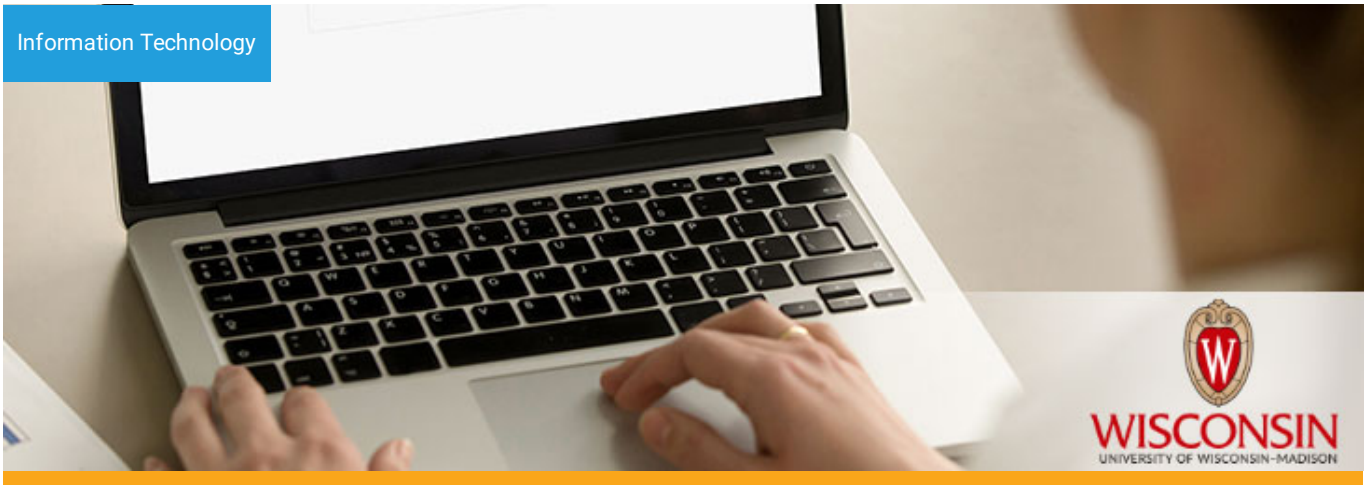
Information Technology



Ultrawideband, Frequency-Selective Transceiver Lens for Less Distortion

View U.S. Patent No. 10,090,603 in PDF format.

WARF: P120192US01

Inventors: Nader Behdad, Meng Li

The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing time-delay microwave lenses for wireless systems that employ wideband radiated pulses.

Overview

Ultrawideband technologies, including certain wireless communication and radar operations, receive and transmit information across a broad swath of radio frequencies by radiating narrow pulses of information. Wideband is considered fundamentally different from conventional radio systems that transmit by varying the power, frequency or phase of waves.

But in wideband, modulating incoming signals to control a transceiver's outgoing pulses can lead to distortion. Microwave lenses composed of frequency selective surfaces (FSS)—conductive materials that provide greater signal response flexibility—have not fully resolved distortion issues. A new lens array needs to more effectively support wideband radiated communications.

The Invention

UW–Madison researchers have developed a microwave lens for ultrawideband signals that doesn't introduce major distortion in the radiated pulse.

The design utilizes low-pass FSS layers of metallic grids. The grids are formed by inductive-capacitive (IC) cells that resonate in response to incoming electromagnetic radiation at frequencies that vary with cell shape. The two-dimensional grids are mounted on both sides of stacked dielectric sheets in alignment with each other to form a time-delay circuit, or filter.

To receive and transmit a pulse, a processor first receives a digital data stream and transforms it into an analog signal. An electromagnetic wave feed element, like a dipole antenna, receives the signal and radiates a spherical radio wave toward the first capacitive grid. The time-delay circuit is selected to reradiate the wave in the form of a second radio wave. Consistent time delays across the desired band and calculated phase shifts ensure that the incident wave is not distorted.

Applications

- Ultrawideband communications
- Commercial and military radar
- Point-to-multipoint communications
- Anywhere existing microwave lenses are used

Key Benefits

- No major distortion of ultrawideband signals
- Broad operation bandwidth of 50 percent

- Ultrathin profile
- Stable under oblique angles of incidence, enabling beam-steering

Additional Information

Related Technologies

- For more information about a hybrid transmitter system that enhances wireless communications, called continuous aperture phased MIMO (CAP MIMO), see WARF reference number P110040US01.

Tech Fields

- Information Technology : Networking & telecommunications

For current licensing status, please contact Michael Carey at mcarey@warf.org or 608-960-9867