Solution Showcase

Advancing Imaging AI Development With NVIDIA and Flywheel

One healthcare platform for data discovery, aggregation, curation, and training.

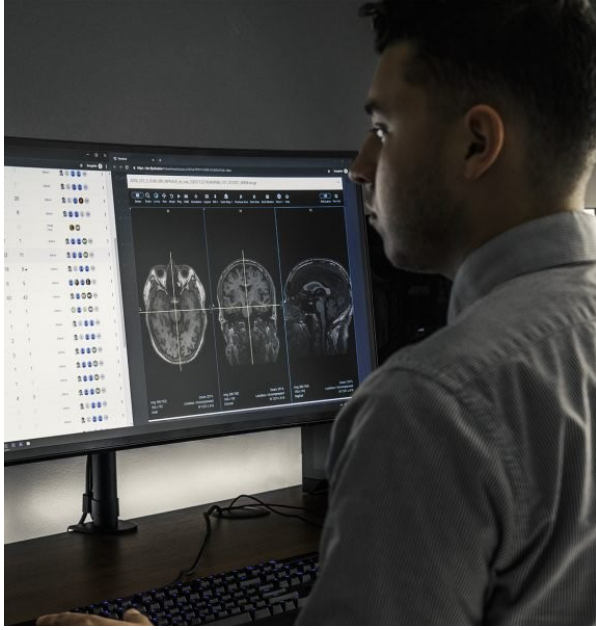


Image courtesy of Flywheel

> "By partnering with NVIDIA, Flywheel is able to leverage the power of GPU computing to help pharmaceutical companies, providers, system integrators, and academic medical centers access and manage data, accelerate research and discovery, and apply AI at scale."
>
> **Travis Richardson**, Chief Strategist, Flywheel

Medical AI development requires access to vast amounts of complex data—data that's typically sensitive and subject to regulations such as HIPAA and GDPR. It's also likely siloed, unorganized, and dispersed around the globe in separate hospital systems, research institutes, and life sciences organizations.

With up to 80 percent of a data scientist's time spent on manual processes to access and curate data, little time is left for analysis, discovery, and innovation. The Flywheel platform helps researchers and healthcare providers overcome these challenges, turning data into an asset that drives healthcare innovation and drug discovery, rather than inhibiting them.

Flywheel Is Driving Biomedical Collaboration and Innovation

Flywheel is a medical imaging data and AI platform that helps pharmaceutical, academic, and clinical researchers access, analyze, train, and securely share data for machine learning, drug discovery, and imaging research.

The Flywheel platform is designed to:

- Ingest and manage medical imaging and associated data types
- Organize and annotate data to common standards
- Automate processing workflows and machine learning pipelines
- Enable collaboration through access-controlled projects

The platform integrates with imaging instruments and is vendor agnostic, allowing researchers to securely send data from clinical picture archiving communication systems (PACS) and vendor-neutral archives (VNAs) into a single centralized platform.

Flywheel

Flywheel powers AI development in healthcare and life sciences with a centralized platform for data discovery, aggregation, curation, training, and collaboration.

Industry

- Academic researchers
- Healthcare providers
- Independent software vendors
- Pharmaceutical companies

Benefits

- Accelerates AI development through automated workflows
- Reduces R&D costs by enabling research support activities at enterprise scale
- Helps aggregate and manage medical imaging data for AI and research

NVIDIA Preferred Partner

Image courtesy of Flywheel.

Flywheel's technology is used by leading pharmaceutical companies and many of the top-tier academic and healthcare institutions to create analysis-ready datasets, streamline collaboration, keep data safe, and ensure regulatory-compliant research and AI development

Flywheel Enterprise and MONAI Enterprise

Flywheel Enterprise, the company's flagship solution, streamlines imaging research and AI development with tools that automate time-consuming processes, ensures data privacy and security, and scales for specific needs.

The platform leverages MONAI, an NVIDIA co-founded project that provides a domain-specific medical AI framework for labeling data, training models, and packaging AI applications. With Flywheel's MONAI Enterprise integration, researchers can quickly annotate ground-truth data using AI-assisted tools and use new or existing data cohorts to train and fine-tune models.

NVIDIA MONAI Enterprise includes MONAI Label (AI-assisted annotation), MONAI Core (model training and fine-tuning), and NVIDIA FLARE (Federated Learning Application Runtime Environment). Developers also have access to the MONAI Model Zoo, which hosts a collection of pretrained medical imaging models, helping users swiftly ramp up the model development life cycle.

Flywheel Exchange

Flywheel Exchange helps researchers access large sets of diverse, real-world data to support the development of algorithms and speed treatment discovery.

Secure access to pre-curated public datasets lets researchers:

- Assess data quality quickly and effectively
- Search and identify desired datasets
- Tap into outside data in a secure, compliant way that reduces cost and complexity

Flywheel Gear Exchange

The Flywheel Gear Exchange is a library of 125+ curated, ready-to-use, plug-in algorithms. Researchers and commercial organizations can use these plug-ins to automate routine tasks such as metadata extraction, classification, data conversion, quality assurance, and full analytics pipelines.

Users can search for available gears and deploy them to automate project tasks.

UW Case Study Results

- 9 percent boost in accurate diagnoses
- 1 million images processed per day
- 10,000 cases processed per day
- 8 months of work condensed to just 1 day

Deployed on NVIDIA With:

- NVIDIA DGX BasePOD™ for Healthcare and Life Sciences
- NVIDIA DGX™ systems
- NVIDIA-Certified Systems
- NVIDIA GPU Direct
- NVIDIA AI Enterprise
- MONAI Enterprise
- NVIDIA FLARE™

94 Percent Diagnosis Accuracy With Machine Learning Models

Researchers from the University of Wisconsin-Madison (UW-Madison) Medical School used Flywheel to implement a workflow for models that accurately label chest X-ray samples to train an AI model that diagnoses COVID-19.

Demonstrating the secure accessibility of the Flywheel platform, teams collaborated on this research while working from home during the pandemic.

UW-Madison researchers migrated 50,000 datasets consisting of chest X-rays and PCR test results from multiple sources to the Flywheel platform. Data was drawn from five hospitals, as well as the National Institutes of Health (NIH), combining original DICOM-formatted images from PACS with relevant metadata from electronic medical records (EMR) and radiology reporting platforms. The resulting solution, CV19-NET, consisted of 22 AI models used to score COVID-19 in chest X-rays.

When measured against the diagnoses of experienced radiologists, CV19-NET performed significantly better, making the correct distinction between COVID-19 and non-COVID-19 pneumonia 94 percent of the time versus the 85 percent achieved by thoracic radiologists.

One Million Abdominal CT Images Processed in Less Than One Day

UW-Madison researchers also used NVIDIA and Flywheel-enabled AI to improve patient outcomes and predict future health issues.

Researchers leveraged Flywheel's MONAI integration to preprocess data from multiple systems in multiple hospitals. Using the **NVIDIA FLARE** open-source SDK for federated learning training and analytics, the UW-Madison team collaborated with other hospitals to securely train AI models on NVIDIA DGX Systems.

NVIDIA DGX powers healthcare and life science workflows with Flywheel's integration of MONAI and FLARE, which in turn provided UW-Madison researchers with the infrastructure they needed to handle large, complex datasets. Running on NVIDIA DGX BasePOD for HCLS provides a cohesive data science platform incorporating storage necessary for the scale of medical imaging workflows.

To seamlessly transition into production, **NVIDIA AI Enterprise** provided a suite of optimized AI and data analytics software, enabling the university to easily replicate its work in other clinics and institutions.

This computing infrastructure enabled UW-Madison researchers to process more than o**ne million images and 10,000 cases per day**—something that previously took six to eight months to accomplish.

> "Using the MONAI imaging framework integrated into Flywheel, with training done on NVIDIA DGX BasePOD, we can apply our state-of-the-art research tools to every single abdominal CT we've ever performed at UW-Madison since 2004. Ten thousand cases used to take six to eight months to get through, and now we can easily process them in a day."
>
> **John Garrett**, Assistant Professor and Director of Informatics, UW-Madison Department of Radiology

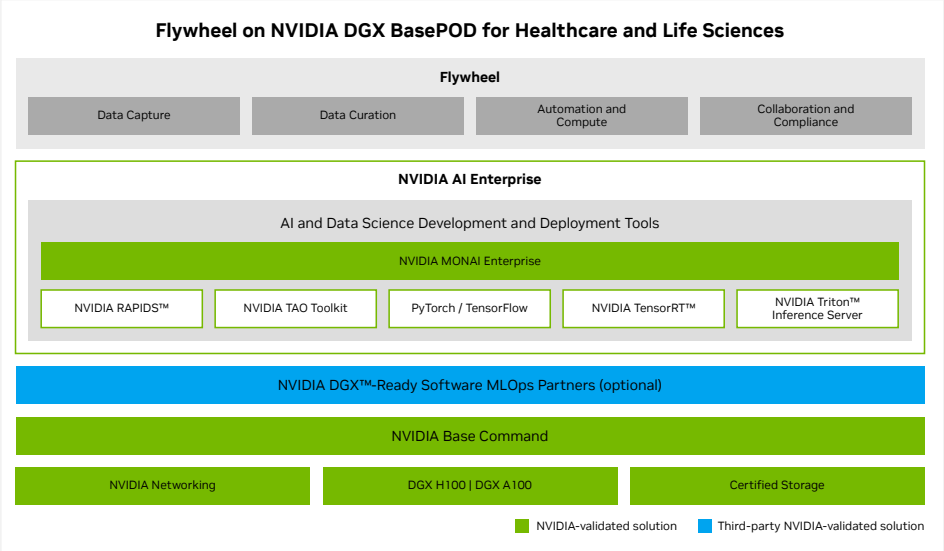
Powered by NVIDIA

The Flywheel platform uses the NVIDIA accelerated computing platform and MONAI to augment its data labeling and training services for healthcare and life sciences.

MONAI provides the essential tools for data labeling, model training, and application deployment, making it easy to develop, reproduce, and standardize medical AI lifecycles. It includes active learning, state-of-the-art data transformations, pre-trained models, and training paradigms such as federated learning and Auto3D segmentation.

MONAI Enterprise is offered with NVIDIA AI Enterprise, an end-to-end, secure, cloud-native suite of AI software that enables organizations to develop and deploy AI for healthcare and life sciences while increasing operational efficiency. It accelerates the data science pipeline and streamlines the development and deployment of medical AI to automate essential processes and gain rapid insights from medical data. Built with an extensive library of full-stack software, NVIDIA AI Enterprise also lets healthcare research and enterprise organizations seamlessly transition into production.

Flywheel can be deployed on **NVIDIA DGX BasePOD** for HCLS, a proven AI-accelerated platform that seamlessly scales from one to 10 to 100 nodes to support an AI center of excellence for any size organization. DGX BasePOD includes NVIDIA Base Command–which delivers cluster and workload management–as well as infrastructure acceleration libraries.



The Flywheel platform runs on NVIDIA DGX BasePOD for HCLS using NVIDIA AI Enterprise for accelerated production AI. NVIDIA AI Enterprise includes MONAI Enterprise for medical imaging workflows.

Lower-Cost, Higher-Impact Innovation

Flywheel is helping to expedite impactful biomedical innovation and reduce costs by removing common data science hurdles for medical researchers and providers.

With the ability to quickly access and curate data, automate processing workflows and machine learning pipelines, and collaborate securely, researchers can accelerate the development of novel algorithms for medical applications.

The result is powerful healthcare AI solutions. With these tools in the hands of leading medical researchers and life sciences organizations, healthcare providers and innovators are making faster, more accurate diagnoses, improving patient outcomes, and delivering more cost-effective medical care.

Ready to Get Started?

To learn more about Flywheel, visit: **flywheel.io**

To learn more about NVIDIA healthcare solutions, visit: **www.nvidia.com/healthcare**