

PHILIP OBHENIMEN JOHN

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HIGHLIGHTS

Computational combustion and scientific machine learning researcher with expertise in **CFD of multiphase turbulent reacting flows**, **reduced-order modeling with chemical reactor networks**, and the **machine learning, deep learning, diffusion models**, and **agentic AI** that make high-fidelity simulation fast enough for design. First author of **two peer-reviewed journal papers**; built reactor-network models that run **over 1,000× faster than CFD**. Also an experienced **software engineer** who has shipped production AI and mobile apps used by **40,000+ students**. Available full-time from **Spring 2027**.

EDUCATION

PhD in Mechanical Engineering | Louisiana State University | GPA: 3.95 2022 - 2027 (expected)
Dissertation: Liquid-Fueled Reactor Network Modeling for Gas Turbine Combustors
BEng in Mechanical Engineering | University of Benin, Nigeria | CGPA: 4.83/5.0 10/2014 - 12/2019

EXPERIENCE

Graduate Research Assistant | [DMO Lab](#), Louisiana State University, LA 01/2022 - present
Advisor: Dr. Ope Owoyele

- Developed the **Liquid-Fueled Reactor Network (LFRN)**, to our knowledge the first coupled reactor-network framework for liquid-fueled combustors, adding spray breakup, droplet heating, and evaporation reactors; substantially reduced NO_x error vs. gaseous networks and ran in $\mathcal{O}(10)$ s on one core, **~2,300× faster** than 256-core CFD (first author, *Combustion and Flame*).
- Trained **reinforcement-learning agents** that treat reactor-network construction as a sequential decision problem, clustering CFD fields automatically and improving lean-blowout prediction over hand-built networks (first author, *Proceedings of the Combustion Institute*).
- Built **multi-fidelity Gaussian-process surrogates** (NARGP) fusing 400 reactor-network and 35 CFD runs to predict outlet temperature and six species; with only 7 CFD points, matched the accuracy a standard GP needs 14 for, lifting mean R^2 from 0.75 to 0.92, and identified where negative transfer occurs.
- Ran **RANS and large-eddy simulations (LES)** of swirl-stabilized, liquid-fueled combustors; RANS of a **Jet-A combustor in CONVERGE**: $k-\varepsilon$, flamelet-generated manifold chemistry with presumed β -PDF, Lagrangian sprays (TAB breakup, Frossling evaporation), and AMR to $\sim 3.2\text{M}$ cells; coupled networks to **Cantera** with HyChem Jet-A kinetics (119 species, 841 reactions).
- Developing a **diffusion model** that reconstructs high-resolution LES flow and species fields from reactor-network data (ongoing PhD project).
- Designed automated, parallel **HPC pipelines** on LSU's SuperMike-3 cluster (SLURM, MPI) linking simulation, data extraction, model construction, and ML training; trained **neural networks** for NO_x prediction and built FGM tabulation pipelines with OpenSMOKE++.

Software Engineer | MyStudySidekick 2025 - present
AI study platform for college STEM students, live on iOS, Android, web, and desktop

- Built the **AI pipeline end to end**: ingestion of PDFs, slides, YouTube captions, and audio (Whisper), chunking, embeddings, retrieval, and LLM generation of summaries, quizzes, flashcards, and study plans.
- Built an **agentic backend** in which LLM agents use **verification tools** and reusable **skills** to check generated summaries, quizzes, flashcards, and solutions before they reach students.
- Built the **Go backend** (net/http, PostgreSQL via pgx, Goose migrations, Cloudflare R2) and a local-first, offline-capable **React Native/Expo** client with SQLite sync across phone, tablet, and **Tauri** desktop.
- Built a SymPy/SciPy computation service for step-by-step STEM problem solving; own deployment, releases, and production debugging.

Co-founder and Lead Developer | Poscholars, Nigeria 04/2021 - present

- Built and shipped a mobile learning app serving **40,000+ students** across multiple universities (App Store rating 4.5), with a NestJS backend and CI/CD release pipeline; 20 releases since launch.
- Added **AI chat over uploaded course files**, AI flashcards, and a course builder; wrote native **Swift and Kotlin** modules, including native SVG math rendering that replaced a slow WebView path.

Teaching Assistant | Louisiana State University, LA

2022 - present

- Thermodynamics, Fluid Mechanics, and Heat Transfer: recitations, laboratory demonstrations, and mentoring undergraduates on research and senior design.

AI Research Intern | Xigma Input and Output Technology, Nigeria

03/2018 - 09/2018

- Developed Python machine-learning models for engineering prediction and optimization; implemented numerical PDE solvers in Python and MATLAB.

PROJECTS

- **Mitrawriter** (public beta planned 12/2026): agentic desktop research environment for scientists with cross-paper chat, citation-aware LaTeX writing, code-to-paper integration, and slide and thesis assembly on a reusable RAG core.
- **Animal Game** (iOS and Android): animal quiz game with 495 animals across six categories and six game modes, published by Poscholars.

SKILLS

Combustion & CFD: CONVERGE, ANSYS Fluent, OpenFOAM, Cantera, OpenSMOKE++, ParaView; RANS, LES, sprays, turbulent combustion, chemical kinetics, FGM.

Scientific ML: PyTorch, TensorFlow, scikit-learn, emukit; diffusion models, reinforcement learning, Gaussian processes, multi-fidelity surrogates, neural networks.

Agentic AI: Agentic workflows, tool use, verification tools, skills, retrieval-augmented generation, embeddings, LLM APIs (Gemini, OpenAI), Whisper.

HPC: MPI, OpenMP, SLURM, Linux, parallel Python pipelines, Git, CI/CD.

Software: Go, PostgreSQL, SQLite, NestJS, React Native/Expo, React, Tauri, Cloudflare R2.

Languages: Python, C++, Go, TypeScript/JavaScript, Rust, Swift, Kotlin, MATLAB, SQL.

PUBLICATIONS

- **P. John**, E. Ikponmwoba, P. Pal, O. Owoyele, “A reinforcement-learning-augmented liquid-fueled reactor network model for predicting lean blowout in gas turbine combustors”, [Proc. Combust. Inst. 42 \(2026\) 106463](#).
- **P. John**, H. Chandrasekhar, S. Saha, O. Owoyele, “A liquid-fueled reactor network model for enhanced NO_x prediction in gas turbine combustors”, [Combust. Flame 292 \(2026\) 115199](#).
- **P. John**, O. Owoyele, “Multi-fidelity Gaussian-process surrogates for data-efficient prediction of gas-turbine combustor emissions”, in preparation.

AWARDS

- Best Graduating Student, University of Benin (2019) - CGPA 4.83/5.0, First Class Honours.
- Winner, Edo State/Siemens Energy Hackathon (2019).
- 2nd Place Team, Hult Prize Nigeria National Finals (2018).
- United Nations Academic Impact Millennium Fellow (2018).
- National Merit Scholarship (2015).

SERVICE AND MENTORING

- Peer Reviewer, *Combustion and Flame* and *Journal of Energy Resources Technology*.
- Mentor, LSU Mechanical Engineering - Advise undergraduates on research and senior design projects.