

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE FEB 2012		2. REPORT TYPE		3. DATES COVERED 00-00-2012 to 00-00-2012	
4. TITLE AND SUBTITLE Coherent Distributed Radar For High Resolution Through-Wall Imaging				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Intelligent Automation Incorporated, 15400 Calhoun Dr, Suite 400, Rockville, MD, 20855				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 22

Contract No. N00014-10-C-0277

Sponsored by

Office of Naval Research

COTR/TPOC: Martin Kruger

Prepared by

Eric van Doorn, Ph.D. (PI)

Satya Ponnaluri, Ph.D.

Distribution Statement A: Approved for public release; distribution unlimited.



1 Work performed this reporting period

1.1 Technical work performed in this reporting period

In this reporting period, we are continuing to collect indoors data and processing the scans for improving the indoors range accuracy. Since the transceivers are very tightly synchronized, the transmission phase and time, and the phase use for down conversion are well-controlled and repeatable as we perform the experiments. As a result, we observe a clear correlation between the range error, and the correlation amplitude. In Figure 1, we show the Correlator output for data with very large positive, or very large negative range error.

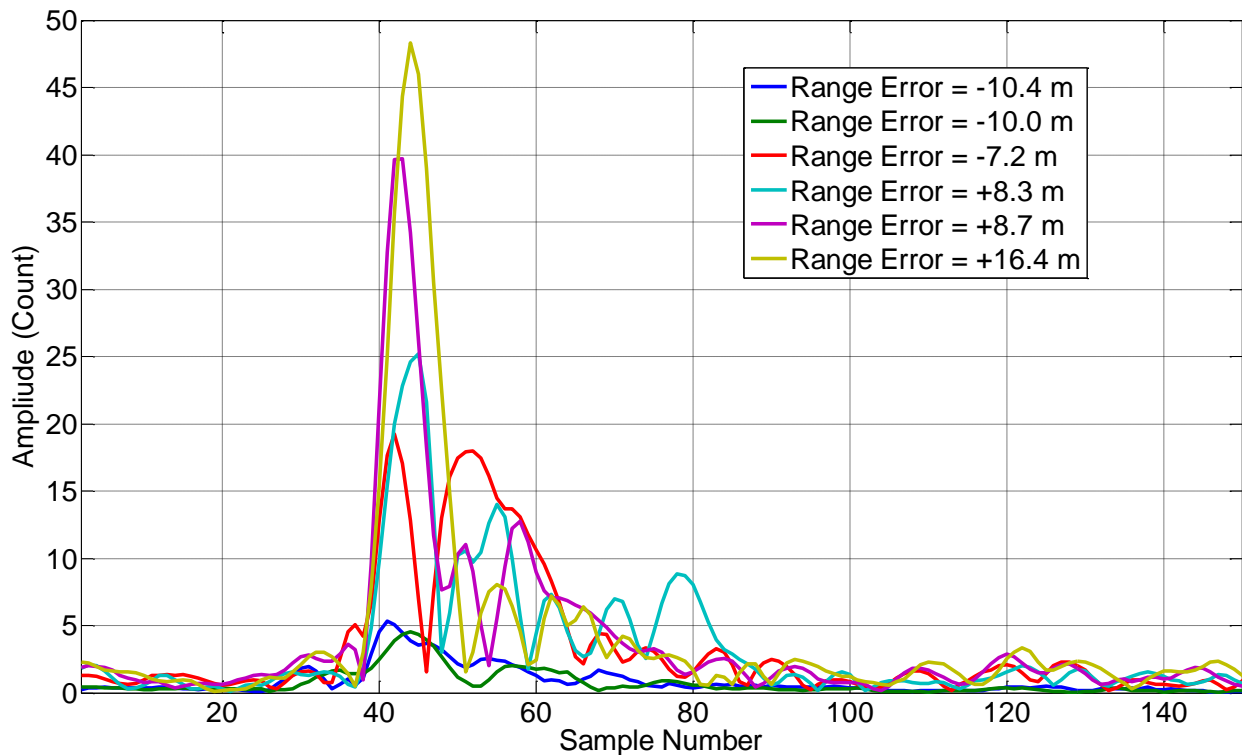


Figure 1. Correlator amplitude vs. sample number for data with various range errors.

The data shows that for large Correlator output, a positive range error is observed, and for small Correlator output, a negative range error output is observed. This result is of course not unexpected; these two cases correspond to constructive, and destructive multipath interference respectively. This observation suggests we can improve the range accuracy by methods that are based on channel estimation, such as successive interference cancellation.

We are continuing to take more data and develop algorithms for improved range accuracy based on both channel estimation and digital beamforming. We are also developing algorithms for bi-static radar imaging.