

.....

15400 Calhoun Drive, Suite 400
Rockville, Maryland, 20855
(301) 294-5241
<http://www.i-a-i.com>

Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 20

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.

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 Drive, 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
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified	Same as Report (SAR)
			18. NUMBER OF PAGES 5
			19a. NAME OF RESPONSIBLE PERSON

1 Work performed this reporting period

1.1 Technical work performed in this reporting period

During this period of performance, we concentrated our efforts in the following technical tasks:

- Integrated I.P. radios to our hardware which enables the master and the slave units to communicate with each other wirelessly for data collection
- Collected coherent data in different node location configurations (indoor, outdoor) for offline processing.

1.1.1 I.P. Radio Integration

We have integrated IP radios into both our master and the slave hardware units. These radios enable the master and the slave to communicate with each other wirelessly for data collection. Figure 1 shows an image of a hardware set with integrated radios.

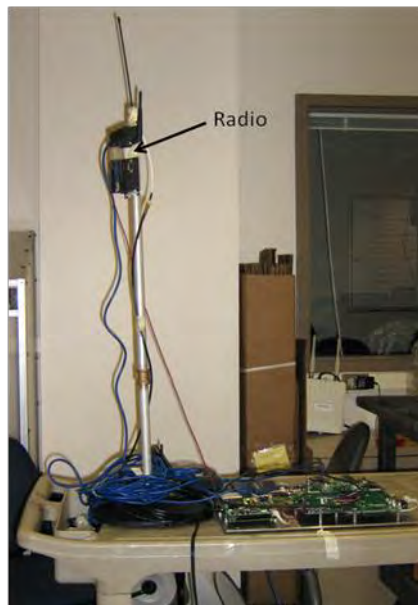


Figure 1. IAI system with integrated radio

1.1.2 Collection of Data

We have collected extensive data for offline processing. The data is collected for two purposes: 1) Bistatic radar imaging, and 2) Improved ranging accuracy.

For all data sets, the I.P. communication radio antennas on both the master and the slave units were situated at about 78" from the ground. The first data set was collected outdoor, in the parking lot of Intelligent Automation. The master unit was stationary while the slave unit was

moved away from the mater incrementally. At each measured distance, the reported range from the system was recorded. During the whole experiment, the master and the slave units retained a line of sight (LOS). Figure 2 shows a map of the experimental site with master and slave locations marked.

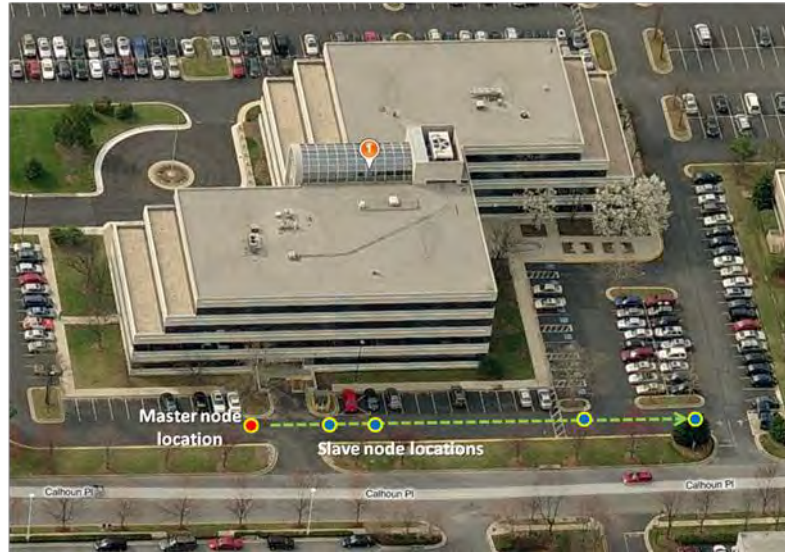


Figure 2. Experiment configuration for the outdoor case

Another set of data was collected inside Intelligent Automation's building. In this experiment, the slave node was kept stationary while the master node was moved at particular locations within the floor. This is shown in Figure 3. For each mater node location, the actual range from slave to master was determined from a calibrated floor plan. For each mater node location, the reported OTOF was also recorded.

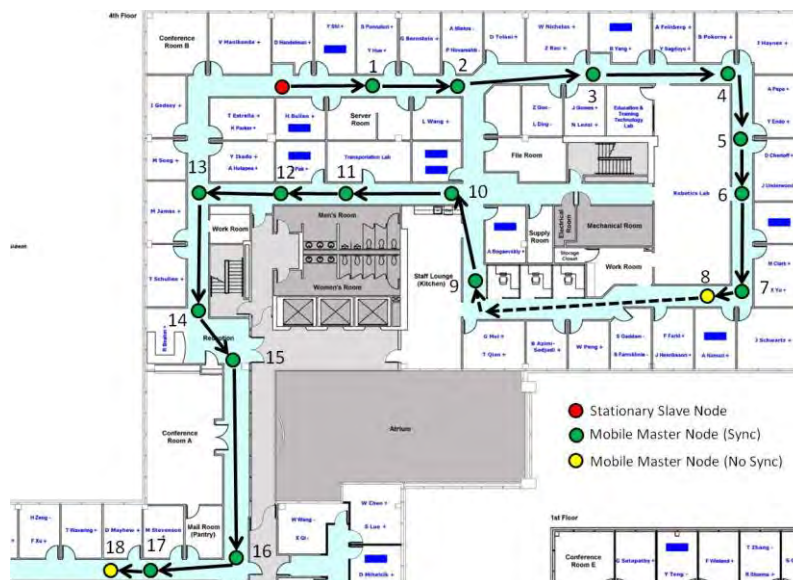


Figure 3. Experiment configuration for the indoor case

For this data set, two subsets were analyzed: (a) master node locations that had LOS (composed of waypoints 1, 2, 3 and 4), and (b) master node locations that did not have LOS (composed of waypoints 5 through 7 and 9 through 17).

In the next reporting period we will process the data and report on the accuracy of the currently-implemented base line algorithm.