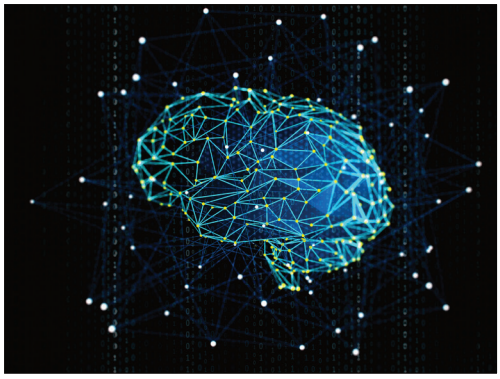
Going deeper with AI

– how Mycronic's new collaborative deep learning center can help unlock the value of AI

TEXT: GRANT BALDRIDGE **PHOTO:** SHUTTERSTOCK MYCRONIC AB

Together with NuFlare Technology and D2S, with support from NVIDIA, Mycronic recently announced the establishment of the Center for Deep Learning in Electronics Manufacturing (CDLe) in San Jose, California. Mikael Wahlsten, Director and Product Area Manager for Photomask Generators at Mycronic, gives his insights into the idea behind the new collaboration and what it can mean for Mycronic customers in the near future.

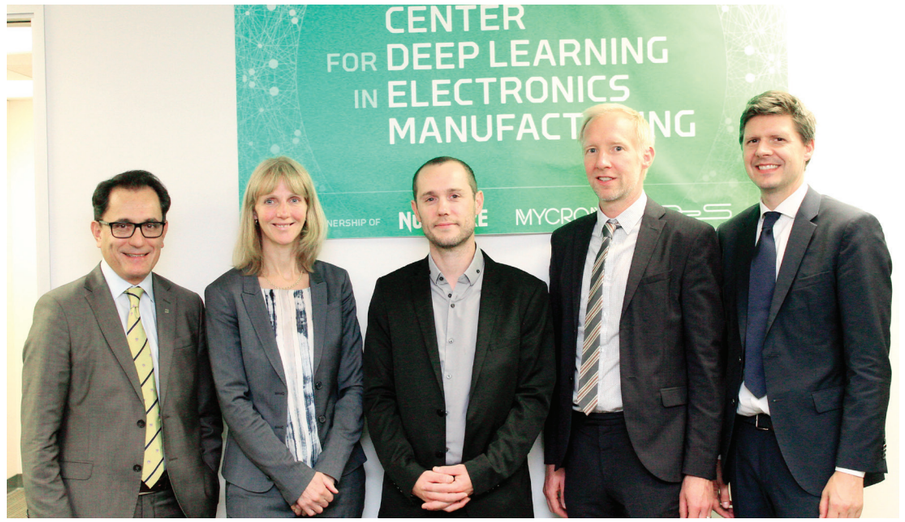


THE NEW CENTER, just launched in collaboration with non-competitive partners NuFlare and D2S, is based in the heart of the world's leading region for artificial intelligence (AI) in southern California. The CDLe is focused on deep learning, a subset of AI and machine learning that employs sophisticated neural networks to effectively learn how to predict actual outputs from actual data. In addition to pooling crucial talent, resources and expertise to accelerate the adoption of deep learning techniques in customer applications, the center will leverage powerful GPUs and other computing systems from the industry-leading chipmaker NVIDIA.

A new global resource

"First of all," Mikael Wahlsten explains, "this new center is a valuable global resource we can use to build our deep learning expertise within Mycronic. It will serve to strengthen our customers' positions within a range of Industry 4.0 applications, providing novel solutions to existing problems in pattern generation, SMT assembly, inspection and dispensing."

As a founding partner, Mycronic will commit one full-time employee to the center, together with a rolling program of 3-month



→ **The Mycronic team ready for the opening ceremony for the Center for Deep Learning in San Jose - Bijan Etemad, Mikaela Näslund, Romain Roux, Robert Eklund and Mikael Wahlsten.**

residencies for other Mycronic staff. Staff members will be able to utilize the center's resources to test customer applications, to refine data and image classification systems and to create simulations for a range of new data-driven approaches as a complement to existing automation models. The result, says Wahlsten, will be a prioritized portfolio of Mycronic initiatives aimed at developing more adaptive solutions to current product-ion challenges as well as new applications and services to help customers increase yield, productivity and performance,

The power of predictive algorithms

According to a recent study from McKinsey, deep learning methods have matured rapidly in recent years, particularly in industries with large volumes of real-world data such as insurance, retail and advanced manufacturing. The report estimates that within supply chain management and manufacturing, some of the highest business impact in the near term is likely to be experienced in predictive maintenance and yield optimization, followed by procurement analytics and inventory optimization.

"Predictive services are one of our initial objectives," explains Wahlsten. "Image classification, for example, has advanced significantly and has strong potential for improvement. In terms of image processing, we can definitely find novel ways to improve quality and enable the system to better adapt to its environment."

Big data means big potential

The quality of deep learning algorithms depends on huge data sets – in most cases requiring millions of labeled examples – in order to exceed human abilities and traditional analytical technologies. And real-world production data is something Mycronic systems have in abundance, thanks in part to the ongoing development of the Mycronic 4.0 intelligent factory. "All of our systems today are essentially software-driven and increasingly integrated with other factory systems," says Wahlsten, "The process data they create is hugely valuable as training data – which is used to train the algorithms. This holds a lot of potential when it comes to generating accurate simulations through deep learning.

Now that we have an integrated jet printing, pick-and-place and inspection line, for instance, we can build a feedback loop based on deep learning to predict and give feedback."

"Simulated environments," he continues, "are particularly useful for SMT customers who need to find new adaptive methods for automated production. The entire Mycronic 4.0 intelligent factory concept relies on factory-wide information flows – horizontal, vertical and into the cloud. This level of total automation involves so many systems, with so much complexity, which is exactly where these types of adaptive deep learning algorithms can add massive value, both within the production line and in other systems throughout the factory."

The digital transformation continues

Due to the rising complexity in electronics production, there appears to be no end in sight to the rising volumes of data generated by today's highly automated factories. In the cases of pattern generation and inspection, in fact, the volume of data produced by a single system in a day can be comparable to the data generated by a small bank. With the help of deep learning, this "big data" is a valuable resource that can help manufacturers bring the next wave of digital transformation into the physical world.

"Our pattern generators are used to produce billions of displays used for smartphone screens, computer flatscreens and TV displays every year," says Wahlsten. "And with AEi, our systems manufacture a large share of all the camera modules which are critical to highly automated next-generation autonomous vehicles. So in many ways, our solutions are indispensible to some very vital global industries. Our responsibility at Mycronic is to identify where state-of-the-art technologies can create more value in our customers' production. The CDLe will help us fulfill that promise, to test new applications in the world's leading region for AI and deep learning, and to bring these improvements into our customers' environments as soon as they're both viable and reliable."