ULTRA WIDEBAND TRANCEIVER FOR RESPIRATION/ BIO-RADAR SENSING

Invention:

This invention demonstrates the frequency diversity radar sensing on a novel CMOS integrated UWB RF front-end that utilizes the full UWB frequency band (3-10 GHz). The advantage of using integrated CMOS UWB technology in biomedical sensing is that this technology provides reduced power, reduced cost, and small area solutions with improved accurate and reliable performance. This invention can be used for constant monitoring of infants, breathing pattern monitoring for radiation therapy, hospital patients, real-time monitoring of highway long-haul drivers that could fall asleep, and other people facing sudden death syndrome. Other applications include contact-less respiration/heart rate monitoring in fitness center.

Applications:

The applications of this UWB frequency diversity radar sensing system-on-chip (SoC) solution include constant monitoring of infants, breathing pattern monitoring for radiation therapy, hospital patients, real-time monitoring of highway long-haul drivers that could fall asleep, and other people facing sudden death syndrome. Other applications include contact-less respiration/heart rate monitoring in fitness equipment. This invention of UWB radar technology has direct impact in health care (e.g. real-time vital sign monitoring and breast cancer detection, etc.).

Advantages over existing Technology:

We present a fully integrated UWB radar transceiver in the standard 130 nm CMOS process. This UWB radar transceiver integrates a UWB diplexer with a full UWB band carrier-based transmitter and receiver front-end. The UWB pulse is generated by a pulse-modulated DCO. The output signal is compliant with FCC spectrum mask. The experiment demonstrates that a human breathing rate up to 50 cm away can be successfully detected. To the best of our knowledge, this proposed radar transceiver is the first to use the entire 3-10 GHz band with an ultra-wide frequency tuning capacity. This frequency diversity capability, along with low-cost and high integration of the

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