Identity verified.
Purchase approved.

IDEX Biometrics uses HPC to develop fingerprint sensors for next-gen payment cards

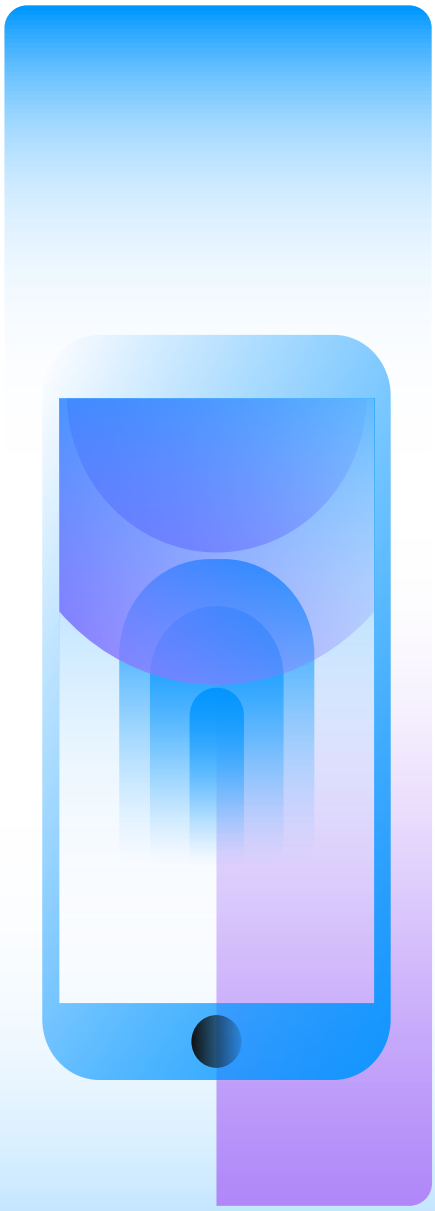
Atos

At a glance

Partnering with Nimbix, an Atos company, IDEX Biometrics obtained essential advanced computing resources to build innovative products that provide better transaction security and convenience to its customers.

Outcomes

- Constant access to advanced computing resources.
- Faster time-to-market for novel products.
- Greater transaction security and convenience for cardholders



IDEX Biometrics is a biometrics company specializing in fingerprint imaging and recognition technology. It offers fingerprint sensor and biometric software for identity cards, banking cards, smart cards, access control, healthcare, IOT and other security solutions. It helps people make payments, prove their identity, access information or unlock devices.

Time to innovate faster

Both card issuers and holders demand higher security and anti-fraud measures in payment cards. To address this need, IDEX Biometrics developed a biometric fingerprint sensor that can be embedded in smart cards. The "off-chip" capacitive sensor uses an advanced substrate design and a small silicon sensing chip to read a fingerprint and enable biometric authentication for payments, identification, access control and other card-based use cases.

By measuring tiny changes in capacitance, the sensor acquires an image of the fingerprint then passes it to an on-card microcontroller for biometric matching. Having the fingerprint sensor located directly on the card offers both a high level of security and enhanced convenience.

While many consumers have embraced smartphone-centric mobile payment apps such as Apple Pay and Samsung Pay, it's inconvenient to have a smart device available for every payment transaction. This is why payment cards remain as popular as they are ubiquitous. The IDEX biometric sensor and system enable another option: biometric authentication that's built right into the cards themselves.

In the past, developing a technology of this type would have involved designing and fabricating a prototype sensor product, then testing and characterizing the performance, iterating the design and building again. Besides the expense of an iterative design process, this approach simply takes too long in today's marketplace.

This is why IDEX relies on advanced finite element simulations of their off-chip sensor to enable right-first-time designs. However, using a simulation-based approach to design a sensor of this type can also be time-consuming and resource-intensive. Each simulation run can typically consume around 70 hours of run-time on a high-performance workstation.

In order to fully optimize a sensor design, extensive parametric simulation sweeps are required. In order to meet project schedules, this would have required IDEX to invest significantly in both the rollout and maintenance of an in-house high-performance compute (HPC) farm.

Speed. Scale. Supercomputing.

Being a relatively small team with limited IT resources, the engineers at IDEX couldn't spare the time away from technology and product development. That's when they looked at partnering with Nimbix to provide the HPC resources they needed to get the job done.

IDEX uses the Nimbix Cloud to access multiple parallel cloud-based workstations. This lets engineers run the extensive simulations that extract the capacitive and mechanical characteristics of the sensor. This, together with a suite of proprietary post processing scripts, allows the sensor performance to be comprehensively evaluated before a single component has been manufactured.

"It would not be practical to maintain an HPC compute farm on our own to run these complex experiments," says Guard. "Logistically, it's far simpler and has proven more efficient to use the Nimbix Cloud."

Using Nimbix Cloud to handle IDEX's parallel computing needs, engineers use ANSYS software to simulate a sensor's capacitive and mechanical characteristics. These simulations measure the electromagnetic characteristics of the 16,000+ capacitive nodes that form the fingerprint sensor. These finite element simulations work with mesh counts that range from three million up to tens of millions of data points. Performing end-to-end simulations allows IDEX to take the capacitive information from the electromagnetic simulation and process it to simulate the sensor's complete measurement scheme, taking into account both substrate characteristics and production process variations.

This allows IDEX engineers to evaluate how the sensor will perform in all circumstances, including its reaction to external variables such as conducted noise or radiated NFC interference.

IDEX also runs extensive mechanical simulations to discover the optimum in-card placement geometries and sensor-embedding methods.

This simulation-driven approach to sensor design has enabled IDEX to develop a sensor that uses advanced off-chip capacitive measurement schemes yet is sufficiently thin and mechanically robust to be embedded within a standard smart card product.

Future payments secured by supercomputing

Since partnering with Nimbix, IDEX engineers always have access to cutting-edge computing speed and power, thanks to Nimbix's continuous server upgrades. They can use the equivalent of four HPC workstations and their associated parallel compute power without having to maintain the infrastructure themselves. This arrangement gives the small team more time to spend on developing products and new technology. In addition, the engineers are happy with Nimbix support and responsiveness, even on tracking down issues that later turn out to be related to third-party resources.

IDEX's partnership with Nimbix means it has the HPC resources it needs to engineer innovative new products. For IDEX's customers and payment card users, this results in higher security and less card fraud. It also provides greater convenience during transactions, because customers don't need to remember a PIN or use a phone for contactless payments. For IDEX, it means bringing its products to market faster, helping boost the bottom line while ushering in the next big thing in payment card security.

Why Atos?

The Nimbix Supercomputing Suite is a set of flexible and secure as-a-service high-performance computing (HPC) solutions. This as-a-service model for HPC, AI and Quantum in the cloud provides customers with access to one of the broadest HPC and supercomputing portfolios. It ranges from hardware to bare metal-as-a-service to the democratization of advanced computing in the cloud across public and private data centers.

Learn more about the Nimbix Supercomputing Suite.

"Only two years ago, IDEX Biometrics had a single desktop machine running field solving electromagnetic simulations, limiting both the cycle time and scope of our sensor design capability. Now that we've partnered with Nimbix, we have effectively increased our available compute resources by an order of magnitude, enabling us to turn around new sensor designs within just one week. We can run through the entire simulation and verification process without any costly local compute infrastructure, giving us an ever-higher degree of confidence in our designs and letting us pull the trigger on new design releases in a timelier fashion."

Brent Guard
Senior Director of Engineering
IDEX Biometrics

About Atos

Atos is a global leader in digital transformation with 107,000 employees and annual revenue of over € 11 billion. European number one in cybersecurity, cloud and high performance computing, the Group provides tailored end-to-end solutions for all industries in 71 countries. A pioneer in decarbonization services and products, Atos is committed to a secure and decarbonized digital for its clients. Atos is a SE (Societas Europaea), listed on Euronext Paris and included in the CAC 40 ESG and Next 20 Paris Stock indexes.

The purpose of Atos is to help design the future of the information space. Its expertise and services support the development of knowledge, education and research in a multicultural approach and contribute to the development of scientific and technological excellence. Across the world, the Group enables its customers and employees, and members of societies at large to live, work and develop sustainably, in a safe and secure information space.

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Let's start a discussion together

For more information: Cristina.white@atos.net