

**Ahmed Youssef**

Senior AI Engineer

**Contact:**

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## Management Summary

Ahmed Youssef is a highly experienced AI and machine learning specialist, recognized for his expertise in **Large Language Models (LLMs)**, **generative AI**, and **AI-driven automation**. He has delivered **invited talks at leading institutions** including **DeepMind** and **IAIFI at MIT**, and presented research at top-tier conferences such as **NeurIPS**, focusing on building scalable, interpretable AI systems that drive efficiency and innovation across industries.

His work has earned him prestigious awards, solidifying his reputation as a leader in AI-driven transformation. With a strong track record in automotive, aerospace, manufacturing, and digital media, Ahmed Youssef develops practical, high-impact AI solutions that optimize operations, reduce costs, and give businesses a competitive edge.

## Education

- **Ph.D. Candidate in Particle Physics (Focus in Machine Learning)**, University of Cincinnati, Expected Grad: May 2025
- **Bachelor of Science in Physics**, Ruhr University of Bochum, Germany, Sep 2016 - Sep 2019

## Expertise and Skills

- **Technical Proficiencies:** Advanced proficiency in Python, C++, and SQL; extensive experience with high-performance computing, parallel computing, and cloud infrastructures.
- **Frameworks & Tools:** Expertise in PyTorch, TensorFlow, JAX, HuggingFace, Apache Spark, Docker, Kubernetes, OpenCV; proficient in developing and deploying AI and machine learning solutions.
- **Technologies & Applications:** Extensive experience with LLM fine-tuning & inference (GPT-models, DALL-E, LlamaIndex, LangChain, LangGraph), Retrieval-Augmented Generation (RAG), and Generative AI models (VAEs, Normalizing Flows, Diffusion Models).
- **Research & Engineering Expertise:** Deep expertise in AI explainability, model optimization, reinforcement learning, and large-scale ML training.
- **Soft Skills:** Exceptional problem-solving abilities, strong analytical skills, and effective communication with both technical and non-technical stakeholders.

## Projects

### June 2024 - Now: AI Explainability for Vision-Language Models

- **Sector:** Software Development
- **Position:** Lead AI Researcher
- **Responsibilities:**
  - Developed cutting-edge techniques for improving the explainability of Vision-Language Models, enhancing model transparency and facilitating easier debugging and validation.
  - Integrated these techniques into commercial AI systems to improve user trust and model accountability in deployed applications.
- **Technologies/Methods:** TensorFlow, PyTorch, Docker, Kubernetes, AI Ethics.

### Jan 2022 - Jan 2023: Real-Time Summarization and Style Transfer in NLP

- **Sector:** Natural Language Processing
- **Position:** NLP Engineer
- **Responsibilities:**
  - Led the development of a real-time text style transfer system using few-shot learning, facilitating dynamic content generation with high accuracy and minimal data input.
  - Tailored NLP models for specific industry applications, enhancing customer engagement through personalized content creation.
- **Technologies/Methods:** GPT-3, Python, HuggingFace Transformers, Machine Learning.

### Jan 2023 – Dec 2023: AI-Driven Monte Carlo Reweighting for Particle Simulations

- **Sector:** High-Energy Particle Physics
- **Position:** ML Research Scientist
- **Responsibilities:**
  - Developed **Monte Carlo reweighting techniques** to correct event generator simulations, ensuring better agreement with **experimental data**.
  - Designed **machine learning-based probability density functions** to fine-tune fragmentation and hadronization models.
  - Integrated methods into existing **high-energy physics workflows**, improving the precision of particle interaction modeling.
- **Technologies/Methods:** Python, PyTorch, TensorFlow, Monte Carlo Simulations, Normalizing Flows, HepMC, High-Performance Computing

## June 2022 - June 2023: Generative Art Using Compact Deep Learning Models

- **Sector:** Creative AI, Digital Art
- **Position:** AI Researcher and Developer
- **Responsibilities:**
  - Developed a pioneering generative art project leveraging compact deep learning models to produce high-quality artistic outputs with reduced computational resources. This approach addresses industry needs for efficient, scalable AI solutions in content creation.
  - Utilized Generative Adversarial Networks (GANs) integrated with CLIP to guide the artistic creation process, enhancing the relevance and contextual alignment of the generated artwork. This method has potential applications in digital media, advertising, and interactive design, offering new ways for companies to engage consumers with personalized and dynamic visual content.
- **Technologies/Methods:** GANs, CLIP, Python, PyTorch.

## Jan 2020 - Now: Generative AI for Particle Collision Modeling

- **Sector:** High-Energy Particle Physics
- **Position:** Technical Lead
- **Responsibilities:**
  - Engineered and enhanced AI-based algorithms using Variational Autoencoders and Normalizing Flows to provide unprecedented accuracy in particle collision predictions.
  - Time-sensitive implementing of the AI-based algorithms and models in software frameworks.
  - Optimized modelling performance for high throughput computing environments, significantly reducing computational time and resource usage.
- **Technologies/Methods:** C++, Python, PyTorch, TensorFlow, CUDA, High-Performance Computing.

## Oct 2024 - March 2025: Open-Source Tool for Interactive Visualization of Particle Simulations

- **Sector:** Computational Physics & Software Development
- **Position:** Lead Developer
- **Responsibilities:**
  - Developed an **interactive open-source visualization tool** to help researchers analyze **particle collision simulations** at a fine-grained level.
  - Implemented **dynamic visualization of all steps of a collision process**, allowing for real-time inspection of particle properties and relationships in event generators.

- Integrated with **Pythia and other simulation frameworks**, providing a flexible tool for both experimentalists and theorists.
- **Technologies/Methods:** Python, Pythia

## June 2020 - July 2022: Optimization of Data Processing Pipelines

- **Sector:** Data Science for Particle Physics
- **Position:** Senior Data Engineer
- **Responsibilities:**
  - Implemented data ingestion and real-time processing pipelines to manage and analyze large datasets from particle collider experiments.
  - Developed algorithms to optimize data flow and processing speed, enabling real-time data analysis capabilities for experimental physicists.
- **Technologies/Methods:** Apache Spark, Python, Pandas, NumPy, Jupyter.

## May 2022 – Jan 2023: Optimal Transport and CP Violation Analysis

- **Sector:** Theoretical & Computational Particle Physics
- **Position:** Lead Software Developer
- **Responsibilities:**
  - Developed a **novel statistical test** leveraging **optimal transport** to analyze complex distributions in CP violation studies.
  - Designed **sampling algorithms** for efficiently handling **large-scale string data files** (10+ GB), optimizing memory and computational efficiency.
  - Engineered **large-scale data pipelines** for error analysis and distribution fitting, ensuring **robust statistical inference** in high-energy physics experiments.
- **Technologies/Methods:** Optimal Transport Theory, Statistical Inference, Monte Carlo Methods, Python, NumPy, Pandas, PyTorch, High-Performance Computing