

Digital Sensing Device for Direct Signal Processing

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Device and Method for Measuring and Digitizing Information for Sensing and IoT Applications

Market Overview

The growing need for quick and easy methods of assessing, analyzing, and storing data of various kinds has increased exponentially in the past several years. In terms of gathering data on parameters such as temperatures, pressures, and humidity levels a sensor with wires and external sources of power are often required. Clemson University researchers have discovered an effective way to accurately and rapidly convert analog parameters into digital signals that can then be further transmitted or stored for the user's need. This all-digital sensing device uses a binary system and allows for entry into the passive sensor market, i.e. FDIR devices whose market was valued at \$10.1 billion in 2015 and has an expected annual growth rate of 11%. Within such a market, this device would allow for companies to examine desired conditions in harsher environments without exposing employees to greater danger, and do this at a much lower cost per node.

Technical Summary

This all-digital sensing device digitizes the parameter to be measured and then encodes into binary bits. This then allows for transmission, display, or storage of the desired parameter. Because this device operates within a binary or quasi-binary fashion, it can recognize varying amplitudes of a given parameter based on conditional recognition. Such conditional recognition may include that of RFID sensors. No external power source is needed for the device due to its passive operation, i.e. the device recognizes changes in a coil as a result of change in environmental temperatures. The absence of a need for external sources of power provides this device an opportunity to be used in harsher conditions where traditional sensors would not be applicable include such those as turbine engines or aerospace applications.

Application

High-accuracy digital sensors/processors

Development Stage

Tested prototype

Advantages

- Provides conversion of analog signals into digital ones without the need of an external power source.
- The device can be applied to a variety of applications and may be created to measure varying levels of precision based on need.
- Its design allows for faster signal conversion and is able to do so at lower costs per node.

App Type	Country	Serial No.	Patent No.	CURF Ref. No.	Inventors
Utility	United States	15/710,394	NA	2017-009	Dr. Hai Xiao Wenge Zhu



About the Inventor

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Dr. Hai Xiao is also jointly affiliated with the Center for Optical Materials Science and Engineering Technologies (COMSET). Dr. Xiao earned his Ph.D. in Electrical Engineering from Virginia Tech. Before coming to Clemson, he served as the Founding Director of the Photonics Technology Laboratory at the Missouri University of Science and Technology. Dr. Xiao has received a number of prestigious awards including the Office of Naval Research Young Investigator Program Award, the R&D 100 award, and the Virginia Tech Outstanding Achievement Award. His research interests focus on photonic and microwave sensors and instrumentation for various applications including energy, biomedical imaging, and national security.

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