

**fidus**  
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Data Scientists Achieve  
Low-Latency, High-Bandwidth  
Data Movement in Genetic  
Sequencing Applications

## THE CHALLENGE

In the process of analyzing and emulating genetic sequences, data scientists need a low-latency, high-bandwidth solution to move massive amounts of data back and forth between processors.

## THE SOLUTION

Working together with a Fortune 500 pharmaceutical company's engineering team, Fidus helped develop a solution to accommodate the large-scale movement and storage of more than 150 GB of digitized, de-identified genetic sequencing data.

With an explosion of machine learning applications in healthcare, challenges in the med tech space more frequently arise from high-speed communication and high-performance computing shortfalls. To train larger neural networks effectively and efficiently, data scientists need infrastructure that can keep up.

### Attention to Architecture Pays Off in Integration

While the company came to Fidus thinking they needed a custom chip and interface for their system, Fidus paused to ideate before moving forward with any one solution. The Fidus engineering team set aside time to interview all stakeholders and understand expectations and concerns for the system. This process was critical to understanding exactly what goals were tied to latency and bandwidth specifications and why each specification was important for the success of the system.

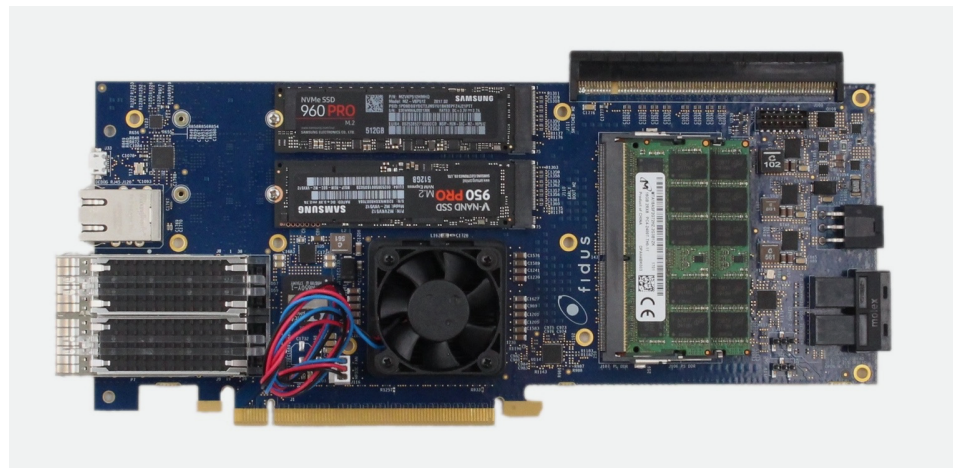


“Defining the right interface parameters and holding both sides accountable to them in weekly project management meetings ensured a low-risk integration. Everyone involved had a line of sight to successful implementation and worked towards the same vision.”

**GSL PRINCIPLE ENGINEER**

With a 10 to 15-year lifespan and ultra-low latency, high-bandwidth requirements in mind, Fidus looked to its own portfolio of products, where Sidewinder emerged as an option. Each Sidewinder includes two M.2 sockets to support on-board NVMe solid state drives (SSDs). Leveraging NVMe drive technology, Sidewinder can minimize the latency associated with large-scale storage devices. Combining the high-capacity storage capabilities of Sidewinder with a Xilinx Zynq Ultrascale+ MPSoC would result in a custom system that could transmit, receive, and store tens of gigabytes per second of genetic sequencing data.

With that solution in mind, Fidus dedicated a system-level architect to design a workflow so that Fidus and the company each owned a piece of development from the beginning, according to expertise. The company undertook building a custom board for their own machine to interface with Sidewinder, and Fidus handled the FPGA and software components of the solution. With this approach, integration was a consideration from the start.



**The Fidus Sidewinder platform. When used with Xilinx Zynq Ultrascale+ MPSoC, engineers can transmit, receive, and store data.**



Using Sidewinder in proof of concept drastically shortened the research and development cycle from the traditional eight to twelve months of hardware development to three months. The Fidus team knew the base components inside and out and using a proven platform created a foundation of trust in the solution. From there, the company included Sidewinder in production.

The production-grade prototype was subject to internal trials. Stakeholders gathered alongside the Fidus team to test the system for parameters of interest, exercising the system in different ways to identify and resolve any unexpected issues.

### Looking Forward

With a low-latency, high-bandwidth design, the customer can train many more models with their machine learning algorithm in a shorter amount of time. The old way of working required data scientists to manually extract a genetic sequence from a biological sample, run it through the system, wait for it to process, and return to perform the process again. Now, with the Sidewinder-based solution, they can run multiple cycles on multiple models in parallel.

The first version of this solution is currently in regulatory approval. Fidus will continue to engage with the customer, supporting them in each phase of U.S. Food and Drug Administration (FDA) documentation, as needed.

To learn about the Fidus approach to defining requirements for a successful final application, [download our recent white paper.](#)

## DESIGN SOLUTIONS WITH FIDUS

### Need prototype and product design help?

We'll work with you to understand what you're looking for, and we'll dedicate the necessary resources to make sure it's a success the first time. Come to us with just an idea or specific challenges that are keeping you up at night, and we'll help you solve them.

Fueled by 20+ years' experience, our expertise, and creativity, along with our collaborative and process driven approach, turns complex challenges into well-designed solutions, and we keep customers like you coming back, again and again:

1. We are committed to "first time right".
2. Experience has taught us how to solve problems on any scale.
3. Faster time to market means faster time to benefit.
4. You choose how we work together.
5. Unique projects are our obsession.
6. We believe transparency builds trust.
7. Customer focus is our calling card.

**20+**

**years experience**

Collaborating with smart teams is what fuels us every day.

**3,000+**

**successful projects**

Your unique challenges are our obsession.

**400+**

**customers**

Extending your team with our expertise brings designs to market faster.

**82%**

**repeat customers**

Customers love to work with us, again and again.

## ABOUT FIDUS

Fidus Systems, founded in 2001, specializes in leading-edge electronic product development with offices in Ottawa and Waterloo, Ontario, and San Jose, California. Our hardware, software, FPGA, verification, wireless, mechanical and signal integrity teams work to innovate, design and deliver next-generation products for customers in emerging technology markets. Fueled by 20+ years' experience and creativity, along with our collaborative and process driven approach, we turn complex challenges into well-designed solutions. And with over 400 customers and 3000+ completed projects, we have the expertise to be a seamless extension of your team, providing a clear focus and commitment to getting designs and prototypes to market faster. Once you start working with us, you'll trust us like one of your own. Our hallmark is transparency. Our guiding principle is first time right.

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