# Wearable sensor technology to measure physical activity

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A new wireless sensor network will help researchers measure physical activity. Credit: G.L. Kohuth

Researchers from Michigan State University's departments of Electrical Engineering and Kinesiology are teaming up to create a new wearable sensor network to assess a person's physical activity and overall well-being.

Using technology developed by engineering professor Subir Biswas, participants will wear three small, wireless sensors — on their wrist, upper arm and lower leg — that during any physical activity will

measure not only the frequency, intensity and time but also now the type of activity, providing valuable information. The data then will be wirelessly transmitted to medical service providers' servers for remote assessment and well-being management.

"This adds another dimension in how we measure physical activity," said Karin Pfeiffer of MSU's Department of Kinesiology. "If we cannot accurately measure physical activity, we cannot know what is effective and what is not in battling obesity and other health risk factors."

The project is being funded by a two-year, $411,000 grant from the National Institutes of Health.

Though accelerometers - wearable devices used to measure motion - have become a popular tool for measuring physical activity, there are several limitations: measuring uphill movements and activities done while standing still, among others. Biswas and Pfeiffer are developing the wireless network system to more accurately detect various physical activities and measure energy expenditure.

"With this technology, we can now measure acceleration, tilt, posture, the proximity of limbs to each other, all in collaboration with each other," Biswas said.

He has been working on the technology for wearable sensor networks for several years and has successfully applied it to projects funded by NASA, the National Science Foundation and the U.S. Department of Agriculture.

"With the traditional accelerometry-based approach, we monitored activity only by measuring the individual body part movements, not by their distance to each other," Biswas said. "While an accelerometry-based approach can be used for differentiating postures such as walking

and running, it is not very effective for identifying and differentiating between low-activity postures such as sitting and standing."

Biswas has created a working prototype, and Pfeiffer soon will begin testing it with graduate students in her department. The results of the current project will allow the team to begin studying advanced features, such as on-body statistical data processing and real-time feedback to participants.

"By detecting more information about physical activity, we can begin tailoring effective exercise programs," Pfeiffer said. "This will help us immensely as we try to reverse some of the alarming trends seen in childhood health."

Provided by Michigan State University