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Intelligent Automation Incorporated

Coherent distributed radar for high-resolution through-wall imaging

Progress Report 10

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Summary

In this period of performance, we are defining, acquiring and beginning to interface the hardware for the final demonstration.

1.0 INTRODUCTION

In this report we discuss progress in hardware selection and definition of the final demonstration.

1.1 Hardware design

We have selected the radar hardware for the final demo. The figure below shows the digital processor board and plug-in transmit-receive modules developed under an on-going AFRL SBIR Phase-II (#FA8650-10-C-1737). An 8-channel, 250Mps waveform digitizer was developed to interface with a 4x2 antenna array. The goal is to directly digitize UHF frequencies without the need for analog down-conversion and still maintain high dynamic range. The digital processor board is also used by our Synchronization Transceiver. For the proposed final demonstration, we will use 5 expansion slots of the digital board, four will be used for the synchronization hardware, i.e. two for the RF frontend, one for the D/A, and one for the ADC board. One slot will be used for either transmit or receive.

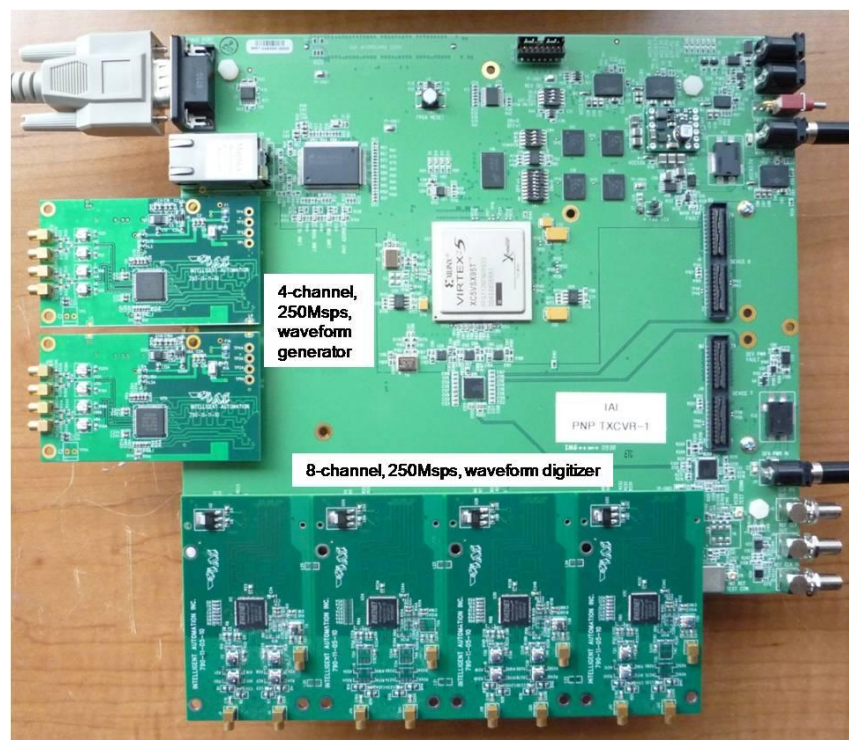


Figure 1: Digital processor and waveform synthesizer-digitizers developed at IAI

While the figure above shows a 4 channel wave generator, we will use only one transmit channel on one board, and one receive channel on a second board. Also, the board above shows the digital waveform generator. Since the clocking rate of the D/A is limited to 250Mps,

we need to upconvert to get to frequencies in the 400-1000MHz range. The board below allows up-conversion up to L-band of the generated bandwidth, and is compatible with digital board.



Figure 2 Waveform synthesizer with up-conversion for radar waveform generation.

To complete the radar transmit system, we will need to select a Power Amplifier, and antenna for the transmitter, and potentially a filter. For the radar receive we need to select an antenna, and a LNA. These will be discrete, connectorized components.