Sherif Tolba

Greater Boston Area
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Professional Summary

Principal Software Engineer with a Ph.D. in Computer Science and Engineering and 10+ years of experience building scientific computing platforms, simulation automation systems, and agentic AI workflows. Architected large-scale Kubernetes-based simulation platforms capable of executing more than 1 million simulations in approximately 2 hours and 40 minutes. Experienced in Python, Go, AWS, Kafka, microservices, event-driven architectures, CI/CD automation, and agentic AI systems — with a strong track record translating complex engineering requirements into deployable software through close collaboration with engineers, researchers, and customers.

Core Expertise

AI & Agentic Systems:	Agentic Workflows, LLM Applications, MCP, Local LLM Deployment, Prompt Engineering
Scientific Computing:	Simulation Platforms, Workflow Automation, MATLAB/Simulink, Modeling
Programming:	Python, Go, JavaScript, Flutter
Cloud & Distributed:	Kubernetes, AWS, Docker, Kafka, Redis, gRPC, Microservices, CI/CD
Engineering:	System Design, Clean Architecture, SOLID Principles, TDD, Technical Leadership

Professional Experience

The MathWorks, Inc. Natick, MA

Principal Software Engineer — Simulink Compiler & Parallel Simulations May 2022 – Present

- **Designed and implemented agentic AI workflows** enabling automated generation of production-ready simulation applications, including frontend/backend code generation, simulation integration, and UI orchestration.
- **Architected a large-scale cloud-native simulation platform** for Simulink enabling distributed execution of engineering system simulations using Kubernetes, AWS, Go microservices, Kafka, Redis, and proprietary distributed services — achieving ∼1 million simulations in ∼2 hours 40 minutes.
- **Developed Python-based cloud simulation microservices** leveraging the MATLAB Engine API for Python; implemented an AWS Lambda–based streaming service for real-time simulation signal delivery using Apache Parquet data pipelines for cloud-scale analytics.
- **Collaborated with Application Engineers and customers** to integrate simulation and software systems with cyber-physical motor-control applications and enterprise engineering workflows.
- Drove architecture decisions for distributed simulation infrastructure, scalability strategy, cloud resource orchestration, and cross-team platform integrations.
- Designed cloud-native, event-driven microservices using Kafka, Redis, Kubernetes, and AWS to support high-throughput parallel simulation execution.
- Leveraged commercial and local LLMs, MCP, and prompt engineering techniques to streamline engineering workflows.
- Led integration of App Designer and Simulink UI component ecosystems, including major contributions to `simulink.compiler.genapp()`.
- Designed hybrid CI/CD pipelines using GitLab CI, MATLAB/Simulink tooling, and internal infrastructure across Linux, macOS, and Windows.
- Applied Clean Architecture, SOLID principles, and TDD to improve maintainability, extensibility, and long-term platform reliability.

Senior Software Engineer Feb 2020 – Apr 2022

- Re-architected the Simulink application generation feature, improving maintainability, UX consistency, and testability, achieving full automated test coverage for major subsystems.
- Designed custom Simulink UI components for MATLAB App Designer, enabling seamless integration of simulation workflows into application environments.
- Designed and implemented a custom plotting integration mechanism for Simulation Manager using proprietary internal frameworks.

Modo Labs, Inc. Cambridge, MA

Full Stack Developer Nov 2016 – Dec 2019

- Implemented scalable SaaS platform capabilities across Marketplace, Create, and Analytics products.
- Designed dependency-management and configuration-validation systems supporting package lifecycle management, integrity checking, and automated issue resolution.

University of Connecticut Storrs, CT

Web Application Developer Jun 2012 – May 2016

- Developed and maintained internal web applications, administration systems, and workflow automation tools in collaboration with faculty and administrative stakeholders.

Research Assistant Feb 2011 – May 2012

- Conducted research in swarm robotics, decentralized autonomous systems, and wireless sensor networks, designing simulation and coordination algorithms for autonomous underwater vehicle swarms.

Education

University of Connecticut Storrs, CT
Ph.D., Computer Science and Engineering 2016
M.S., Computer Science and Engineering 2011

Mansoura University Mansoura, Egypt
B.S., Electronics and Communications Engineering 2007

Selected Research Publications

- Tolba, S.; Raafat, H.; Tolba, A.S. "Gesture-Based Physical Stability Classification and Rehabilitation System." *Sensors* 25(19), 6098, 2025. doi:10.3390/s25196098
- Tolba, S.; Ammar, R. "Virtual Tether Search: A Self-Constraining Search Algorithm for Swarms in an Open Ocean." In *Proc. IEEE Symposium on Computers and Communications (ISCC)*, pp. 1128–1135, 2017. IEEE Xplore
- Tolba, S.; Ammar, R.; Rajasekaran, S. "Taking Swarms to the Field: Constrained Spiral Flocking for Underwater Search." In *Proc. IEEE Symposium on Computers and Communications (ISCC)*, pp. 1177–1184, 2016. IEEE Xplore
- Tolba, S.; Ammar, R. "Taking Swarms to the Field: AUV Reorientation Algorithm for PSO Realization." In *Proc. IEEE International Symposium on Signal Processing and Information Technology (ISSPIT)*, pp. 116–121, 2015. **Best Paper Award.** IEEE Xplore

Open Source & Technical Presence

- **GitHub:** github.com/aghilmort/swim, github.com/aghilmort/imdb_clone
- **Technical Blog:** sheriftolba.com/wordpress/blog