Nimbix helps IDEX Biometrics accelerate development of fingerprint sensors that enable next-generation biometric authentication for payment cards

"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

INTRODUCTION

IDEX Biometrics, a leading provider of advanced fingerprint identification and authentication solutions, has 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 for the user.

CHALLENGES

Both card issuers and cardholders are demanding higher security and anti-fraud measures in payment cards. One option that is popular with many consumers is smartphone-centric mobile payment apps such as Apple Pay and Samsung Pay. However, having to have their smart device available for every payment transaction can be inconvenient, which is why payment cards remain as popular as they are ubiquitous. The IDEX biometric sensor and system enables 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 then 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 roll-out and maintenance of an in-house high-performance compute (HPC) farm.

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.

TECHNOLOGY USED

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, allow 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."

ENGINEERING SOLUTION

Using Nimbix Cloud to handle IDEX's parallel computing needs, engineers use ANSYS software to simulate the sensors 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 utilizes advanced off-chip capacitive measurement schemes yet is sufficiently thin and mechanically robust to be embedded within a standard smartcard product.

BENEFITS

Since partnering with Nimbix, IDEX engineers always have constant 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.

COMPANY DESCRIPTION

IDEX Biometrics ASA (OSE: IDEX and OTCQB: IDXAF) is a leading provider of fingerprint identification technologies offering simple, secure and personal authentication for all. It helps people make payments, prove their identity, gain access to information, unlock devices, or gain admittance to buildings with the touch of a finger. IDEX invents, engineers, and commercializes these secure, yet incredibly user-friendly solutions. Its total addressable market represents a fast growing multi-billion-unit opportunity.

Partnering with Nimbix, IDEX Biometrics ran end-to-end simulations to design the off-chip biometric fingerprint scanner, which allows secure identity validation right on the payment card.