Self-Powered Wireless Sensor (2017-027)

Portable, Self-Sufficient Sensor Allows for Wireless Communication

Market Overview

This novel, self-powered sensor technology enables wireless transmission over a range of tens of meters without a motor or active power supply. The smart sensor market is expected to grow from 18.58 billion USD in 2015 to 57.77 billion USD by 2022, with the wireless sensor market share expected to reach over $940 million by 2020. However, all commercially available wireless sensors in the market require a power source. Clemson University researchers have developed a portable, self-powered wireless sensor that can be adapted to many applications such as smart electrochromic screens, security alarms, temperature and pressure sensors, and infrared sensors.

Application

Electrochromic touch screens, security alarms, temperature and pressure sensors

Development Stage

Preliminary Prototype

Advantages

- Operates without batteries or an external power source, making it environmentally friendly, maintenance free, and long lasting
- Comprised of simple design features and inexpensive materials, minimizing manufacturing costs
- Specific waveforms can be mechanically programmed, enabling transmission of security codes

Technical Summary

This wireless sensor and transmitter is comprised of a tactile driven electric generator, using 3D-printed nanocarbon and polymer electrodes. The technology relies on two electrodes capable of producing > 2000 V, which when connected to a metal conductor is sufficient to create an electric field that can be used to wirelessly communicate a signal over range of few tens of meters. The sensor is completely self-contained and requires no additional power. Additionally, waveforms generated by the sensor can be modulated by mechanical action such as hand tapping in a given sequence. These waveforms are preserved in the wireless signal (akin to Morse coding) and can be detected by existing compatible commercial electronic receivers. Thus, the technology can be developed into products suitable for security applications requiring wireless transmission of codes.

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Provisional	United States	62/587,717	NA	2017-027	Dr. Ramakrishna Podila Dr. Apparao Rao

About the Inventors

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Dr. Ramakrishna Podila is an Assistant Professor in the Department of Physics and Astronomy at Clemson University. He received his M.S. in physics from the Indian Institute of Technology at Roorkee in 2007 and a Ph.D. in Physics from Clemson in 2011. He worked as a post-doctoral fellow at the Brody School of Medicine in Greenville, NC until 2014. His current research is focused on elucidating fundamental optical, electronic, and magnetic properties of nanomaterials and using them for nanomedicine and energy applications.

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Dr. Apparao Rao is the Robert A. Bowen Professor of Physics at Clemson University and Director of the Clemson Nanomaterials Institute. Prior to joining Clemson, Dr. Rao was a postdoctoral research assistant at MIT and a research assistant professor at the University of Kentucky. Dr. Rao is a fellow of the American Physical Society and the American Association for the Advancement of Science. He is a recipient of the SC Governor's Award for excellence in scientific research. His research interests include the synthesis, characterization and application of nanomaterials.

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