

## **FACULTY RESEARCH FUND**

**Award Date:** Spring 2016

**Proposal Title:** Diversity Circuit Design using Discrete Wavelet Transform Based System for  
UWB Space Time Block Code

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## **Diversity Circuit Design using Discrete Wavelet Transform Based System for UWB Space Time Block Code**

A software-defined radio provides both post fabrication definition of the radio and ample parallel processing power. Existing schemes provide sufficient resolution of heart rate and respiration but due to low power requirements commissioned by UWB standards committee, the actual distance is limited to within 1-2 meters with clear line-of-sight. This proposal presents the diversity portion of the design for a software-defined radio targeted to impulse ultra-wideband signals. Due to low power requirements set aside by the FCC for the UWB band, the existing single antenna configurations for receive and transmit, respectively do not allow for obstructed or distant vital signal measurements. To improve on the limits set aside by standards there within, a multi-diversity configuration for the UWB would be capable of improving the temporal diversity by a factor of to-be-determined (TBD) and a space diversity improvement by a factor TBD. If both spatial and time diversity are employed, the combined improvement factor is the product of the two values. To achieve this one approach is to use Fast Fourier Transforms (FFT) and another is using Discrete Wavelet Transforms (DWT). A wavelet transform can be considered as a pair of input values that store the difference and pass the sum.