

RADAR SYSTEM USING RF NOISE

The present invention is a radar that uses transmitted radio frequency noise. The system utilizes predetermined, pseudorandom, or random waveforms that may be substantially matched to the impulse response of the radar and any surrounding clutter. The signal-to-clutter ratio is then optimized so that specific targets may be identified and/or classified.

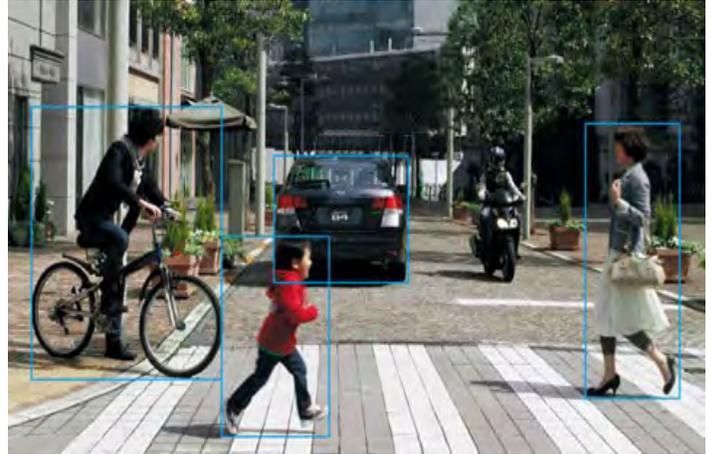
BACKGROUND

The present invention has the capabilities of measuring the physical properties of objects or fluids. Specifically, it entails the methods and sensors for determining the physical properties of objects or fluids in multi-path clutter environments. For the purposes of defining and describing the invention, it is noted that a "fluid" should be taken to define any matter with fluidic properties including, but not limited to, a gas, a liquid, a vapor, etc.

It is often necessary to measure physical properties such as temperature, strain, pressure, etc. using a wireless system. In some cases, there are a large number of multiple reflections (multi-path signal propagation environment) of the radio signals along the propagation path so that the signal to or from the sensor will be corrupted and/or modulated by the multi-path environment. When there are a number of varying coherent signal reflections along the propagation path, the result is multi-path induced variations in the phase, amplitude, and/or time domain character of the signal. This situation presents a very serious problem for sensor system design. Also, practical constraints on sensor placement, weight, size, temperature, and lifetime requirements present problems to engineers in the design of very small and light weight sensors that can operate wirelessly without a source of power.

PROJECT GOALS

The Ohio State University is seeking industry partners who would benefit from the implementation of this radar system. The Center for Design and Manufacturing Excellence (CDME) will work with partners to scope projects to meet the needs of our industry partners. As an advanced object detection system, this technology has potential to change the way the world detects objects in a multitude of conditions. The overarching goal of the program is to insert the technology into its multiple industrial areas of application.



INTELLECTUAL PROPERTY

Patent Granted US13197465 "Determining Physical Properties of Objects or Fluids in Multi-Path Clutter Environments"

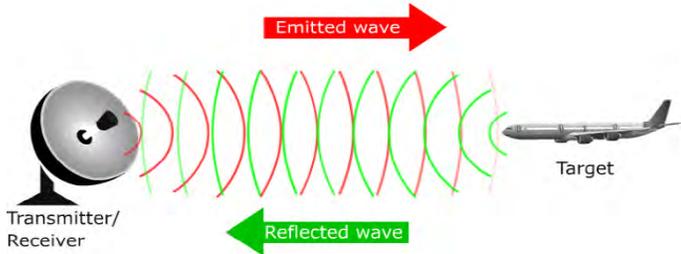
INVENTOR

Eric K. Walton received his Bachelor of Electrical Engineering degree from the University of Delaware (1966) and his MS and PhD degrees from the University of Illinois (1968 and 1971).

He has been with The Ohio State University Electrical Engineering Department in the ElectroScience Laboratory since 1977, where he has been involved in the study of radio and radar signal and system analysis, ultra-wide band radar sensing, radar target identification, compact range development, and antenna design.

PROGRAM MANAGER

It is proposed that Dr. Yongbo Wan will lead this project for CDME. Dr. Yongbo Wan is the Electronics Program Manager at CDME and is currently working on multiple technology commercialization initiatives. He has a Bachelors, Masters, and Ph.D. all in electrical engineering. His research background in embedded systems and signal processing are particularly applicable to this initiative.



THE TECHNOLOGY

In one embodiment of the invention, a method for determining an unknown physical property of an object or fluid in a dynamic multi-path clutter environment is provided. According to the method, an RF interrogation signal is transmitted to a wireless sensor physically coupled to the object or the fluid in the dynamic multi-path clutter environment. A retransmitted reference signal and a retransmitted measurement signal are subsequently received from the wireless sensor. The structure of the wireless sensor is such that, upon receipt of the RF interrogation signal, the wireless sensor produces a reference signal and a measurement signal and retransmits the reference signal and the measurement signal in the dynamic multi-path clutter environment. The retransmitted reference signal is delayed by a first time delay that may or may not be a function of the unknown physical property, while the retransmitted measurement signal is delayed by a second time delay that is a function of the unknown physical property. The retransmitted reference and measurement signals are compared to determine the unknown physical property of the object or fluid.

KEY FEATURES

- Determines unknown physical property of an object or fluid in a dynamic multi-path clutter environment
- Measures temperature, strain, pressure, etc.
- Works in hazardous weather.
- Useable day and night.
- Functional while object is at rest or in motion.
- Multiple applications in different industries.

MARKET OPPORTUNITIES

- **Transportation** Detect and Identify Objects
- **Security Systems** Detect Individuals and Objects
- **Military Applications** Target Identification, Bullets
- **Industrial Applications** Automated Identification

THE OHIO STATE UNIVERSITY

CDME is supporting the commercialization of technologies that emerge from Ohio State's annual research efforts. Ohio State has one of the largest research and development budgets of all universities. The amount of annual funding is a leading indicator of the breakthrough innovation occurring within the University. Recent annual highlights from OSU:

- » \$934 Million: Total research and development (R&D) expenditures
- » \$470 Million: Federal R&D expenditures
- » \$101 Million: Industry-sponsored research expenditures

Whether your interest is in licensing, sponsored research, joint ventures, investment, corporate giving or placement of our best students, Ohio State is here to help accelerate your business through innovation.

CONTACTS

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