True Technology Forward Vision Description of Operation

The Forward Vision driving aid detects and warns of dangerous possible collisions using a frequency modulated continuous wave, FMCW, radar system operating in the 77 GHz band. The radar has one wide-beam transmit horn antenna and two narrower receive horns angled slightly left and right, with an over-lap in the center to assist in angular discrimination. The transmitter derives its frequency control using a phase-locked loop, PLL, referenced to a 50 MHz crystal. The local oscillator output is at 38 GHz, and is frequency doubled in the power amplifier block of the transmitter integrated circuit, IC, up to the 77 GHz band. The receiver IC multiplexes the left and right receiver channels and down-converts to an IF frequency below 10 MHz. After the receiver IC, the intermediate frequency, IF, is further band-limited to between 10 kHz and 500 kHz, and high-passed filtered to compensate for the 1/range^4 signal amplitude effects. The IF signal is digitized in a high-speed analog-to-digital converter, ADC, inside the microcontroller, sequentially sampling the left channel up-chirp, left channel down-chirp, right channel up-chirp, and right channel down-chirp. The microcontroller executes a Fourier transform on the digitized radar signals, which is further processed by an image filter to detect potential targets. The algorithm then associates and tracks potential targets, augmented by vehicle speed information from a global positioning system, GPS, receiver and a 3-axis accelerometer. When a potentially dangerous situation is detected, an audible warning signal is provided to the vehicle operator.