



Simurgh: System and Method for Artifact Reduction of Computed Tomography Reconstruction Leveraging Artificial Intelligence and a Priori Known Model for the Object of Interest



Simurgh revolutionizes industrial CT imaging with AI, enhancing speed and accuracy in nondestructive testing for complex parts, reducing costs.

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Computed tomography (CT) is a critical technology in nondestructive evaluation (NDE) for industries such as aerospace, automotive, biomedical, and energy. Traditional CT methods face challenges in detecting defects in dense and complex components due to limitations in scan speed, resolution, and artifact management. Simurgh revolutionizes industrial CT imaging by incorporating artificial intelligence (AI), resulting in cost reduction through enhanced speed and offering superior accuracy in nondestructive testing for complex parts.

Simurgh is an AI-powered CT framework developed by Oak Ridge National Laboratory (ORNL). This advanced technology integrates AI algorithms with physics-based modeling and computer-aided design data to enhance the quality and speed of CT scans. Simurgh enables high-quality reconstructions from sparse and low-exposure scans, significantly improving defect detection, and greatly reducing scan times.

Benefits

- **Increased speed:** Delivers scan times of 12 to 20 times faster than traditional methods.
- **Enhanced accuracy:** Improves defect detection capabilities by four times. Simurgh has reliably demonstrated that it can identify flaws as small as 50 μm –100 μm depending on material and related high energy industrial X-ray system capabilities with significantly faster scan times.
- **Cost reduction:** Lowers operational costs by reducing scan times, the need for extensive post-processing and manual input, and associated labor costs.
- **Versatility:** Applicable across various industries including aerospace, automotive, biomedical, electronics, and advanced manufacturing.
- **Scalability:** Facilitates high-throughput evaluation and testing, making it ideal for Industry 4.0 applications.

Applications and industries

- **Additive manufacturing (AM):** Qualifies complex AM parts by providing rapid, high-resolution CT scans to detect flaws and ensure part integrity.
- **Aerospace and automotive:** Enhances safety and performance through accurate defect detection in critical components.
- **Biomedical devices:** Improves the quality assurance of medical implants and devices, ensuring patient safety.
- **Energy industry:** Assists in the evaluation of components used in energy production, enhancing reliability and efficiency.

To learn more about this technology, email partnerships@ornl.gov or call 865-574-1051.