Anna Karanika

+1(217)953-1932 | annakaranika@gmail.com | anna-karanika | annakaranika | annakaranika.github.io
Thomas M. Siebel Center for Computer Science, 201 North Goodwin Avenue, Urbana, IL, 61801-2302

Research Interests

Distributed Systems, Fault Tolerance, Internet of Things (IoT), Edge Computing, Large Language Models (LLMs), State Machine Replication (SMR), Cloud Computing, Storage Systems, Software Reliability

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 an order of magnitude.
- Released as part of an internal data loading library for PyTorch.
- Worked with Li Li, Shiwen Zhao and Ming-Chuan Wu, 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, Mihir Nanavati and Yuri Vishnevsky in the Infrastructure Optimization Performance (IOP) Team, part of which is now an independent company.

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 distributed model placement methods for LLM inference locally within a smart space.
- [Ph.D. Thesis] Designed an abstraction on top of RPC that enhances observability and enables fine-grained control in an Internet-of-Things setting towards reliability and energy-efficiency.
- [Ph.D. Thesis] Conducted a human study of central vs. per-device smart home control schemes. Found that users prefer central control in the general case, but turn to per-device control when troubleshooting or in need of finer-grained control.
- [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.
- 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.
- Collaborated with Profs. Indranil Gupta, Tianyin Xu, Ramnatthan Alagappan, Camille Cobb and Karrie Karahalios. Mentored 2 undergraduate and 2 graduate students.

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.
- Collaborated with Profs. Kostas Kolomvatsos, George Stamoulis, Christos Anagnostopoulos and Thanasis Loukopoulos.

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: C/C++, Java, Python, Go, Bash, JavaScript, SQL, Scala, MATLAB, R, LaTeX, HTML, CSS

Technologies: Apache Maven, Git, Docker, Linux, Node.js, Scikit-Learn, Keras, PyTorch, TensorFlow, OpenMP, CUDA, MPI, WireShark, Raspberry Pi, Matter, Zipkin, llama.cpp, Home Assistant

Teaching Experience

Computer Science Department, University of Illinois Urbana-Champaign Urbana, IL, USA

Graduate Teaching Assistant *Spring 2023/24/25 & Fall 2024, Part-time*

- CS425 Distributed Systems
- CS525 Advanced Distributed Systems

Digital Systems Department, University of Thessaly Larissa, Greece
Graduate Teaching Assistant *Fall 2019, Part-time*

- Y103 Introduction to Programming

Electrical and Computer Engineering Department, University of Thessaly Volos, Greece
Undergraduate Teaching Assistant *Spring 2018, Part-time*

- ECE120 Engineering Drawing

Professional Service

External Reviewer: ATC'24

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