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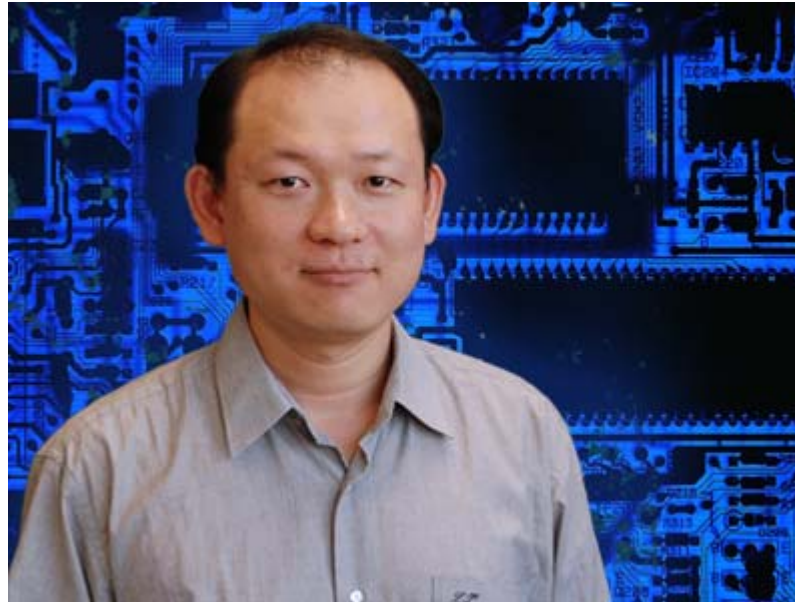
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Lun-Chen Hsu - Here's to Your Health



Tiny sensors being perfected by electrical engineering doctoral student Lun-Chen “Peter” Hsu may soon help people prevent two unwanted consequences – death and acid reflux condition.

Hsu, working with Professor J.C. Chiao and others, had developed wireless sensors that detect carbon dioxide. Originally, they saw the sensors as tools to detect and monitor automobile exhaust fumes. But another graduate student, Hung Cao, thought of another use for the sensors, one with a more personal connection. Cao had seen his newborn son in a hospital nursery and noticed various sensors monitoring the infant’s condition. He knew that Sudden Infant Death Syndrome (SIDS), the primary killer of infants beyond the first 30 days after birth, was a potential threat to his son. He wondered if the carbon dioxide sensors might play a beneficial role, not by measuring the

presence of carbon dioxide, but its absence.

Cao and Hsu's research work on a remote infant breath monitoring system could noninvasively and wirelessly detect non-traumatic signs to prevent SIDS. If an infant stops breathing for a certain period of time, the absence of exhaled carbon dioxide could trigger warning signals so a caregiver can rush to the crib. Collaborating with the School of Nursing, they built a prototype and tested it in the lab under controlled environments in the Smart Hospital.

Hsu soon became part of a team investigating how wireless sensors could be used not only to prevent SIDS, but also improve health monitoring for many conditions. The engineers envisioned clinical applications for patients with a variety of pulmonary and other medical problems.

One of these was gastroesophageal reflux disease (GERD), where stomach acids seep or are pushed into the esophagus. The painful result is usually described as heartburn, but the acids can severely damage body tissue, possibly leading to a form of cancer.

Hsu and Dr. Chiao were joined by graduate student Thermpoon Ativanichayaphong in a quest to develop a wireless sensor to monitor GERD. Wireless sensors would be a major improvement over current methods of monitoring GERD, which require a wired sensor that runs through the patient's nostril and into the esophagus. The wires are attached to a recording device, resulting in an uncomfortable procedure that makes it very difficult for a patient to eat and behave normally, which is required for accurate testing.

Hsu has also miniaturized the implant and portable reader so they are more comfortable for patients. The team's device gets its power through radio frequency signals in a process similar to RFID tags. Working together with clinicians at the UT-Southwestern Medical Center Department of Medicine and the Dallas VA Medical Center, the Batteryless Endoluminal Sensing Telemetry system is able to detect reflux episodes in GERD and non-erosive reflux disease (NERD) patients.

After two years of work, a series of animal trials has confirmed the practicality of a wireless sensor to monitor GERD episodes. The trials are another step in perfecting the device for eventual use in



humans.

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