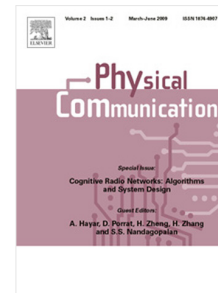


## Accepted Manuscript

Ultra-wide band impulse radar for life detection using wavelet packet decomposition

Xiaolin Liang, Hao Zhang, Tingting Lyu, Lingwei Xu, Conghui Cao, Thomas Aaron Gulliver



PII: S1874-4907(17)30627-4  
DOI: <https://doi.org/10.1016/j.phycom.2018.04.004>  
Reference: PHYCOM 522

To appear in: *Physical Communication*

Received date : 23 December 2017  
Revised date : 9 April 2018  
Accepted date : 9 April 2018

Please cite this article as: X. Liang, H. Zhang, T. Lyu, L. Xu, C. Cao, T.A. Gulliver, Ultra-wide band impulse radar for life detection using wavelet packet decomposition, *Physical Communication* (2018), <https://doi.org/10.1016/j.phycom.2018.04.004>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

# Ultra-wide Band Impulse Radar for Life Detection Using Wavelet Packet Decomposition

Xiaolin Liang<sup>1,\*</sup>, Hao Zhang<sup>1,3</sup>, Tingting Lyu<sup>1</sup>, Lingwei Xu<sup>2</sup>, Conghui Cao<sup>1</sup> and Thomas  
Aaron Gulliver<sup>3</sup>

<sup>1</sup>Department of Electronic Engineering, Ocean University of China, Laoshan District Song  
Ling Road 238th, 266100, Qing Dao, China;

<sup>2</sup>College of Information Science & Technology, Qingdao University of Science & Technology,  
Laoshan District Song Ling Road 99th, 266061, Qing Dao, China;

<sup>3</sup>Department of Electrical Computer Engineering, University of Victoria, 3800 Finnerty Road  
Victoria BC V8P 5C2, Canada Victoria;

iamxiaolin2016@126.com; hzhangouc@163.com; lytingting33@163.com;

gaomilaojia2009@163.com; caoconghui2008@163.com; agullive@ece.uvic.ca

\*Corresponding author

**Abstract:** This paper develops an improved algorithm for life detection based on ultra-wide band (UWB) impulse radars in through-wall condition. Usually, the cardiac-respiratory movement is the most significant sign of a living person, which can be extracted from the collected pulses. The proposed algorithm analyzes the variances of the collected pulses, which are mixed with various clutters. The time of arrival (TOA) between UWB radar and human target can be calculated by performing the wavelet packet decomposition on the calculated variances. The rates of human cardiac-respiratory movement are acquired based on the variable time-window (VTW) method. Compared with several well-known algorithms, the developed method can provide competitive performance in life detection. Results acquired from different sites prove the efficiency and reliability of the method.

**Keywords:** ultra-wide band (UWB) impulse radar; cardiac-respiratory movement; wavelet packet decomposition; variable time-window (VTW)

## 1. Introduction

Non-contact detection technology is researched widely, which has been used in different applications such as life monitoring [1-3], heartbeat rate variability analysis [4], evaluations of patients with chronic heart failure [5], cancer radiotherapy [6], life research and rescue [7], and animal health care [8]. Among numerous approaches for life detection, ultra-wide band

Download English Version:

<https://daneshyari.com/en/article/6888942>

Download Persian Version:

<https://daneshyari.com/article/6888942>

[Daneshyari.com](https://daneshyari.com)