

FACULTY CANDIDATE JOB TALK SCHOOL OF ITCS • NILE UNIVERSITY OCTOBER 12, 2026

Engineering Data Quality, Information Retrieval Pipelines & AI in the Life Sciences

Research Program, Teaching Portfolio, and Strategic Alignment with Nile University & Egypt's Vision 2030

Islam Akef Ebeid, Ph.D.

Candidate for Associate Professor of Artificial Intelligence

Lead PI, National Science Foundation (NSF) Grant | Director, [Data2AI4LifeSciences Lab](#)

[School of Information Technology and Computer Science \(ITCS\) • Nile University](#)

Candidate Profile at a Glance

Demonstrated record across federal grants, peer-reviewed scholarship, and teaching excellence

\$600K

ACTIVE NSF GRANT
(\$210K LEAD PI PORTION)

14+

PEER-REVIEWED PAPERS
(NATURE SCI DATA, IEEE,
FRONTIERS)

4.5 / 5

MEAN TEACHING RATING
(10+ CS & AI COURSES)

7+

GRADUATE CAPSTONES
& THESES MENTORED

Research & Funding Strength

- ▶ **Active NSF PI (2025–2028):** Multimodal medical image segmentation with domain ontologies.
- ▶ **Lab Director:** Founded *Data2AI4LifeSciences Lab* with \$66K startup & HPC grants.
- ▶ **High Impact:** Publications in *Nature*, *Frontiers*, and *IEEE*.

Academic Background & Heritage

- ▶ **Egyptian & US Foundation:** BSc from Ain Shams; MSc & PhD from US programs (UA Little Rock, UT Austin).
- ▶ **US Faculty Leadership:** Assistant Professor at TWU and SAU; NIH Postdoc at UNT.
- ▶ **Industry R&D:** Software engineering and data science roles at Intel, AbbVie, and Arkansas.gov.

Presentation Agenda

Structured strictly around the ITCS Committee criteria (20-Minute Job Talk)

PART 1

Academic Background

Education, training trajectory from Cairo to leading US institutions, and industry engineering roles.

PART 2

Research & Grants

Data quality in AI, biomedical knowledge graphs, protein GNNs, and active \$600K NSF award.

PART 3

Personal Frontier Project

Taming modern AI parameter explosion via Neuro-Symbolic & Graph-Based architectures.

PART 4

Teaching Portfolio

Pedagogy (live coding, research synergy), course history, and curricular offerings for ITCS.

PART 5

Faculty Service & Advising

Curriculum governance, student recruitment coordination, student capstones, and peer review.

PART 6

Vision for Nile University

Lab setup at NU, securing Science, Technology & Innovation Funding Authority (STDF) & Academy of Scientific Research and Technology (ASRT) funding, and advancing Egypt's Vision 2030.

Academic Background & Journey

A disciplined trajectory bridging Egyptian engineering fundamentals with US research

Degrees & Certifications

2014 – 2022
MSc, Ph.D. in Computer & Information Science (94 Cr)
University of Arkansas at Little Rock • *Outstanding Doctoral Graduate*

2017 – 2021
Doctoral Studies in Information Science & Fellowship (72 Cr)
University of Texas at Austin • Texas Advanced Computing Center ([TACC](#))

2011 – 2013
Professional MSc in Computer & Information Science (36 Cr)
Arkansas Tech University

2003 – 2008
BSc in Electrical & Computer Engineering
Ain Shams University, Cairo, Egypt • Distinctive Capstone Award

Professional Certifications: **FE (Fundamentals of Engineering)** | **ITIL**

Academic Appointments & Industry

2023 – Present
Assistant Professor of Computer Science
Texas Woman's University • Tenure-Track • Lab Director

2023
Assistant Professor of Computer Science
Southern Arkansas University • CS Club Faculty Advisor

2022 – 2023
Postdoctoral Research Associate
University of North Texas • NIH-funded GNNs in Drug Repurposing

Industry R&D Roles
AbbVie, Intel Corporation, Arkansas.gov
Data science predictive modeling (AbbVie); Software engineering (Intel)

Research Program: Data2AI4LifeSciences Lab

An interdisciplinary research ecosystem bridging theoretical AI with computational life sciences

Core Mission: Transforming noisy, unstructured biomedical data into high-fidelity dynamic Knowledge Graphs and trustworthy AI models—ensuring both mathematical validity and clinical reliability.

1. Data Quality in AI

- ▶ **Entity Resolution (ER):** Linking non-unique records across disparate sources.
- ▶ Hierarchical record clustering & modularity optimization.
- ▶ Automated data quality assessment & observability pipelines.

2. AI in Life Sciences

- ▶ **Knowledge Graphs & GNNs:** Harmonizing multi-omics with PubMed literature.
- ▶ Computational drug discovery & automated hypothesis generation.
- ▶ Directed Graph CNNs for protein-protein interaction prediction.

3. Human Factors in AI

- ▶ **Cognitive Modeling:** Eye tracking, scanpaths & operator attention modeling.
- ▶ Bridging machine logic with human expert cognition.
- ▶ Ethical, sustainable, and transparent AI system design.

Project 1: PubMed Knowledge Graph & MedGraph

Disambiguating and semantically querying millions of biomedical publications

The Challenge & Innovation

- ▶ **Biomedical Fragmentation:** 35M+ PubMed papers lack unified semantic linkage between authors, clinical entities, and grants.
- ▶ **PubMed Knowledge Graph (PKG):** Extracted entities using fine-tuned BERT; linked authors and NIH funding at massive scale.
- ▶ **MedGraph Architecture:** Knowledge Graph Embeddings (TransE, RotatE) enabling conceptual search beyond simple keyword matching.

Key Dissemination & Venues

NATURE SCIENTIFIC DATA

Building a PubMed Knowledge Graph

Scientific Data (Nature), 7(1), 2020. Highly cited international resource.

FRONTIERS IN BIG DATA

MedGraph: Semantic Biomedical IR

Frontiers in Big Data, 2022. Fast vector similarity search engine.

UNSUPERVISED ER

ModER: Modularity-Based Record Linkage

IJACSA (2022) & *ITNG Springer* (2022).

Project 2: Graph Neural Networks for Proteomics

Novel residue transition graphs for protein-protein interaction prediction (2025)

Direct Graph CNN Architecture

- ▶ **The Challenge:** Experimental 3D protein structure determination is prohibitively slow; 1D sequence models miss spatial contact topology.
- ▶ **Our Method (2025):** Developed an algorithm to infer *Global Dense Residue Transition Graphs* directly from primary amino acid sequences.
- ▶ **Directed GCNN:** Captures directional residue constraints, achieving accurate protein-protein interaction (PPI) prediction without physical 3D coordinates.

Translational & Industry Impact

PUBLISHED 2025

Frontiers in Bioinformatics (doi: 10.3389/fbinf.2025.1651623)

Ebeid IA, Tang H, Gu P (2025). Inferred global dense residue transition graphs from primary structure sequences enable protein interaction prediction via directed graph convolutional neural networks.

Pharma & NIH Translation:

- **NIH Postdoc (UNT):** Graph Neural Networks for computational drug repurposing.
- **AbbVie Collaboration:** Drug-target interaction prediction using Chem2Bio2RDF embeddings.

Project 3: Active NSF Grant — Multimodal Medical AI

National Science Foundation CISE/CCF • Award #2523786 (\$600K Total / \$210K Lead PI | 2025–2028)

Grant Scope: Auto-Prompting with Knowledge

- ▶ **Title:** *Towards auto-prompt textual annotations generation with domain knowledge for multimodal medical image segmentation.*
- ▶ **Lead PI:** Collaborative Award with UT Rio Grande Valley.
- ▶ **Scientific Goal:** Foundation models (e.g. SAM) require tedious manual bounding prompts. We automate prompting using medical ontologies and clinical text knowledge.
- ▶ **Innovation:** Developed Spatially Localized Channel Attention (SLCA) for foundation segmentation backbones.

Milestone & Significance for Nile University

IEEE CBMS 2025

Adapting a Segmentation Foundation Model for Medical Images

Gu, Tang, Ebeid, et al. Validated across 3 clinical imaging benchmarks.

Direct Benefit to ITCS:

Brings an active international federal collaboration to Nile University, providing opportunities for NU students to participate in joint international papers and co-mentored research.

The Data2AI4LifeSciences Laboratory

Research infrastructure, active funding, and lab ecosystem (iebeid.github.io/pages/research/lab.html)

FEDERAL PI NSF CISE/CCF

\$210,000 / \$600,000

Award #2523786 (2025–2028). Auto-prompt multimodal segmentation.

LAB STARTUP TWU Startup Fund

\$66,000

Established GPU computing lab, student stipends, and research software stack.

INFRASTRUCTURE HPC Upgrade Grant

\$5,000

High Performance Computing memory expansion for large-scale GNN model training.

Lab Mission & Ecosystem

Accelerating Biomedical Informatics, Literature Mining, Imaging, and Computational Drug Discovery through novel GNNs, knowledge extraction pipelines, and cognitive observability.

Training & Team Culture

Mentoring undergraduate and graduate researchers (e.g., student researchers and faculty collaborators) in production PyTorch, HPC workflows, and academic publishing.

PERSONAL FRONTIER RESEARCH

Taming the AI Parameter Explosion

A Neuro-Symbolic & Graph-Based paradigm to bypass brute-force parameter scaling

The Critical AI Scaling Crisis: The Unsustainable Trillion-Parameter Trap

Modern foundation models achieve performance through massive brute-force overparameterization (billions to trillions of weights). This incurs extreme computational costs, massive energy footprints, and uncontrollable black-box hallucination.

My Independent Research Initiative

(Conducted as personal fundamental research alongside student lab projects)

- ▶ **Structured Relational Knowledge:** Replace memorization of facts in dense weights with sparse, dynamically queried Graph Neural Networks (GNNs).
- ▶ **Neuro-Symbolic Reasoning:** Ground neural representations in formal symbolic logic constraints to eliminate hallucination.
- ▶ **Drastic Parameter Compression:** Target equivalent or superior reasoning fidelity with orders of magnitude fewer parameters.

Long-Term Strategic Impact

- ▶ **Green & Sustainable AI:** Enables high-capability AI on edge and local compute clusters without requiring multi-million-dollar GPU farms.
- ▶ **Verifiable Reasoning:** Logic-guided graph traversals guarantee interpretability and safety in high-stakes domains.
- ▶ **Intellectual Leadership for Egypt:** Establishes a unique, high-impact theoretical and algorithmic contribution originating from Nile University.

Teaching Philosophy: Research-Led & Active

Transforming students from passive learners into confident, research-ready computer scientists

1. Live-Coding & Debugging

- ▶ Live coding in class to demystify compiler and runtime errors.
- ▶ Treat model bugs as diagnostic learning moments.
- ▶ Ground abstract algorithms in practical software engineering rigor.

2. Research-Teaching Synergy

- ▶ The classroom as an incubator for future researchers.
- ▶ Replace toy assignments with real open-source biomedical & graph datasets.
- ▶ Expose students to genuine challenges in data quality and scalability.

3. Guild-Based Mentorship

- ▶ Paired programming and collaborative code reviews.
- ▶ HyFlex (Hybrid-Flexible) design ensuring equity for working/remote students.
- ▶ Continuous low-stakes assessments to reinforce mastery and confidence.

"My mission is to produce graduates who are not only technically proficient in algorithms and AI, but deeply literate in software engineering, ethics, and data quality."

Demonstrated Teaching Record & Evaluations

Broad instructional versatility across core undergraduate CS and specialized graduate AI seminars

4.75 / 5.0

UT AUSTIN (INSTRUCTOR)

4.50 / 5.0

SOUTHERN ARKANSAS UNIV.

4.20 / 5.0

TEXAS WOMAN'S UNIVERSITY

Courses Taught as Primary Instructor

- ▶ **Foundations of Data Science** (CSCI 3603 / 5173, TWU)
- ▶ **Principles of Data Mining** (CSCI 4823, TWU)
- ▶ **Big Data & High-Performance Computing** (CSCI 4623, TWU)
- ▶ **Data Warehousing & Engineering** (CSCI 4513 / 5803, TWU)
- ▶ **Statistical Programming** (CSCI 5663, TWU)
- ▶ **Computer Science II & OOP** (CSCI 2113, SAU)
- ▶ **Database Management Systems** (MSIS 5133, SAU)
- ▶ **Unix Operating Systems** (MSIS 5033, SAU)
- ▶ **Computer Vision & Machine Learning** (UT Austin)

Curriculum Design & TA Experience

- ▶ **Curriculum Developer:** Designed *CSCI 5773 Artificial Intelligence* graduate course syllabus.
- ▶ **UT Austin (Graduate TA):** Artificial Intelligence in Healthcare, Data Semantics, Human-AI Interaction, Virtual Environments.
- ▶ **UA Little Rock (TA):** Information Visualization, Python Programming.
- ▶ **Arkansas Tech (TA):** Computer Networks, Intro to Programming.

Curricular Contributions to Nile University (ITCS)

Immediate readiness to cover core departmental curriculum and launch cutting-edge electives

Undergraduate Core CS

- ▶ Artificial Intelligence
- ▶ Machine Learning
- ▶ Database Systems
- ▶ Data Structures & Algorithms
- ▶ Operating Systems / Unix
- ▶ Data Warehousing

Graduate Program Core

- ▶ Deep Learning & Neural Networks
- ▶ Knowledge Graphs & Semantic Web
- ▶ Big Data & HPC Systems
- ▶ Natural Language Processing
- ▶ Distributed AI Systems

Proposed Novel Courses

NEW COURSE 1

AI in Health & Life Sciences

Graph models, medical vision, and clinical NLP.

NEW COURSE 2

Foundation Model Governance & MLOps

Data quality, observability, and enterprise AI security.

Service to ITCS Students: Prepared to take on high-enrollment core undergraduate lectures immediately, while establishing graduate seminars that bridge academic theory with industry engineering standards.

Student Advising & Research Mentorship

Guiding students from capstone formulation to publication-ready computational scholarship

Supervised Capstone & Thesis Projects (Selected)

SPRING 2024 Jordan Frazier:

Predicting Alzheimer's disease progression via multimodal machine learning.

FALL 2024 Peggy Berko:

Drug Repurposing: Graph ML algorithms for disease-drug interaction prediction.

FALL 2024 Dominique Pettway:

Oral Microbiome & Cardiovascular Risk: Predictive metagenomic modeling.

SPRING 2025 Munira Karim:

Automated Enterprise Data Warehouse (EDW) architecture for cybersecurity analytics.

FALL 2024 M. Bobo & H. Campbell:

Predictive modeling for financial credit card fraud detection.

Mentorship Model: The Research Guild

- ▶ **Hands-On Apprenticeship:** Undergraduates and graduate students contribute directly to funded lab pipelines.
- ▶ **Pathway to Publications:** Mentoring students to present at regional conferences (MCBIOS, TACCSTER) and co-author papers.
- ▶ **Production Software Stack:** Training in production Python, PyTorch Geometric, Git, and cloud infrastructure.
- ▶ **Undergraduate Retention:** Dedicated to empowering first-generation college students in STEM.

Faculty Service & Administrative Leadership

An active institutional citizen dedicated to departmental governance and scholarly review

Institutional Governance

Texas Woman's University (2023 – 2024)

Faculty Recruitment Coordinator

Managed faculty search committees, job postings, screening, interviews, and onboarding.

Texas Woman's University (2024)

Division Curriculum Committee

Reviewed and updated degree requirements and course syllabi across CS programs.

Texas Woman's University (2024)

University AI Initiative Committee

Formulated institutional policies on AI adoption in research and classroom pedagogy.

Southern Arkansas University (2023)

Faculty Advisor, Computer Science Club

Mentored student hackathons, coding workshops, and career readiness events.

Scholarly Service & Peer Review

▶ Journal Reviewer:

- *Nature Quality & Quantity* (2025)
- *Journal of Supercomputing* (2025)
- *Cambridge University Press J. of Natural Language Eng.*

▶ Conference Reviewer:

- *ACM SIGKDD, ACM CIKM, IEEE BIBM, ACM ETRA*

▶ Editorial Board: *Research in Biomedical Engineering and Technology* (2025–Present).

▶ Professional Memberships: ACM, IEEE, Egyptian Syndicate of Engineers (since 2008).

Strategic Future Plan at Nile University

A concrete 3-year roadmap aligning with Egypt's Vision 2030 and ITCS priorities

YEAR 1: LAUNCH & INTEGRATE

Establish Lab & Teach

- ▶ Launch the **Data2AI4LifeSciences Lab** at Nile University.
- ▶ Seamlessly integrate into ITCS core teaching schedule.
- ▶ Recruit Nile University undergraduate and MSc students.
- ▶ Publish joint papers on ongoing US NSF collaborative deliverables.

YEAR 2: NATIONAL GRANTS

Target STDF & ASRT

- ▶ **STDF Proposals:** Submit health informatics & automated drug hypothesis generation grants.
- ▶ **ASRT Proposals:** Target multi-modal data linkage in national biomedical repositories.
- ▶ Collaborate with NU Biotechnology and Engineering faculties.

YEAR 3: REGIONAL HUB

Industry Partnerships

- ▶ Partner with Egyptian pharma and health-tech leaders (data observability).
- ▶ Pilot Neuro-Symbolic parameter compression tools.
- ▶ Host regional workshops on Knowledge Graphs and Trustworthy AI at Nile University.

Alignment with Egypt Vision 2030: Advancing national digital transformation, AI sovereignty, and biomedical innovation through applied research anchored at Nile University.

Why Nile University? Why me?

A synergistic mutual alignment for academic excellence and long-term impact

What Nile University ITCS Offers Me:

- ▶ **Innovation-Driven Culture:** Nile University's standing as a leading research-intensive, forward-thinking university.
- ▶ **Exceptional Student Talent:** Motivated students eager to tackle advanced AI and data engineering problems.
- ▶ **National Purpose:** The opportunity to bring 10+ years of US research and federal grant experience back home to Egypt.

What I Deliver to Nile University:

- ▶ **Active Federal Grant PI:** Brings active NSF funding experience (\$600K) and competitive grant-writing expertise.
- ▶ **High Quality Publications:** Track record in *Nature Scientific Data*, *Frontiers*, and *IEEE*.
- ▶ **Evaluated Teaching Excellence:** Dedicated educator with 4.5+ average ratings across 10+ core CS courses.
- ▶ **Institutional Builder:** Eager to serve in curriculum design, faculty recruitment, and student mentorship.

THANK YOU

Questions & Discussion

Thank you to the Faculty Hiring Committee • School of ITCS, Nile University

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Google Scholar: [Citations & Publications](#)

Lab: [The Data2AI4LifeSciences Lab](#)

I look forward to discussing how we can build the future of AI and Computing at Nile University together.

