



Low-Complexity Ultra-wideband (UWB) Sensor for Wireless Detection and Monitoring of Human Body Movements

A low-cost solution delivering millimeter range accuracy with robust performance against obstacles and interferences

We have developed a wireless sensor scheme based on the Ultra-wideband (UWB) technology that offers a highly accurate mechanism for the detection and measurement of the human body movements. The sensor is able to provide accuracy in the range of millimeters, which makes it particularly suitable for detecting small movements of the human body, such as the respiratory chest movements. UWB signals provide features such as low energy consumption, low electromagnetic radiation, low interference, and the ability to penetrate obstacles, including concrete. These features lead to many potential applications including medical instrumentation, search and rescue, security and surveillance, and indoor tracking and localization to name a few. Our technique enables robust performance even in highly noisy and non-isolated environments. Our novel subsampling technique leads to reduced complexity of the hardware and development of the low-cost portable device.

TECHNOLOGY OPPORTUNITY



Benefits

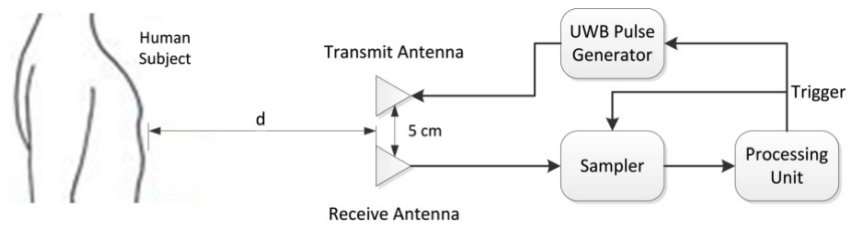
- ▲ Provides a low-cost solution to wireless monitoring of respiratory movements
- ▲ High level of accuracy with detection and tracking in the order of millimeters
- ▲ Capable of operating in highly noisy environments
- ▲ Robustness against changing background clutter and obstacles
- ▲ Energy efficient and low power radiation suitable for portable devices and medical applications

Applications

- ▲ Medical and Fitness (Health Monitoring, Diagnosis of Respiratory Disorders)
- ▲ Surveillance (Through Wall Monitoring)
- ▲ Search and Rescue (Survivors Under Rubble)
- ▲ Indoor tracking and localization (Smart Homes)

Technology Details

How It Works



Why It Is Better

Our choice of UWB technology enables sensing through obstacles using pulses which consume low power and emit low electromagnetic radiations. Our novel subsampling scheme enables us to overcome the Nyquist sampling constraint, allowing to achieve millimeter range accuracy using UWB signals while sampling much below the Nyquist rate. For example, 80GHz sampling frequency is required for a 2mm accuracy using traditional methods. With our sensor the same accuracy can be achieved using only 2.1GHz! The reduction in hardware complexity leads to significant cost savings and possibility of developing a portable and low-cost commercial device. Moreover, our processing algorithms enable to effectively deal with and eliminate background clutter, noise, and interferences, even in harsh and non-isolated environments. The result is a highly accurate and robust sensor that provides a low-cost solution for the wireless detection and monitoring of human body movements.

IP Protection

KAUST has a patent pending for this technology.

Opportunity

This technology is part of KAUST's technology commercialization program that seeks to stimulate development and commercial use of KAUST-developed technologies.

Opportunities exist for joint development, patent licensing, or other mutually beneficial relationships.

For More Information

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