



Artificial Intelligence Radio Transceiver (AIR-T)

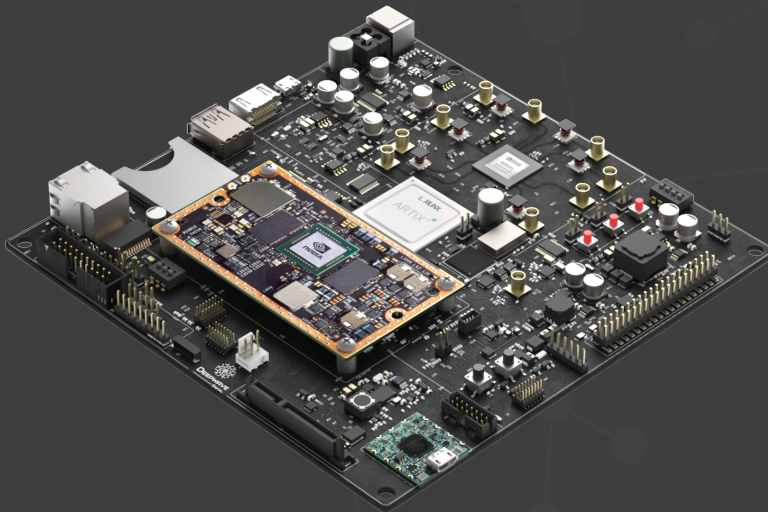
Overview

Deepwave's AIR-T is the first software defined radio with embedded high performance computing. It contains three unique digital processors for any application:

- FPGA for strict real-time operations
- GPU for highly parallelized processing
- CPU for control, I/O, and software applications

The AIR-T allows users to easily incorporate artificial intelligence into their radio frequency and wireless technologies.

This versatile system can function as a highly parallel SDR, data recorder, or inference engine for deep learning algorithms. The embedded GPU allows for SDR applications to process bandwidths greater than 200 MHz in real-time.



Key Specifications

- **Dual Channel MIMO Transceiver**
 - 300 MHz to 6 GHz
 - 100 MHz bandwidth Rx (per channel)
 - 100 MHz bandwidth Tx (per channel)
- **Digital Signal / Deep Learning Processors**
 - Xilinx Artix 7 FPGA
 - NVIDIA Jetson TX2
 - ARM Cortex-A57 CPU (4 core)
 - NVIDIA Denver2 CPU (2 core)
 - NVIDIA Pascal GPU (256 core)
 - 8 GB of memory
- **Connectivity**
 - GPS Sync via 1 PPS and 10 MHz
 - USB 3.0, USB 2.0/3.0, SATA
 - High-speed digital I/O (GPIO/UART)
 - 1 Gbps Ethernet
- **Dual Power Mode:**
 - 22 / 14 Watts

Software Support



CUDA

GPU Acceleration

HPC with CUDA toolkit using C/C++ or Python interfaces



GNU Radio

Signal Processing

Support for industry leading SDR development environment



Keras



TensorFlow

Deep Learning

Train and deploy AI systems using standard frameworks

Operating System
Ubuntu 18.04



Mechanical

- Size - 17.0 x 17.0 x 3.5 cm
- Weight - 0.35 kg

Deepwave Digital, Inc.

1430 Walnut St, Suite 317, Philadelphia, PA 19102

www.deepwavedigital.com sales@deepwavedigital.com



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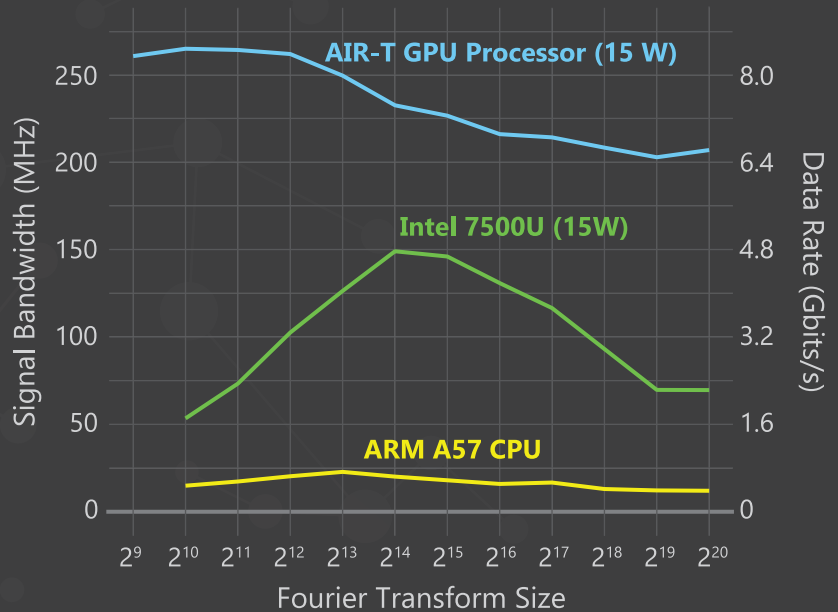
Performance

The AIR-T uses **256 GPU cores** to create a highly parallel compute environment making wideband processing for software defined radio (SDR) applications obtainable.

Using the embedded NVIDIA Jetson TX2 the AIR-T provides **250% bandwidth improvement** over a power-comparable CPU and **1,350% bandwidth improvement** over an embedded CPU for real-time SDR applications.

The AIR-T uses **zero copy** memory access to overcome the data transfer overhead typically associated with GPU processing.

Real-time DSP Measurements



Applications

Pre-trained AI Cores

User Developed Applications

AI Frameworks

DSP Frameworks

AIR-T Hardware Abstraction

AIR-T Hardware

Interfaces

- **Open architecture hardware platform**
 - Python and C++ control interfaces
- **Support for multiple deep learning frameworks**
 - Example code provided to optimize and deploy user trained neural networks
 - AIR-T optimized and tested neural networks available
- **Execute existing GNU Radio code built on other SDRs***
- **Deploy open-source or proprietary software**
- **High-speed data recording for acquiring training data**

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