FPGA Design and IP Solutions

FPGA Solutions, Simplified

An FPGA can improve your project, but starting a new FPGA design can be a daunting process. With the complexity of the system components, multi-core SoCs, IP available from a variety of sources, and a need to learn the tools, it's a challenge to get it all done. Is there a simpler way to harness the advantages of this technology?

DornerWorks understands how challenging it is to design for an FPGA. As a Gold member of Intel's Design Solutions Network, and a trusted partner of Altera, we have created many FPGA and SoC designs for numerous companies. You can depend on DornerWorks expertise to architect your solution, lower the risk on your project, and accelerate your time to market.

Our approach begins from your requirements, and builds incrementally to an optimal solution. We can build from an idea, through rapid prototypes, to a fully customized logic solution, depending on your budget and performance requirements. Not only can we handle your FPGA development, but our engineering team also has the experience to assist with your embedded software, electronics hardware, and test systems engineering needs. Our talented design teams can tackle any electronics engineering challenge.

Solutions

- **Turnkey Solutions**: Requirements Development, Design, Validation, and Documentation
- **Design Migration**: Replacing discontinued parts with FPGAs and CPLDs, migrating designs to the latest technology
- Algorithm Development & Acceleration: Xilinx SDSoC/HLS, C, C++, Matlab, Simulink
- **Isolation/Separation**: Open-source hypervisor provider with Xen Zynq Distribution
- **IP**: AES cryptographic IP, Ethernet MAC, Network Time Synchronization

Tools

- FPGA: ISE, Vivado
- **Embedded**: EDK, SDK, SDx
- **Simulation**: Vivado, Mentor Graphics QuestaSim
- **Debug**: Chipscope, Vivado Logic Analyzer, Xilinx Virtual Cable (XVC)

Key Capabilities

- **Functional Safety**: DO-254 up to DAL A
- **Video**: Demosaicing, Filtering, Color Space Conversion, Scaling, Overlay, Image Fusion
- **Communication Protocols**: Ethernet, TCP/IP, AVB, TSN, IEEE 1588v2, PCIe, ARINC 429
- **DSP**: Transforms, Filters, Windowing, Radar Signal Processing
- **I/O Interfaces**: JESD204, Gigabit Serial, PCI
- **Processors:** Microblaze, Picoblaze, ARM Cortex-A9, ARM Cortex-A53
- **Devices:** Zynq-7000, Zynq US+, RFSoC, Artix, Kintex, Virtex
- **Memory Interfaces**: DDR2/3/4, SRAM, Flash, SDIO
- **Safety/Security**: Security Monitor, Isolation Design Flow (IDF), Partial Reconfiguration, Modular Redundancy, Lock-step
- **Languages**: VHDL, Verilog, SystemVerilog, C/C++

ALTERA MATLAB SIMULINK XILINX ALLIANCE PROGRAM PREMIER

Contact us to learn more
www.DornerWorks.com
sales@dornerworks.com
616-245-8369

DornerWorks, Ltd. 3445 Lake Eastbrook Blvd SE, Grand Rapids, MI 49546 USA

FPGA Solutions Case Studies

ASIC Algorithm Development Platform

DornerWorks used a custom pulse sequence generated using a DAC and a feedback signal sampled with an ADC, fed into the customer's algorithm to test and identify several issues that would have resulted in a non-functioning ASIC. This saved the customer money and enabled them to develop a functioning ASIC more quickly.
Technologies: Xilinx ZC702 Dev Board, Zynq-7000, SPI ADC, Parallel DAC

Trailer Angle Detection

DornerWorks provided key assistance in developing the FPGA design logic for a leading manufacturer's Trailer Backup Assist technology and its Trailer Angle Detection (TAD) logic, which leverages advanced camera technology to track trailer position while working seamlessly with a manually controlled trailer-turn knob and the truck's steering and controls.
Technologies: Xilinx Zynq-7000, Microchip PIC32

Video Processing Box (360 degree situational awareness)

An Altera Stratix IV FPGA was used to process five 1080p HD-SDI and two NTSC video inputs into a single video output. Each video input is scaled and positioned into its own overlay layer, and then combined into a mosaic over a single video output. Dedicated video frame buffering was provided by DDR3 memory. The system software was run on a soft-core processor implemented in the FPGA. A custom PCB with the video processing FPGA was designed to meet MIL-STD specifications for ground vehicles.
Technologies: Altera Stratix IV, Altera Quartus II, NIOS II, HD-SDI, NTSC, 1080p30, DDR3, MIL-STD

GE-HealthCare PandaWarmer

When the technology a medical client used to track infant vital signs had become obsolete, DornerWorks built the PandaWarmer using an Altera MAX10 FPGA to provide reliable heart-rate, blood-pressure and ambient temperature data in real-time. The FPGA design leveraged Altera Qsys Video modules to provide the necessary LCD signaling and memory interface into and out of Video Buffers in DDR3. A fully custom color pallet conversion and bus interface to the system allowed use of the original control system with no modifications to software or CCA geometry. The customer was able to continue meeting the delivery schedule without having to wait for the next generation of Kyocera chip or reworking the entire system to interface with a new display driver.
Technologies: Altera MAX10 FPGA, DDR3

Medical Network Interface

DornerWorks replaced the discontinued PCI bridge chip and dual port RAM used as the interface between a host PC and a CAN network processor with a Xilinx FPGA, and provided documentation to support the product's use as a medical device. Replacing the discontinued PCI bridge chip was transparent to software running on both the host computer and the CAN network processor, eliminating the need for expensive software updates by the customer.
Technologies: Xilinx Spartan-6, PCI

Portable Data Acquisition & Analysis Recorder

DornerWorks developed a full product solution for data acquisition and analysis, enabling 4-16 simultaneous 24-bit accelerometer channel acquisition, GPS input, Tachometer input, 24-bit Digital to Analog (DAC) output up to 108 kHz sample rate, Gigabit Ethernet, 802.11 b/g/n WiFi, and an operational battery life of over 6 hours. The customer's sampled data was then able to be easily stored to an SD card or streamed over Ethernet.
Technologies: Xilinx Zynq-7000, ARM Cortex-A9, Serial ADC, AXI, DMA, Linux, WiFi