
應用相位累增以提升雜訊容忍度
FMCW 雷達架構之生理訊號準確度研究

Noise Tolerable Vital Sign Detection Using
Phase Accumulated Demodulation for
FMCW Radar System

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無線創新系統電磁應用實驗室 (WISE Lab)

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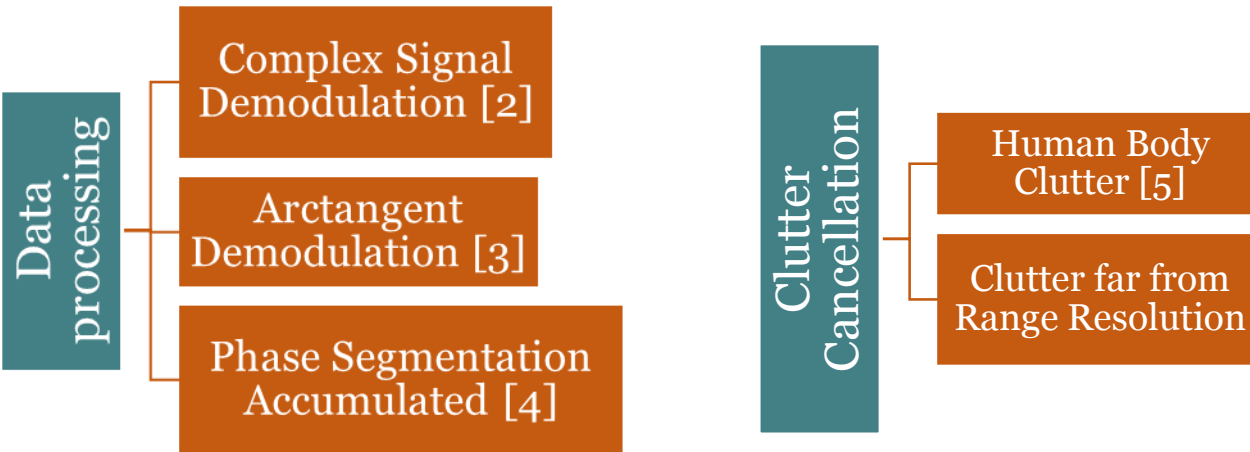
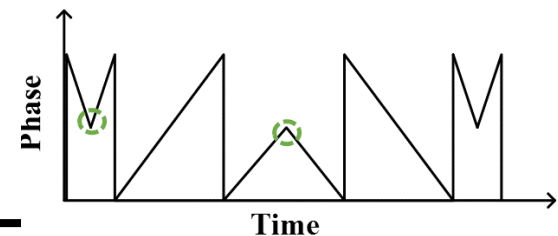
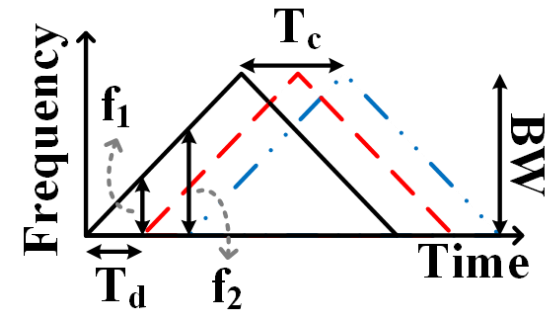
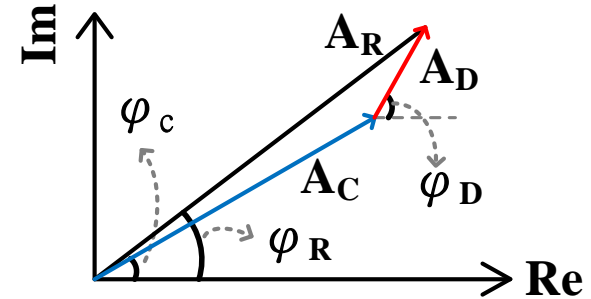
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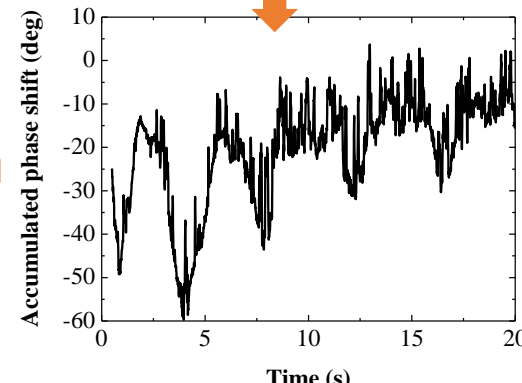
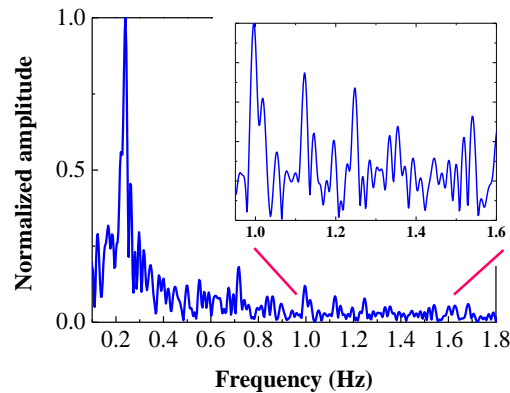
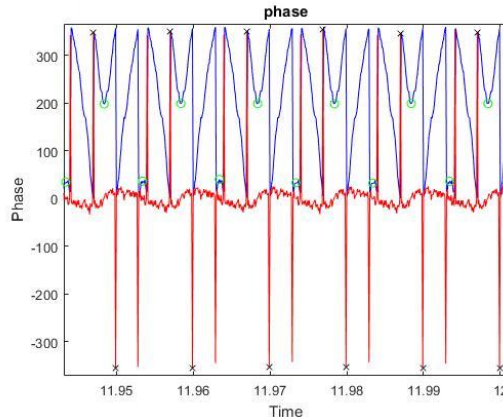
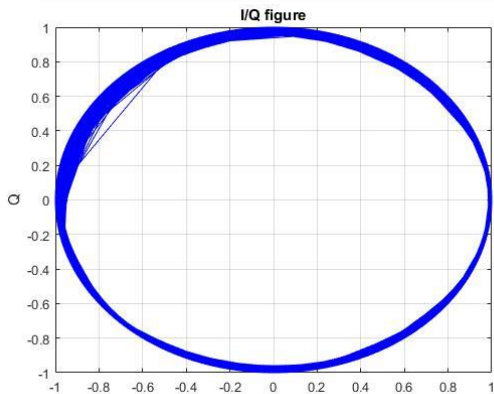
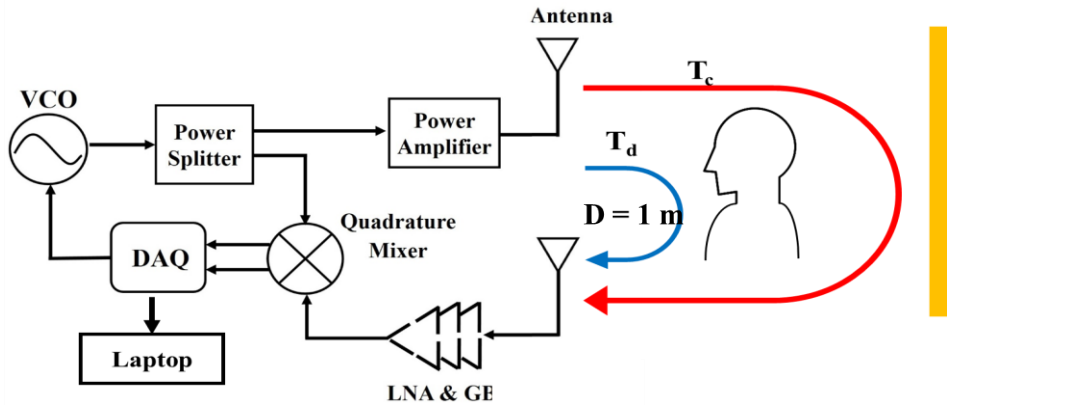
LITERATURE REVIEW & OBJECTIVE

- Clutter and noise tolerable method
 - Clutter have great influence on vital sign signal measurement
 - Used to use delay-line avoid flicker noise
- Use phase accumulated demodulation to reduce the influence of clutter and noise

➤ Range distance : $R = \frac{\phi_{R,accumulated} \cdot C}{4 \cdot 180 \cdot \Delta f}$



FMCW SYSTEM AND PAD FLOW



Baseband signal of I/Q channels

DC offset calibration and normalized

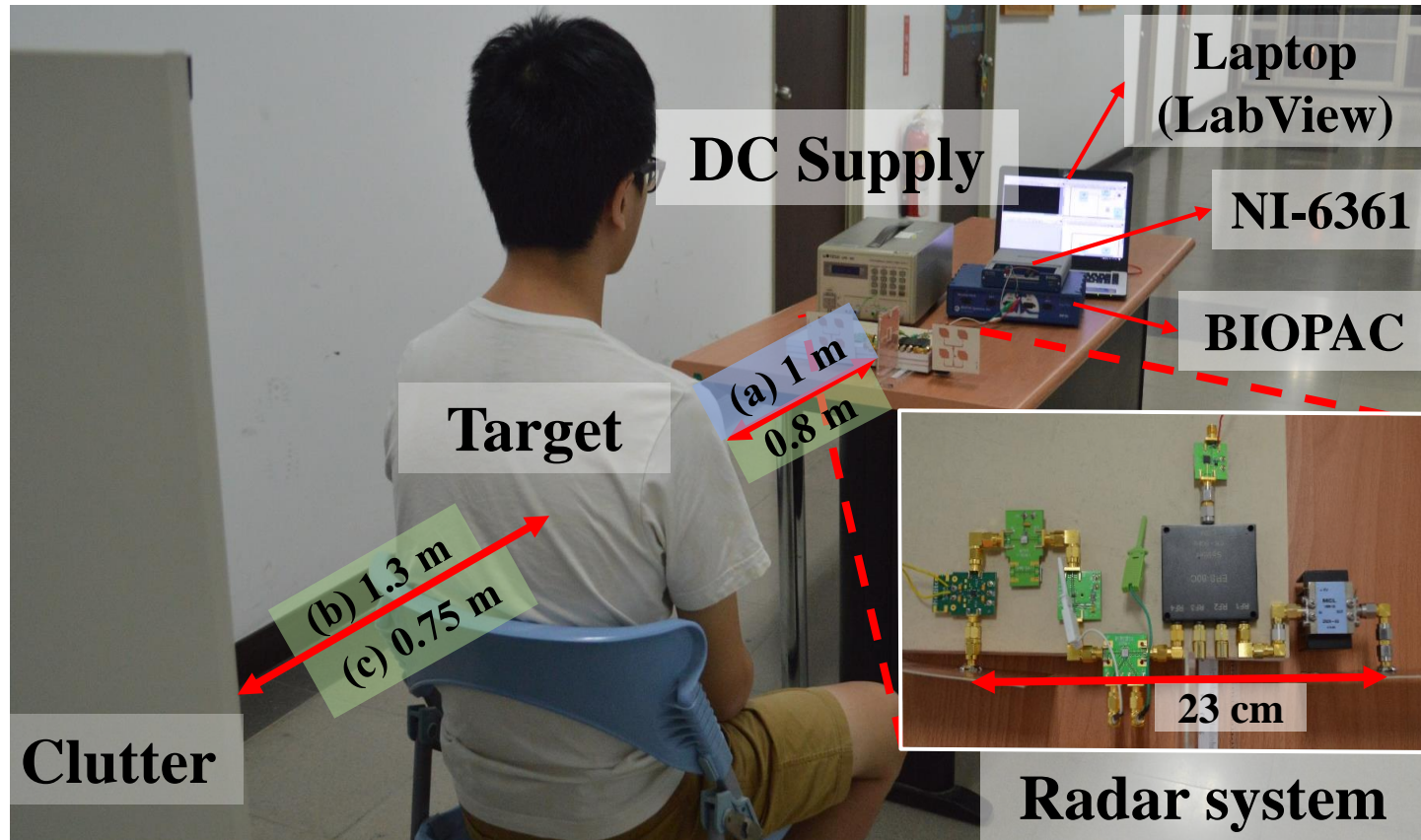
Applying $\arctan(I/Q)$

Phase accumulate

Find phase shift and absolute distance

Applying FFT find vital sign

SYSTEM SETUP



(a) Human target 1 m away from antenna

(b) Clutter 1.3 m behind human target which 0.8 m away from antenna

(c) Clutter 0.75 m behind human target which 0.8 m away from antenna

EXPERIMENT RESULTS

- A. Averaged error from 50-305 cm : 7.26 cm
- B. Human target 1 m away from antenna
- C. Stationary clutter 0.75 m and 1.3 m behind the human target

