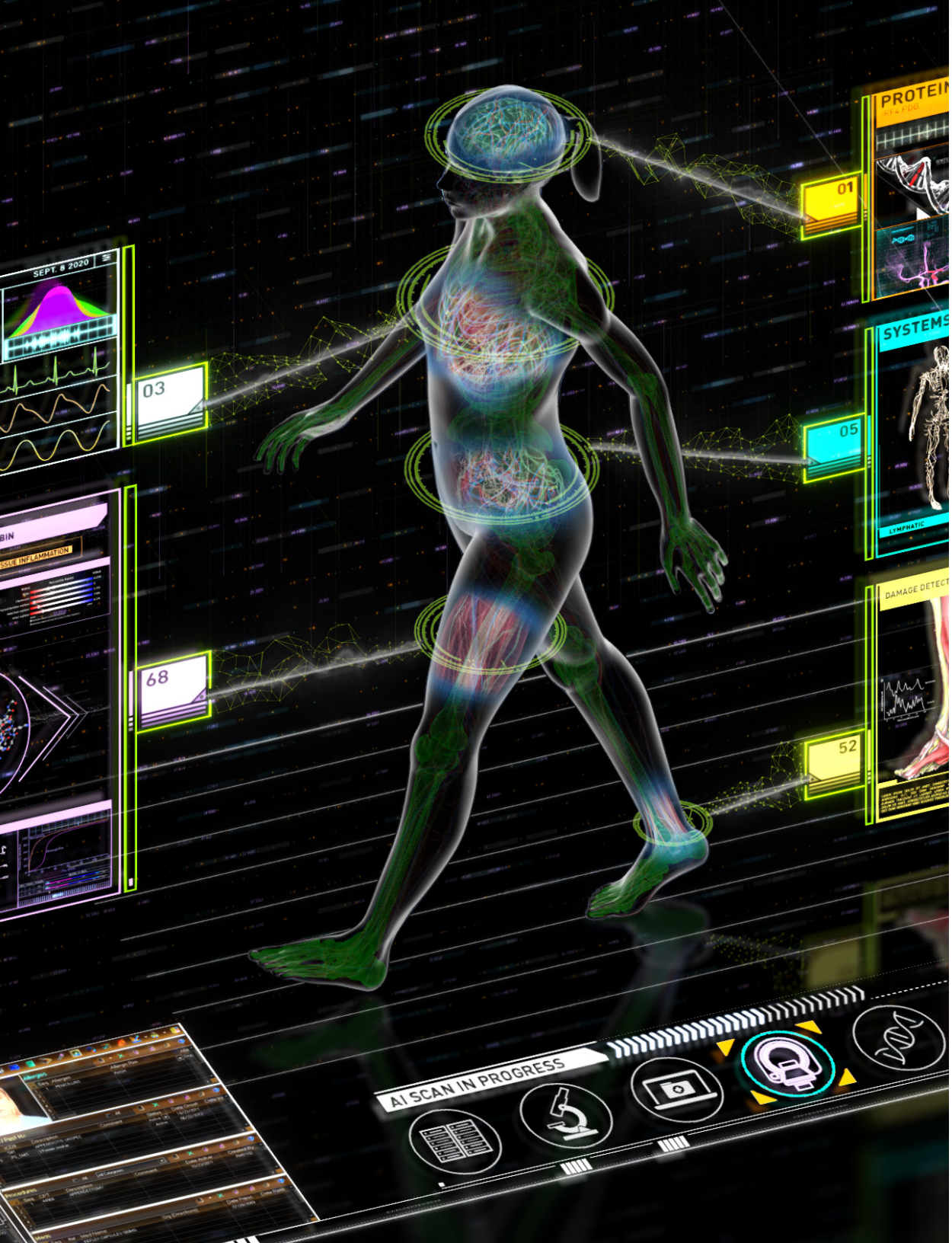
NVIDIA

IMPLEMENTING AI SOLUTIONS FOR EVERY INDUSTRY

Businesses have turned to artificial intelligence (AI) to solve their greatest challenges. From enabling more accurate, faster diagnoses in healthcare to offering personalized customer experiences in retail, when powerful AI platforms are integrated into existing workflows, business is improved and industry is transformed. Explore how it's happening.



HEALTHCARE

The world's leading organizations are equipping their doctors and scientists with AI, helping them transform lives and the future of research. With AI, they can tackle interoperable data, meet the increasing demand for personalized medicine and next-generation clinics, develop intelligent applications unique to their workflows, and accelerate areas like image analysis and life science research.

King's College London has partnered with NVIDIA and OWKIN to create a federated learning and algorithm deployment platform as part of the UK Research and Innovation (UKRI)-funded London Medical Imaging & Artificial Intelligence Centre for Value-Based Healthcare (AI4VBH). The platform will connect four NHS partner hospitals to form a decentralized dataset while protecting patient privacy. This federated dataset will be available to Centre partners and will be used to deliver research, clinical, and operational improvements in a wide range of areas, from cancer and heart failure to dementia and stroke. The AI4VBH Centre utilizes NVIDIA DGX-2™ and DGX-1 supercomputers and the NVIDIA Clara™ toolkit for highly optimized and accelerated AI.

Scientists at the Massachusetts General Hospital (MGH) and Brigham and Women's Hospital (BWH) Center for Clinical Data Science launched a federated learning initiative with Partners HealthCare. Clinicians and researchers will have access to diverse datasets to develop better AI models that can be used at the point of care. At the same time, the initiative will leverage these individual contributions to create a global model without compromising patient privacy. Using NVIDIA DGX deep learning systems and NVIDIA Clara's privacy-preserving federated learning feature, the MGH & BWH Center for Clinical Data Science can develop and deploy AI across institutions.

Oxford Nanopore Technologies is speeding the discovery of pathogens with its MinION device, a portable, low-cost, real-time DNA and RNA sequencer. Connecting to MinION is their hand-held AI supercomputer, MinIT. Powered by NVIDIA AGX™, MinIT enables DNA and RNA sequencing by anyone, anywhere, eliminating shipping-to-lab time and reducing time to answers from months to hours.

RETAIL

An Accenture report estimates that AI has the potential to create $2.2 trillion worth of value for retailers by 2035 by boosting growth and profitability. As it undergoes a massive digital transformation, the industry can increase business value by using AI to improve asset protection, deliver in-store analytics, and streamline operations. Intelligent stores can leverage GPU-powered intelligence video analytics (IVA) to accurately detect mis-scans in real time and gather data on popular aisles, unique visitors, and customer demographics.

AiFi is currently pilot testing NanoStore, their 24/7, autonomous, checkout-free store, with retail giants and universities. NanoStores hold over 500 different products and use image recognition, powered by NVIDIA T4 Tensor Core GPUs, to capture merchandise choices and add those to the customer's tab.

TRACXPOINT

To make in-store retail experiences as streamlined as online experiences, Tracxpoint created the Artificial Intelligence Cart (AIC). Trained on the NVIDIA DGX Station™, inferenced using NVIDIA® TensorRT®, and able to perform real-time video analytics with the Deepstream SDK on NVIDIA Jetson™ TX2, AIC can recognize 100,000 products in under a second. Customers simply need to place the products in their carts. AIC also delivers personalized offers from suppliers in real time, helps customers navigate the supermarket with ease, and accepts automatic, digital payments.

Walmart

With over 100,000 different products in its 4,700 U.S. stores, the Walmart Labs data science team must predict demand for 500 million items-by-store combinations every week. By performing forecasting with the NVIDIA RAPIDS™ suite of open-source data science and machine learning libraries built on CUDA-X AI™ and NVIDIA GPUs, the Walmart team is able to engineer machine learning features 100X faster and train algorithms 20X faster.

TELECOMMUNICATIONS

AI is opening up new waves of communication in the telecommunications industry. By tapping into the power of GPUs and the 5G network, smart services can be brought to the edge, simplifying deployment and enabling them to reach their full potential. Public services can use traffic cameras and AI to generate real-time insights into traffic congestion, pedestrian safety, and parking, making cities safer, smarter, and greener.

2Hz, Inc., is bringing clarity to live calls with noise-suppression technology powered by NVIDIA T4 and V100 GPUs. 2Hz's deep learning algorithms scale up to 20X more than CPUs, and by running TensorRT on GPUs, 2Hz meets the 12 millisecond (ms) latency requirement for real-time communications.

China Mobile's 5G network, powered by NVIDIA EGX, is delivering interactive, accessible education through the company's Chengdu Research Institute. Using the NVIDIA CloudXR cloud platform and the power of virtual reality (VR), the institute is connecting schools over 5G, giving facilities with less funding and resources the tools they need to provide the same quality of education as other schools in the country. China Mobile is also helping essential emergency services. Drones connected over the 5G network provide early and remote detection of wildfires in the sparsely populated and inaccessible mountain and forest areas. By delivering videos, images, and infrared scans over the network in real time, the emergency rescue headquarters can quickly analyze and deploy teams to the most critical fire spots.

5G will deliver multiple computing capabilities, including gigabit speeds with latencies under 20 ms. This has led the Verizon Envrmnt team to deploy powerful NVIDIA GPUs to beef up Verizon's high-performance computing operations and create a distributed data center. 5G will also enable devices to become thinner, lighter, and more battery efficient, opening the door to memory-intensive parallel processing that can power rendering, deep learning, and computer vision. To take advantage of these advancements, Verizon is embedding NVIDIA GPUs throughout its network—at its mega data centers, at the hundreds of smaller ones that those feed, and at the thousands of smaller cell sites supported by those.

FINANCIAL SERVICES

The financial services industry is integrating AI to improve real-time fraud-monitoring and detection, enhance call center operations, and personalize the customer experience.

American Express is developing deep learning generative and sequential models to prevent fraudulent transactions. In most financial fraud use cases, machine learning systems are built on historical transactional data. With its global, integrated network of tens of millions of customers and merchants, American Express has access to massive volumes of structured and unstructured data. Using this resource, they're developing machine learning systems that use deep learning models to scan incoming payments in real time, identify patterns associated with fraudulent transactions, and then flag anomalies.

The number of mobile banking users is estimated to reach 2 billion by 2021. In response to this growth, Capital One developed Eno, an SMS text-based intelligent assistant that uses GPU-powered deep learning to respond to natural language text messages. Eno takes mobile banking to the next level by helping Capital One clients to manage their accounts 24x7, whether its tracking balances and recent charges or paying bills.

PayPal is deploying a new fraud detection system that sets a high bar, operating worldwide 24/7 and working in real time to protect customer transactions from potential fraud. Using NVIDIA T4 GPUs, this new level of service uses GPU inference to improve real-time fraud detection by 10 percent while lowering server capacity by nearly 8X over CPU-based systems.

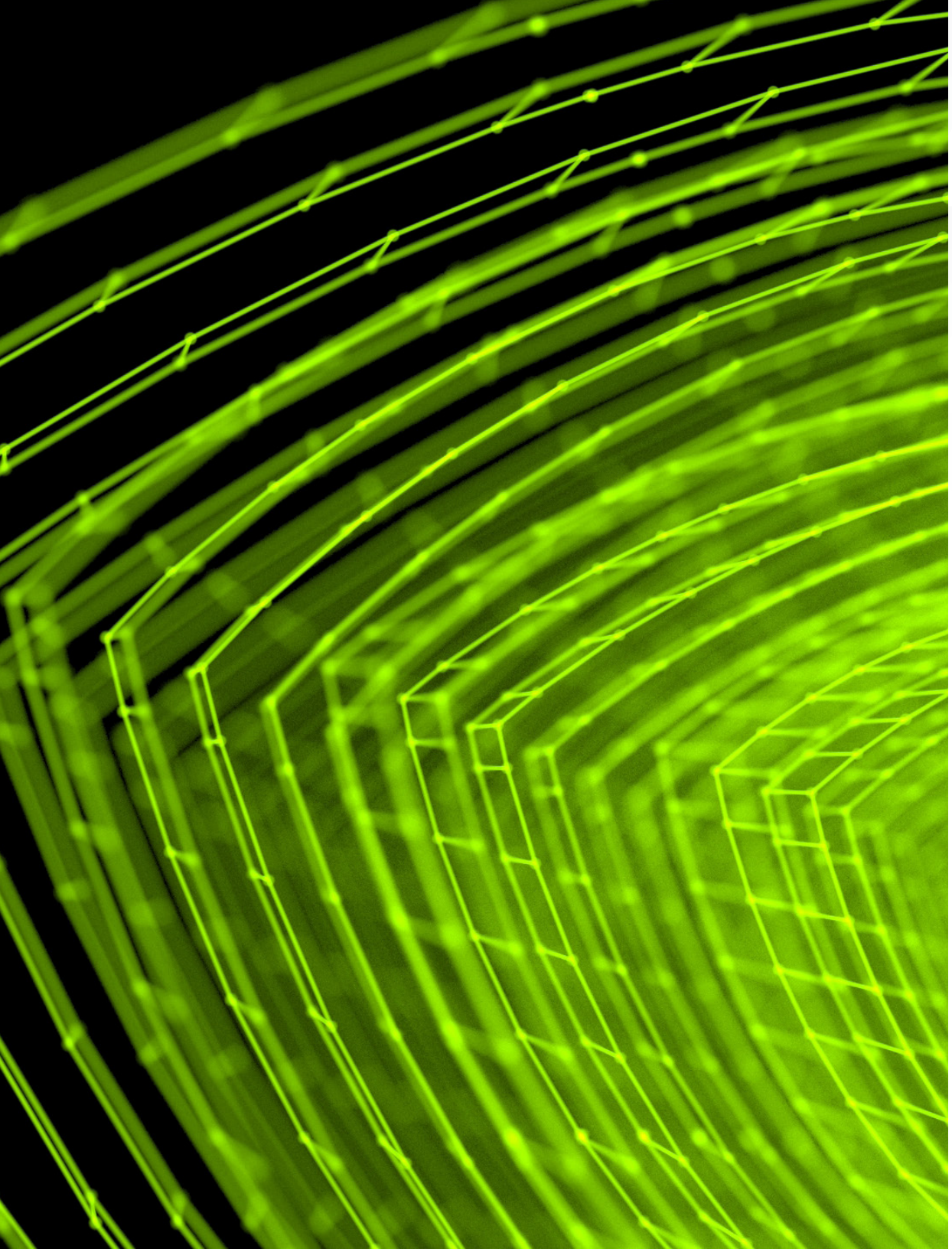
INDUSTRIAL

AI-enabled smart factories are changing the landscape of manufacturing. Industrial and manufacturing companies are deploying GPU-accelerated, large-scale AI solutions that deliver real-time insights, helping them to improve quality, boost operational efficiency, reduce costs, and build smarter, safer working environments.

Spartanburg, South Carolina, is the home of BMW Group's largest plant in the world, producing 450 thousand vehicles per year. To ensure a flawless delivery experience, BMW uses GPUs to power intelligent image analytics that automate full-vehicle inspection. Using NVIDIA EGX edge servers, they can process data from a camera array capturing 1,000 images per car in 70 seconds. The system checks quality with the highest precision and confirms hundreds of customization options to match each customer's exact order specifications.

Musashi utilizes AI technology in the optical inspection of defects in gears, camshafts, and welds, which has traditionally been a complex and manual process. Using NVIDIA DGX Station and Tensor Core GPUs, they developed and trained their TensorFlow-based network algorithms to analyze images and identify defects. Musashi was able to then quickly build and deploy a trained inference algorithm on NVIDIA Jetson on the manufacturing floor, giving them the ability to evolve and adapt their manufacturing process as needed.

Seagate is transforming manufacturing quality assurance using cutting-edge deep learning technologies, deployed from edge to cloud. With models trained on NVIDIA Tensor Core GPUs and optimized for inference at the edge, these solutions automate defect inspection of semiconductor wafers, electrical components, and assemblies—dramatically improving inspection accuracy, product quality, and factory efficiency.



TRANSFORMATION ACROSS INDUSTRIES

Businesses and organizations across industries are integrating AI to dramatically improve the speed and efficiency of business operations. Using AI to gain deeper insights into business workflows—while enhancing customer experiences and reducing operational costs—is essential for breakthroughs in innovation. Accelerate AI at the edge and unleash the full potential of what your business can do. Here are a few resources to help you get started:

> Start transforming your business with **AI: 5 Steps to Get Started**

> Enroll in the NVIDIA Deep Learning Institute's IT course **Introduction to AI in the Data Center**

> Learn more about what AI can do for your business:

Healthcare
Retail
Telecommunications
Financial Services
Industrial