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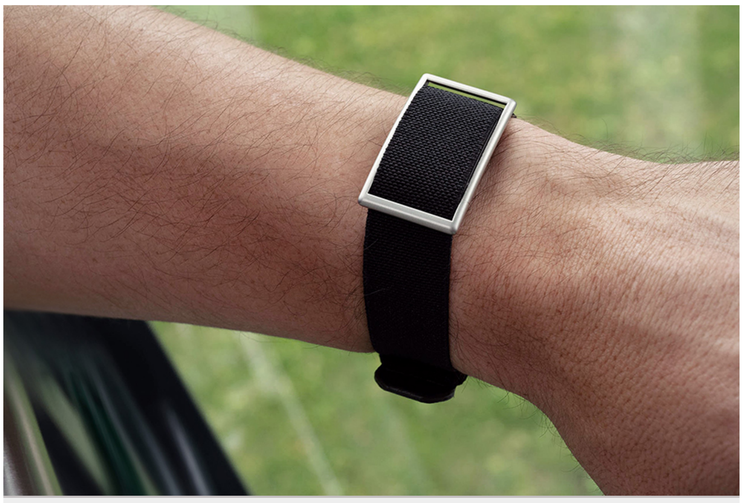
Hands-on experience with wearable sensors provides students with the knowledge necessary to help transform healthcare



Students in a new course developed by Weldon School of Biomedical Engineering faculty were given a Corsano Health CardioWatch Bracelet smart band. (Photo credit: Corsano)

Breakthroughs in digital technologies like wearable sensors can revolutionize healthcare, making it more precise and personalized. But to best accelerate their meaningful implementation into healthcare requires knowledge of both their technical capabilities and the implications of the data they provide for improving health. This is especially true when taking advantage of these innovative technologies to address existing health disparities and make sure they are used in an equitable, person-centric manner to realize the most widespread benefits.

That was the driving force behind an inventive new course developed by Purdue Weldon School of Biomedical Engineering faculty Matthew Ward and Steve Steinhubl. They, along with two students from the inaugural class, recently published their learnings from the class in Nature Partner Journal - Digital Medicine titled "Educating the healthcare workforce of the future: lessons learned from the development and implementation of a 'Wearables in Healthcare' course."

Their course on wearables takes an experiential learning approach, where students learn by doing through hands-on experience with their own wearable sensor and analyzing their own data. This is complemented by a series of lectures and discussions around all aspects of the health implications of these data. This enables them to more accurately translate the received knowledge of the classroom and labs into real-world therapeutic applications.

"Digital technologies will play a major role in shaping healthcare's future," said Ward, assistant professor in the Weldon School. "Our course teaches students about every aspect of wearables and how to process the continuous data streams from the sensors. We gave each student a medical-grade wrist sensor to wear during the semester, so they could learn firsthand how to interpret the data analytically to understand their own unique physiological responses."

The students were given a Corsano Health CardioWatch Bracelet smart band. Its multi-sensor algorithms enable the device to monitor things like heart rate, respiratory rate, blood pressure, sleep stages and core body temperature, among other biometrics, as well as detect arrhythmia. The device connected with the manufacturer's phone and cloud-based web applications to collect data directly from users. Homework was personal: students analyzed all the physiologic data from their device, and had to quantify and describe differences between data collected during different physiologic challenges, such as stress associated with a karaoke performance.

"The class had the opportunity to see and better understand vast differences in physiology among individuals and understand how each individual has their own unique 'normal' and equally unique response to different life situations," said Steinhubl, the Vincent P. Reilly Professor of Biomedical Engineering. "Recognizing how the use of data from wearables can impact different individuals and communities, in both good and potentially bad ways, is vital to understanding their proper role in healthcare."

The initial class offering focused on biomedical engineering students who had taken a prerequisite signals processing class, received ethics research training, and had some programming experience, typically with MATLAB or Python. The researchers recommend some course adjustments for dissemination to a more clinical audience: a wider range of wearable devices, reducing programming components by using outside labs to analyze the data, and training users such as nursing students to identify the signs of distress or pain in patients by analyzing the biometric data over shorter timescales.

"Providers must have evidence-based, hands-on training to meet the challenges of the digital transformation of healthcare," Ward said. "We hope this course can inspire others globally to refine and expand our early-stage learnings to speed that transformation, with the goal of creating a system that is, in the words of the World Health Organization's global strategy on digital health, '… ethical, safe, secure, reliable, equitable and sustainable.'"

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