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Engineered Micro Systems & Devices Track

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NASA field center Marshall Space Flight Center (Huntsville, AL), has invested in advanced wireless sensor technology development. Developments for a wireless microcontroller back-end were primarily focused on the commercial Synapse Wireless family of devices. These devices have many useful features for NASA applications, good characteristics and the ability to be programmed Over-The-Air (OTA). The effort has focused on two widely used sensor types, mechanical strain gauges and thermal sensors. Mechanical strain gauges are used extensively in NASA structural testing and even on vehicle instrumentation systems. Additionally, thermal monitoring with many types of sensors is extensively used. These thermal sensors include thermocouples of all types, resistive temperature devices (RTDs), diodes and other thermal sensor types. The wireless thermal board will accommodate all of these types of sensor inputs to an analog front end. The analog front end on each of the sensors interfaces to the Synapse wireless microcontroller, based on the Atmel Atmega128 device. Once the analog sensor output data is digitized by the onboard analog to digital converter (A/D), the data is available for analysis, computation or transmission. Various hardware features allow custom embedded software to manage battery power to enhance battery life. This technology development fits nicely into using numerous additional sensor front ends, including some of the low-cost printed circuit board capacitive moisture content sensors currently being developed at Auburn University.