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OSU Research Team Developing Garment to Monitor Vital Signs



Dr. Mary Ruppert-Stroescu, left, and Dr. Brek Wilkins, adjust a prototype of the Health Smart Garment on patient model Woranat Wongdhamma, graduate student in the College of Engineering, Architecture and Technology.

An Oklahoma State University research team is working together to create a wearable garment that could revolutionize the diagnosis and treatment of common cardiac and respiratory diseases.

"One of the greatest challenges we face in the battle against cardiovascular and respiratory diseases and disorders is identifying at-risk people early so they can begin treatment," said Dr. Bruce Benjamin, interim vice provost for graduate studies and associate dean for biomedical sciences at the Oklahoma State University Center for Health Sciences in Tulsa.

"This garment will offer physicians a more accurate picture of a patient's health and allow for more accurate and earlier diagnosis and

treatment of these diseases."

The project, called Health Smart Garment technology, will integrate electrodes into a comfortable garment that can be worn by a patient outside of their physician's office. The garment could aid in the treatment of cardiovascular disease such as coronary artery disease and congestive heart failure, and respiratory diseases and disorders such as sleep apnea and chronic obstructive pulmonary disease.

"In many cases if a patient is diagnosed early and begins treatment for these conditions, a catastrophic event like a heart attack can be prevented," said Benjamin.

The team, including biomedical researchers, industrial engineers, textile scientists and business consultants from OSU's Tulsa and Stillwater campuses, is addressing everything from functionality to comfort in their design of the garment.

Dr. Satish Bukkapatnam, professor of industrial engineering and management and the director of the OSU Sensor Networks and Complex Systems Research Lab, has developed the sensor system that would be a part of the garment. Bukkapatnam serves as the principal investigator for an Innovation Corps Grant from the National Science Foundation to help develop the garment for market.

"People are craving a solution for disease diagnosis that is viable and will help solve their medical problems," said Bukkapatnam. "With this technology, patients could be treated for diseases they don't even know they have yet."

Designed for patient comfort and wearability, the garment will give physicians continual assessment of patients and help detect abnormal patterns in heart and breathing rates that are more difficult to discover from traditional tests. Patient health data could be collected and stored in the garment or transported wirelessly to a collection center where a physician could then download and analyze the signals.

"The whole idea of wearable electronics has unlimited applications in all sorts of different aspects of our lives," said Dr. Mary Ruppert-Stroescu, assistant professor of apparel design and textile science. "This project seamlessly integrates technology that monitors vital signs with our fabric to create a very wearable garment."

Ruppert-Stroescu has developed the design of the garment, including everything from selecting a fabric that is comfortable to creating a fit that is comfortable and natural to wear to creating ways for the garment to house the sensors.

In addition to the NSF grant, the team has also received a grant from the Oklahoma Center for the Advancement of Science and Technology to further develop the garment.

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