Anna Karanika

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Technical Summary

Specializing in distributed systems and large-scale ML infrastructure. Experienced with PyTorch data loading, and distributed tracing tools. Research in hybrid parallelism for LLMs, and abstractions that enhance observability, fault-tolerance and scalability in distributed systems. Augmented open-source systems with the above abstractions.

Education

University of Illinois Urbana-Champaign (UIUC) — Urbana, IL, USA
Ph.D. in Computer Science — *Aug 2020 – May 2026*
Advised by Professor Indranil (Indy) Gupta

University of Thessaly (UTh) — Lamia, Greece
M.Sc. in Computer Science — *Oct 2019 – Jun 2020*
Advised by Professor Kostas Kolomvatsos

University of Thessaly (UTh) — Volos, Greece
Diploma (B.Eng. + M.Eng.) in Electrical and Computer Engineering — *Sep 2014 – Jun 2019*
Advised by Professors Kostas Kolomvatsos and George Stamoulis

Industry Experience

Apple — Seattle, WA, USA
AIML Intern — *May 2024 – August 2024, Internship*

- Designed and implemented a peer-to-peer ephemeral cache for ML dataset shards for the training duration.
- Download time decreased by 10×. Integrated with PyTorch.
- Worked in the Iris team of MLPT.

Twitter — San Francisco, CA, USA
Engineering Intern — *May 2022 – August 2022, Internship*

- Developed a method for pinpointing the appropriate Zipkin sampling rate for tracing incoming user requests so that events and trends are maintained for debugging while storage requirements decrease by 10–1000×.
- Developed a tool that creates traces' Zipkin JSON representations from tables where services record info.
- Worked with Rebecca Isaacs in the Infrastructure Optimization Performance (IOP) Team.

Research Experience

DPRG Research Group, University of Illinois Urbana-Champaign — Urbana, IL, USA
Graduate Research Assistant — *Aug 2020 – Present, Part-time*

- [Ph.D. Thesis] Exploring hybrid-parallelism distributed model placement methods for LLM inference locally within a smart space.
- Designed and conducting a user study in AI adoption challenges and expectations in DevOps (AIOps) with SREs.
- [Ph.D. Thesis] Designed an abstraction on top of RPC that enhances observability and programmability in an Internet-of-Things setting towards reliability and energy-efficiency.
- [Ph.D. Thesis] Worked on CoMesh, a system that alleviates the workload of centralized automation managers more than 10× in a commercial edge mesh by decentralizing control for large-scale device and automation management.
- [Ph.D. Thesis] Designed and conducted a human study of smart home control interface (de)centralization. Found that users prefer central control in the general case, but turn to decentralized interfaces when troubleshooting or in need of finer-grained control.
- Designed SkyrosFS, an externally-synchronous replicated file system, which utilizes speculation to decrease the amount of replicated write operations, by skipping invalid operations, thus increasing throughput.
- Analyzed Cross-System Interaction (CSI) failures that occur more than 20% of the time when independent and interacting cloud systems interact with each other.

iPRISM Research Group, University of Thessaly Volos, Greece

Graduate Researcher *Mar 2019 – Jul 2020, Part-time*

- Designed an interpretable machine learning scheme for securing data quality on storage nodes at the edge.
- Worked on demand-driven proactive task scheduling at the edge.
- Proposed task scheduling methods at the edge based on machine learning and bio-inspired algorithms.

Publications

Conference Publications

[C5] Lilia Tang, Chaitanya Bhandari, Yongle Zhang, **Anna Karanika**, Shuyang Ji, Indranil Gupta, Tianyin Xu. **"Fail through the Cracks: Cross-System Interaction Failures in Modern Cloud Systems."** In *EuroSys*, 2023.

[C4] **Anna Karanika**, Ioannis Filippopoulos, Angelika Kokkinaki, Panagiotis Efstathiadis, Ioannis Tsilikas, Yiannis Kiouvrekis. **"Extensive Use of RFID in Shipping."** In *EMCIS*, 2020.

[C3] **Anna Karanika**, Panagiotis Oikonomou, Kostas Kolomvatsos, Christos Anagnostopoulos. **"An Ensemble Interpretable Machine Learning Scheme for Securing Data Quality at the Edge."** In *CD-MAKE*, 2020.

[C2] **Anna Karanika**, Panagiotis Oikonomou, Kostas Kolomvatsos, Thanasis Loukopoulos. **"A Demand-driven, Proactive Tasks Management Model at the Edge."** In *FUZZ-IEEE*, 2020.

[C1] **Anna Karanika**, Madalena Soula, Christos Anagnostopoulos, Kostas Kolomvatsos, George Stamoulis. **"Optimized Analytics Query Allocation at the Edge of the Network."** In *IDCS*, 2019.

Journal Publications

[J3] **Anna Karanika**, Rui Yang, Xiaojuan Ma, Jiangran Wang, Shalni Sundram, Indranil Gupta. **"There is More Control in Egalitarian Edge IoT Meshes."** *IEEE TNSM*, Special Issue on 'Resilient Communication Networks for a Hyper-Connected World', to appear, 2025.

[J2] Panagiotis Oikonomou, **Anna Karanika**, Christos Anagnostopoulos, Kostas Kolomvatsos. **"On the Use of Intelligent Models towards Meeting the Challenges of the Edge Mesh."** *ACM CSUR*, vol. 54, no. 1, 2021, pp. 1–42.

[J1] Madalena Soula, **Anna Karanika**, Kostas Kolomvatsos, Christos Anagnostopoulos, George Stamoulis. **"Intelligent Tasks Allocation at the Edge based on Machine Learning and Bio-Inspired Algorithms."** *Springer EVOS*, vol. 13, no. 2, 2021, pp. 221–242.

Book Chapters

[BC1] Panagiotis Efstathiadis, **Anna Karanika**, Nestoras Chouliaras, Leandros Maglaras, Ioanna Kantzavelou. **"Smart Cars and Over-the-Air Updates."** *CybET*, edited by Leandros Maglaras, Ioanna Kantzavelou, CRC Press, 2021, pp. 137–152.

Skills

Languages: Python, Java, C/C++, Shell/Bash, SQL, Scala, JavaScript, MATLAB, Go, R, LaTeX

Systems: Apache Maven, Git, Docker, Linux

Parallel & Distributed Computing: OpenMP, CUDA, MPI, Zipkin

Machine Learning: llama.cpp, PyTorch, Scikit-Learn, Keras

Edge Computing: Raspberry Pi, Home Assistant, Matter, WireShark

Professional Service

External Reviewer: ATC'24

Artifact Evaluation Committee: EuroSys'25, SOSP'25, NSDI'26, EuroSys'26