A 24-GHz portable FMCW radar with continuous beam steering phased array (Conference Presentation)

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ABSTRACT

A portable 24-GHz frequency-modulated continuous-wave (FMCW) radar with continuous beam steering phased array is presented. This board-level integrated radar system consists of a phased array antenna, a radar transceiver and a baseband. The phased array used by the receiver is a 4-element linear array. The beam of the phased array can be continuously steered with a range of ±30° on the H-plane through an array of vector controllers. The vector controller is based on the concept of vector sum with binary-phase-shift attenuators. Each vector controller is capable of independently controlling the phase and the amplitude of each element of the linear array. The radar transceiver is based on the six-port technique. A free-running voltage controlled oscillator (VCO) is controlled by an analog "sawtooth" voltage generator to produce frequency-modulated chirp signal. This chirp signal is used as the transmitter signal, as well as the local oscillator (LO) signal to drive the six-port circuit. The transmitter antenna is a single patch antenna. In the baseband, the beat signal of the FMCW radar is detected by the six-port circuit and then processed by a laptop in real time. Experiments have been performed to reveal the capabilities of the proposed radar system for applications including indoor inverse synthetic aperture radar (ISAR) imaging, vital sign detection, and short-range navigation, etc.
(This abstract is for the profiles session.)

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