



Med Students and Engineering Undergrads Collaborate on Award-Winning AI Project

A group of University of Miami Miller School of Medicine medical students and University of Miami engineering undergraduates have come together to create Smart Scan, a potentially life-saving technology that helps detect pulmonary embolisms (PEs) and identify patients who need immediate care.

PEs are blood clots in the lungs that kill around 100,000 people in the U.S. each year, and those mortality rates have been rising. In addition, patients who survive PE often suffer from chronic lung conditions for the rest of their lives.



Collaboration on the Smart Scan project produced an algorithm that helps physicians identify and triage PE



patients.

PE patients need to be diagnosed quickly. Unfortunately, in a busy emergency room, a patient with moderate breathing problems may be overlooked. To complicate matters, PEs can be difficult to detect on X-rays or CT scans.

“Sometimes, a patient looks like they are doing fine, but they actually have a time bomb inside their body,” said Noel Ziebarth, Ph.D., associate professor of biomedical engineering. “Smart Scan uses AI to analyze chest X-rays or CT scans to identify PE and get those patients the attention they urgently need.”

To honor this innovation, Smart Scan was awarded Best Biomedical Engineering (BME) Project and Best Expo Poster at the recent College of Engineering Design Expo.

Cross-Pollinating Medicine and Engineering

Smart Scan was designed by three medical students (Guarav Gupta, Kenneth Richardson, and Ronald Swonger) and three biomedical engineering undergraduates (Ryan Fisher, Beatriz Guevara, and Janette Herr).

The med students are fulfilling their requirement for 150 hours of mentored research. This concentration was added to the Miller School of Medicine NextGenMD curriculum two years ago to produce well-rounded physicians who have in-depth research experience. A BME class sets the stage.

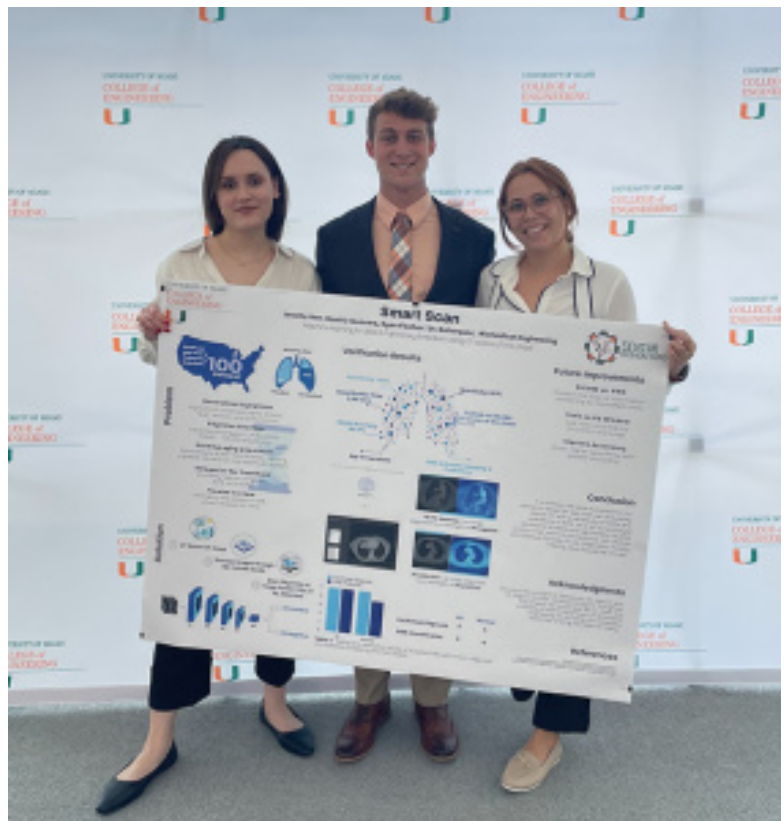
“They learn how to observe things in the clinic, identify how current processes may not be the best way to do things, and come up with better ideas,” said Dr. Ziebarth, who is graduate program director of biomedical engineering and teaches the



course. “From there, they have to develop a design, something mechanical or maybe a software program.”

This additional training and the associated project work provide new insights into how medical tools are developed, and can change students’ perspectives on problem solving.

“I have always been fascinated with the idea of engineering and product development,” said Kenneth Richardson, who will graduate from medical school in spring 2024. “Project Smart Scan made me realize that I can still pursue that dream. I intend to go into interventional radiology, but Smart Scan showed me I can continue working on engineering products throughout my career.”



(From left) Engineering students Janette Herr, Ryan Fischer, and



Beatriz Guevara at the College of Engineering Design Expo

After completing their engineering class, the medical students team up with biomedical engineering undergrads, who are fulfilling their senior-year capstone project, which matches them with industry partners to solve health care-related problems.

This collaboration provides major insights from both disciplines. For the Smart Scan project, the medical students understood the difficulty of detecting PE on a scan. The engineers took this input and translated it into solutions – in this case, an artificial intelligence algorithm that helps physicians identify and triage PE patients.

“The engineering students have the technical expertise, but they don’t have the experience,” said Dr. Ziebarth. “The medical students are seeing problems, like PE detection, during their rotations and can help the engineers design a technology that will work in the real world.”

These projects can be powerful educational tools, giving both medical students and engineers unexpected perspectives on problem-solving for a clinical environment.

“The process of developing and optimizing the algorithm by following how the CT scans were processed and analyzed gave me a greater understanding of the pathogenesis of the disease, as well as image pre-processing and visualization,” said biomedical engineering student Janette Herr. “The knowledge I gained from this project refined my programming and image analysis abilities.”



Success at the Expo and Beyond

The College of Engineering Design Expo is a focused version of “Shark Tank.” Participants are given fake money to invest in promising projects. The students woo potential investors with posters, videos, and other support materials. It gives them added experience pitching their wares.

These projects are wins for everyone. The medical students gain a better understanding of how engineers research problems and iterate solutions. The biomedical engineering students get to develop technologies that have a real chance of making a difference for patients and physicians.

“This project opened my mind to the possibilities of working with big data in science,” said biomedical engineer Beatriz Guevara. “Machine learning and AI are, I believe, the future of image processing and analysis, because they alleviate the workload on physicians and medical staff and give accurate and predictable results.”

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