



## Anthony Dellinger | Computer Science & IT Student Highlight

All it took was a tour of the campus and a meeting with a few professors for Anthony Dellinger to know that Kutztown University was the best fit for him. He came to KU knowing he wanted to pursue a degree in computer science, and now, as a senior, Anthony has proven that he made the right choice by taking advantage of a KU Bears research opportunity to explore one of the various paths within computer science and gain first-hand experience in the field.

Soon after Anthony began taking courses and immersing himself in the world of computer science at the college level, he found his niche in scientific programming. Scientific programming,

around it. As the lasers shoot around the room, the program, with the help of the camera, measures and records the amount of time it takes for the lasers to return to the robot, and uses that information to create data points. "The lasers create a 3D map," said Anthony. "And then we take that map and use it to give the robot a way to navigate."

Since he was working virtually, Anthony did not have physical access to the robot and mainly focused on the code base by programming, adding features, and implementing algorithms. "We worked on a pipeline of data processing steps for use in robotics, localization, and mapping," said Anthony. He used the point cloud that was created by

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also known as scientific computing, takes an experimental approach to programming and uses a higher-level programming language, such as Julia or Python, to complete experiments. Scientific programming can also be used to execute very complex mathematical problems.

In Fall 2019, Anthony was enrolled in Introduction to Scientific Programming with Dr. Schwesinger, assistant professor of computer science and information technology. Because of Anthony's great work in the class, Dr. Schwesinger invited Anthony to take part in a research project over summer 2020.

The project is centered around a physical robot that has multiple lasers and a camera on top that measures the depth of the space

the lasers and entered it into a localization algorithm to define the position of the points so the robot knew its location.

A point cloud is its own custom file, and its purpose is to represent a scan of a room or environment. Anthony's point cloud was created from the tens of thousands of points that the lasers on top of the robot recorded; these points were then stored as vectors, or as X, Y, and Z. "We know that something is there, something that we can see," said Anthony. "Then, we have to take that unstructured point drive and turn it into walls and corners, stuff we can navigate."

Since the project was unexpectedly moved online, Anthony and Dr. Schwesinger had time to attempt various experiments with their data. When it comes to determining

where walls are within an enormous point cloud, programmers typically use a density scanner to establish where features are. Instead, Anthony worked on creating an original optimization algorithm, or a formula, that compared various points within the point cloud to find which points made up walls and which were simply outliers.

This project solidified for Anthony that he is in the right field, and he really enjoys scientific programming. He loves the ability to make something out of nothing and be able to actually see the results, like a robot navigating a room because of laser-recorded points. He learned the techniques and skills to complete the project as he worked through each step of the process. These are skills he would not have learned if he did not take this opportunity. Now, he has an advantage when he starts to look for jobs after graduation.

Anthony is on track to graduate in Fall 2021, and he plans to work in the industry for a while before going to graduate school. He hopes to continue in the field of scientific programming and eventually work on programming medical equipment, such as MRI machines.

## DEAN'S CORNER DR. DAVID BEOUGHER

As I began to write this message, I was struck by the highlights for this month. Actually, I was struck by the articles from the past several months. They drove home why Kutztown is such a special place. Our faculty are top notch and provide experience with instrumentation, processes, and understanding that is very relevant to the world in which we live. They provide access to an education with the power to change lives. They open the door and invite students in. So many of our students use that opportunity and step into experiences that challenge, excite, and inspire them. This becomes the foundation of new understanding, preparing them for the next steps in their life journeys. As this spring begins to bring changes, I see a vibrant garden growing that is well-tended and a true joy to behold. I encourage us all to grow, flourish and bring a little joy to each other.





## Dr. Julie Palkendo | Environmental Chemistry Faculty Highlight

After she attained her doctorate from the University of Delaware, Professor of Environmental Chemistry Dr. Julie Palkendo knew she wanted to teach—a passion she discovered during graduate school—at an academic institution that had strong undergraduate programs, fit her specific area of study, and was close to home. Thus, when a position in analytical chemistry with a focus on environmental chemistry opened over a decade ago at Kutztown University, she knew it was a perfect fit. Throughout her time at KU, Dr. Palkendo has taken inspiration from everyday life to drive her research and is not afraid to try something new and out of her comfort zone, whether inside the classroom or in the laboratory.

In graduate school, Dr. Palkendo studied analytical chemistry with a focus on atmospheric chemistry—the chemical study of the Earth's atmosphere—and mass spectrometry, which is an analytical technique that measures the mass-to-charge ratio of ions. “I think what appeals to me about analytical chemistry is that you can boil things down to those basic two questions: what is there, and how much is there,” said Dr. Palkendo. “The challenge is that in order to answer those questions, you have to know which tool or technique to grab in a toolbox overflowing with options.” Through analytical chemistry, she has worked on measuring compounds and molecules within a sample and determining their mass using a mass spectrometer, an analytical tool.

However, when she started teaching, Dr. Palkendo continued to expand on her expertise to meet her evolving interests and the needs of her students. For example,

she has been experimenting, with her students, on the study of environmental samples of soil, particulate matter, motor oil, water, and different foods using atomic spectroscopy and electrochemistry.

She has also been working on research over the last couple of years entitled “Investigating the Effectiveness of Washing Methods to Remove Pesticides on Fruit,” a project that came together after Dr. Palkendo read an article during her sabbatical in 2017 that analyzed pesticides on the skins of apples, which was of interest to her because she was a new mom to two daughters who loved eating fruit. Prior to

her sabbatical, Dr. Palkendo had assisted in the purchase of a commercial-grade mass spectrometer, so with this convergence of events, she was inspired to analyze the

amount of pesticides left on fruit that was washed in various cleaning solutions. But she could not just jump right into experimentation once the inspiration struck. Dr. Palkendo first needed to prepare for the project by researching and developing the appropriate methods for the lab. She needed to better understand the instrumentation and figure out exactly which pesticides were most common on fruit, which fruit to study, and how to study it.

“There’s a lot of sample prep,” said Dr. Palkendo. “And the technique to extract pesticides from fruit is called QuEChERS.” QuEChERS stands for quick, easy, cheap, effective, rugged, and safe, and it is a method that involves extracting, shaking, centrifuging, and cleaning up the sample to concentrate the pesticides. The QuEChERS extraction process combined with the mass spectrometer is the basis of the project that shows which washing methods are effective or not in removing different pesticides.

When Dr. Palkendo returned to the classroom in Spring 2018, she began working on the project with students in her Introduction to Environmental Science and Environmental Analysis courses. Over the last three years, Dr. Palkendo

and her students have tested samples—strawberries, grapes, and apples, as well as some vegetables, in both organic and non-organic varieties that were broken into skins, flesh, and core components—that they cleansed using plain tap water, a diluted Clorox solution, a baking soda solution, and a salt solution.

The results on the best washing solution are mixed. There were methods that worked on some fruit and not on others; however, the Clorox solution was a little more effective than the others. One of the greatest challenges of the project was that the fruit and pesticides were not controlled. Every carton of fruit purchased from the grocery store was different with regard to brands, location of farms, and concentrations of pesticides. Despite the drawback, Dr. Palkendo and her students have amassed an enormous amount of data and are in the process of researching journals to submit their findings to.

The fruit project is not the only one Dr. Palkendo is working on. She is in the method development stage with a student on a project entitled “Developing an Efficient Solid-Phase Extraction and

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LC-MS/MS Analysis to Study Drugs and Metabolites in Wastewater Effluent.” The project involves testing treated and untreated wastewater from community treatment plants to discover how efficient the treatments are in removing harmful substances, such as the drugs amphetamine and methadone. She hopes to begin experimentation with samples from the Borough of Kutztown soon.

Dr. Palkendo is excited about the path she is on and will continue publishing her various research projects as she finds the time in her busy schedule. She will continue to

expand her area of study to learn as much as she can while always bringing her students along for the journey.

