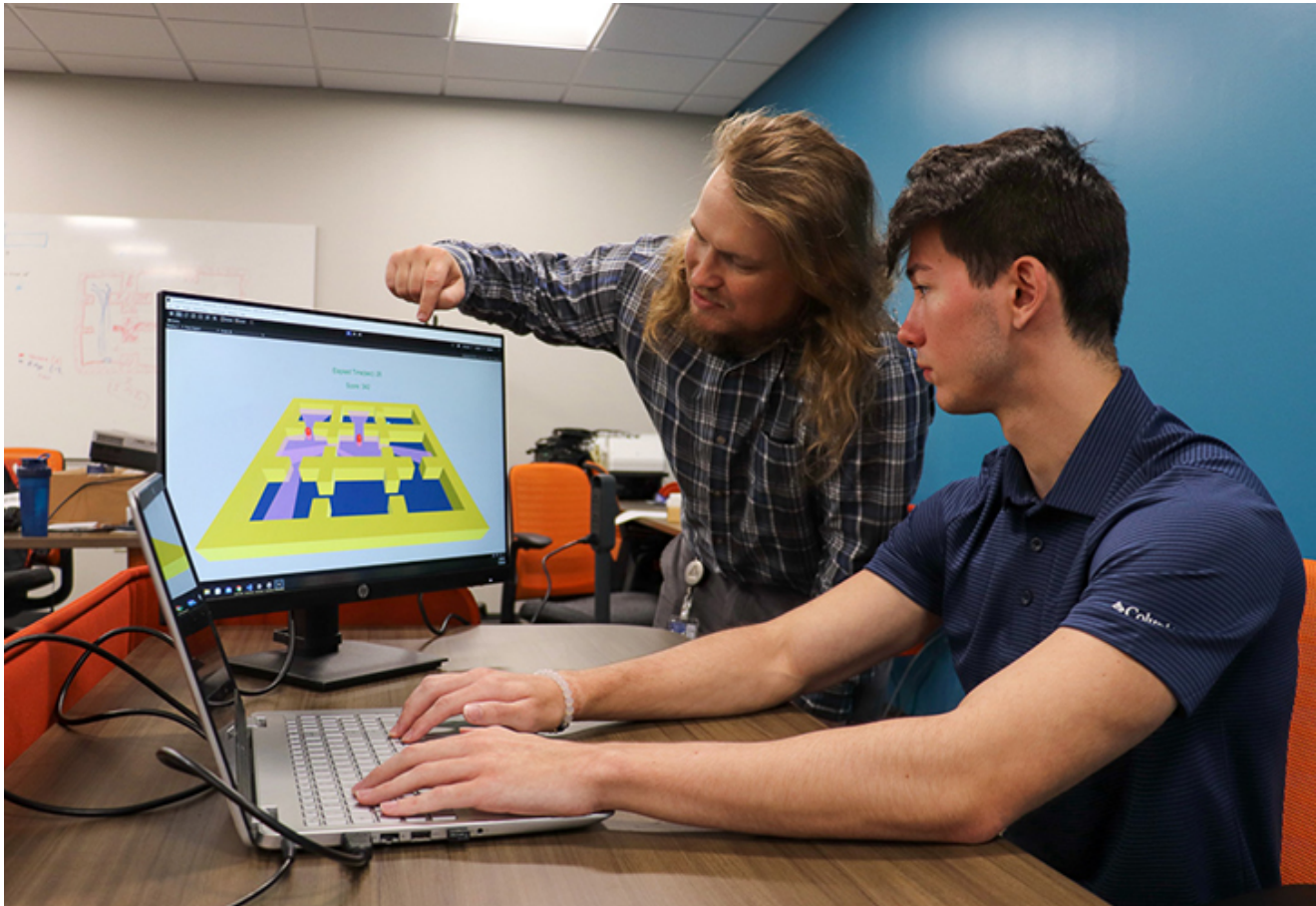Follow this and additional works at: https://ecommons.udayton.edu/cas_blog

Computer science student, professor collaborate on 'pursuit-evasion' video game

Monday October 31, 2022

By Lucy Waskiewicz '24

Like many college students, University of Dayton senior Spencer Pennypacker used his summer break to spend time on video games. However, the game Pennypacker devoted his summer to was one he designed himself.

Pennypacker, a computer information systems major from Gaithersburg, Maryland, developed his game through the College of Arts and Sciences Dean's Summer Fellowship program, which provides opportunities for students to collaborate with a faculty mentor during the summer on an original research project.

Nick Stiffler, assistant professor in UD's Department of Computer Science and Pennypacker's mentor, works in the field of algorithmic robotics. Pennypacker's strength is in developing web applications. Their project needed to integrate their specialized

backgrounds.

"Spencer didn't really have a robotics background, but he was interested in working with me based largely on his experience in my fall CPS 242 course and our similar personalities," Stiffler said. "We wanted to leverage my experience in robotics and his skill set in web application development."

The result was a project titled *Hide and Sneak: An Active Evasion Game*, a web-based game teaching general audiences about robotics concepts. *Hide and Sneak* demonstrates the concept of "pursuit-evasion" where one group of "pursuers" seek a second group of "evaders."

Pennypacker developed an interactive 3D environment in which players attempt to hide a virtual object from two autonomous seekers that use robotics algorithms to locate it.

Stiffler likened the game to *Pac-Man*, except the "evader" can't stay hidden for long. The point of the game is for players to realize the algorithms controlling the seekers guarantee the human-controlled evaders will eventually be found.

"The 'a-ha' moment of the game is that you can't win," Stiffler said. "So if your job is to hide for as long as possible, you can delay that process, but our research and our algorithm is designed to find you no matter what."

Pennypacker's research also educates audiences about the importance of understanding pursuit-evasion, which can be used in real-life applications.
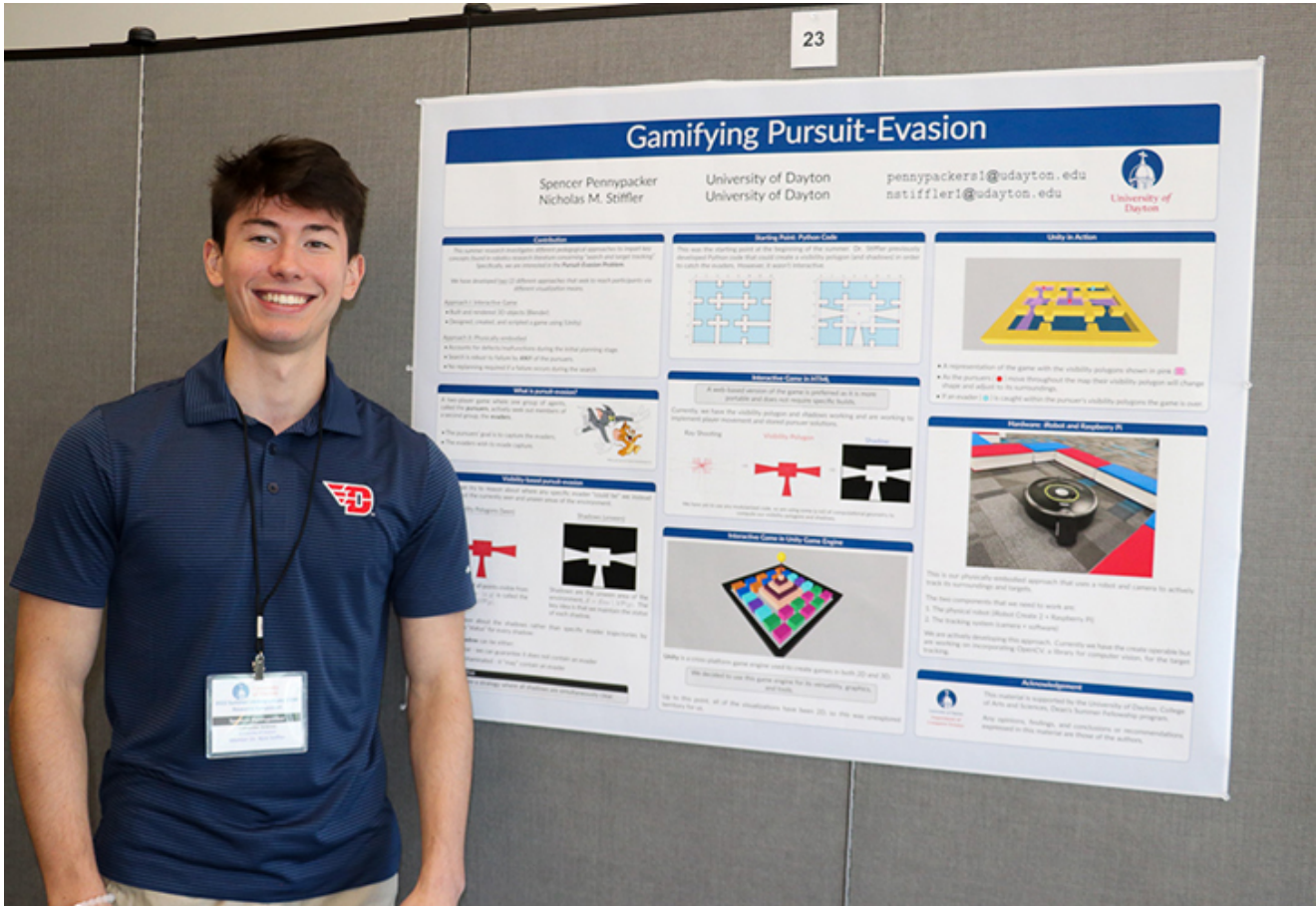
"For example, in a search-and-rescue scenario, it's really reassuring when you realize that it doesn't matter if you're in a classroom or in a bathroom or in an office — there are algorithms out there with which, if we deploy them in a robot, we will find you," Stiffler said.

Pennypacker said developing *Hide and Sneak* included converting the game from a 2D to 3D model, expanding on preexisting code and adding extra functions to make the game more exciting for players.

"We started with just an idea and to see it all come to fruition was truly exciting and rewarding," Pennypacker said. "There were a lot of long days and hours spent behind the computer coding, but I'm glad I persevered and created something that will be used to help others in the future."

As the summer ended, Pennypacker and Stiffler began creating a physical version of the game with camera-equipped robots. Pennypacker said the project allowed him to work with state-of-the-art software and hardware and apply knowledge learned in his computer science courses.

Pennypacker said the game and his summer research will be a building block for his future endeavors in computer science.

"Not only did I learn so much within the field of computer science, but I learned what it would be like post-graduation and how to best prepare and succeed," he said.

Pennypacker's fellowship culminated in a poster presentation at the 2022 Summer Undergraduate STEM Research Symposium. There, he and many other Dean's Summer Fellows shared their research projects and built connections with fellow students and faculty.

"One of the most rewarding aspects of this summer was finally completing my research and seeing it on the poster that I would eventually present," he said. "It felt good to see my hard work displayed on something, as well as people coming up and asking questions about it."

For more information, visit the Dean's Summer Fellowship and Department of Computer Science websites.
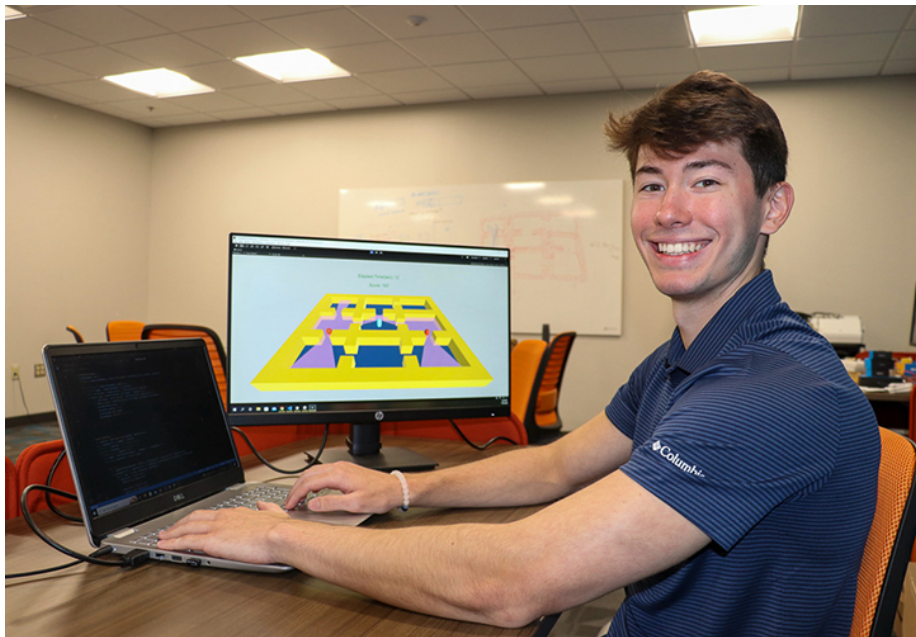
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University of Dayton senior Spencer Pennypacker, a computer information systems major from Gaithersburg, Maryland, works on developing his video game through the College of Arts and Sciences Dean's Summer Fellowship program.