Aleksey Charapko

Kingsbury Hall W233, 33 Academic Way
Durham, NH 03824
Email: aleksey.charapko@unh.edu
Web: https://charap.co

RESEARCH INTERESTS

- Distributed systems, distributed databases, distributed consensus, distributed monitoring & debugging, fault tolerance, systems reliability, scalability.

EDUCATION

- **Doctor of Philosophy,** Computer Science & Engineering, 2020
  "Consensus End-to-End: Design, Implementation, and Evaluation of Consensus Protocols"
  Advisor: Dr. Murat Demirbas
  University at Buffalo, SUNY, Buffalo, New York

- **Master of Science,** Computer Science, 2015
  "Time Series Similarity Search in Distributed Key-Value Data Stores Using R-trees"
  Advisor: Dr. Ching-Hua Chuan
  University of North Florida, Jacksonville, Florida

- **Bachelor of Science,** Computer Science, 2015
  University of North Florida, Jacksonville, Florida

EXPERIENCE

- **Assistant Professor**, University of New Hampshire, 2020 - Present
- **Visiting Researcher/Engineer**, Microsoft, 2018 - 2020
- **Graduate Research Assistant,** University at Buffalo, 2016 - 2019
- **Graduate Teaching Assistant,** University at Buffalo, 2015 - 2016
- **Graduate Research Assistant,** University of North Florida, 2012 - 2015

FUNDED RESEARCH PROJECTS

1. **NSF CAREER** $594,000 from 2025 to 2030
   Mitigating the Risks of Metastable Failures in Distributed Systems
   PI: **Aleksey Charapko** (funded to date: $212,345)

2. **NSF CSR Program** $500,000 from 2022 to 2026
   Resource-efficient, Strongly Consistent Replication for the Cloud
   PI: **Aleksey Charapko** (50%), co-PI: Abutalib Aghayev

3. **AWS Cloud Credit for Research** $7,625 from 2021 to 2022
   Access Locality in Geo-distributed Databases
   PI: **Aleksey Charapko**

PUBLICATIONS

- **Journal Papers**

  1. *WPaxos: Wide Area Network Flexible Consensus*
     Ailijiang A., **Charapko A.**, Demirbas M., Kosar T. *IEEE Transactions on Parallel and Distributed Systems*, 31(1), pp. 211-223, 2020.

2. *Using Weaker Consistency Models with Monitoring and Recovery for Improving Performance of Key-Value Stores*
Nguyen D., **Charapko A**., Kulkarni S., Demirbas M. *Journal of the Brazilian Computer Society*, Accepted for publication, 25(10), 2019.

3. *Retroscope: Retrospective Monitoring of Distributed Systems*
Charapko A., Ailijiang A., Kulkarni S., Demirbas M. *IEEE Transactions on Parallel and Distributed Systems*, 30(11), pp. 2582 - 2594, 2019.

4. *Indexing Musical Sequences in Large Datasets Using Relational Databases*
Charapko, A., and Chuan. C.-H. *International Journal of Multimedia Engineering and Management*, 6(2), pp. 1 - 18, 2015.

5. *Predicting Key Recognition Difficulty in Music Using Statistical Learning*
Chuan, C.-H., and **Charapko, A.** *International Journal of Multimedia Engineering and Management*, 5(2), pp. 54 - 69, 2014.

- **Conference and Workshop Papers**

  1. *HoliPaxos: Towards More Predictable Performance in State Machine Replication*
  Liang Z., Jabrayilov V., Aghayev A., **Charapko A.**
  The 51st International Conference on Very Large Data Bases (VLDB), 2025

  2. *Practical Considerations for Implementing State Machine Replication in the Cloud*
  Liang Z., Jabrayilov V., Aghayev A., **Charapko A.**
  The 45th IEEE International Conference on Distributed Computing Systems (ICDCS), 2025

  3. *Simpler is Better: Revisiting Mencius State Machine Replication*
  Cui B., **Charapko A.**
  The 43rd International Symposium on Reliable Distributed Systems (SRDS), 2024

  4. *Cloudy Forecast: How Predictable is Communication Latency in the Cloud?*
  Hilyard O., Cui B., Webster M., Muralikrishna AB., **Charapko A.**
  The 33rd International Conference on Computer Communications and Networks (ICCCN), 2024, **Best Paper Runer-up**

  5. *Linearizable Low-latency Reads at the Edge*
  Guarnieri J., **Charapko A.** *10th Workshop on the Principles and Practice of Consistency for Distributed Data (PaPoC), 2023.*

  6. *Metastable Failures in the Wild*
  Magnusson M., Muralikrishna AB., Estyak S., Huang L., Isaacs R., Aghayev A., Zhu T., **Charapko A.** *The 16th USENIX Symposium on Operating Systems Design and Implementation (OSDI), 2022. (Acceptance Rate: 19%)*

  7. *Scaling Replicated State Machines with Compartmentalization*
  Whittaker M., Ailijiang A., **Charapko A.**, Demirbas M., Giridharan N., Hellerstein JM., Howard H., Stoica I., Szekeres A. *47th International Conference on Very Large Data Bases, 2021*

  8. *Scalable but Wasteful: Current State of Replication in the Cloud*
  Matte V. S., **Charapko A.**, Aghayev A. *The 13th ACM Workshop on Hot Topics in Storage and File Systems (HotStorage), 2021. (Acceptance Rate: 37%)*

  9. *Metastable Failures in Distributed Systems*
  Bronson N., Aghayev A., **Charapko A.**, Zhu T. *The 18th Workshop on Hot Topics in Operating Systems (HotOS), 2021. (Acceptance Rate: 26%)*

10. *Read-Write Quorum Systems Made Practical*
    Whittaker M., **Charapko A.**, Hellerstein JM., Howard H., Stoica I. *8th Workshop on the Principles and Practice of Consistency for Distributed Data (PaPoC), 2021.*

11. *PigPaxos: Devouring the Communication Bottlenecks in Distributed Consensus*
    Charapko A., Ailijiang A., Demirbas M. *ACM SIGMOD/PODS conference, 2021*

12. *Fast Flexible Paxos: Relaxing quorum intersection for Fast Paxos*
    Howard H., **Charapko A.**, Mortier R. *22nd International Conference on Distributed Computing and Networking (ICDCN '21), 2021. (Acceptance Rate: 35%)*

13. *Linearizable Quorum Reads in Paxos*
    Charapko A., Ailijiang A., Demirbas M. *USENIX Workshop on Hot Topics in Storage and File Systems (HotStorage), 2019.*

14. *Dissecting the Performance of Strongly-Consistent Replication Protocols*
    Ailijiang A., **Charapko A.**, Demirbas M. *ACM SIGMOD/PODS conference, 2019*

15. *Adapting to Access Locality via Live Data Migration in Globally Distributed Datastores*
    Charapko A., Ailijiang A., Demirbas M. *IEEE International Conference on BigData 2018*, pp. 3320 - 3329, 2018.

16. *Using Weaker Consistency Models with Monitoring and Recovery for Improving Performance of Key-Value Stores*
    Nguyen D., **Charapko A.**, Kulkarni S., Demirbas M. *Latin-American Symposium on Dependable Computing (LADC)*, 2018.

17. *Bridging Paxos and Blockchain Consensus*
    Charapko A., Ailijiang A., Demirbas M. *IEEE Blockchain 2018*, 2018.

18. *Lightweight, Incremental, and Retrospective Distributed Snapshots Using Loosely Synchronized Clocks*
    Charapko A., Ailijiang A., Kulkarni S., Demirbas M. *The 37th International Conference on Distributed Computing Systems (ICDCS)*, pp. 2061 - 2066, 2017.

19. *WANKEEPER: Efficient Coordination at WAN scale*
    Ailijiang A., **Charapko A.**, Demirbas M., Turkkan B., Kosar T. *The 37th International Conference on Distributed Computing Systems (ICDCS)*, pp. 1575 - 1585, 2017.

20. *Consensus in the Cloud: Paxos Systems Demystified*
    Ailijiang A., **Charapko A.**, Demirbas M.
    The 25th International Conference on Computer Communication and Networks (ICCCN), pp. 1 - 10, 2016.

21. *Indexing and Retrieving Continuations in Musical Time Series Data Using Relational Databases*
    Charapko, A., and Chuan. C.-H. *IEEE International Symposium on Multimedia*, pp. 341 - 346, 2014.

22. *Predicting Key Recognition Difficulty in Polyphonic Audio*
    Chuan, C.-H., and **Charapko, A.** *IEEE International Symposium on Multimedia*, pp. 421 - 426, 2013.

- **Technical Reports**

1. *Benchmarking Distributed Coordination Systems: A Survey and Analysis*
   Turkkan B., Kosar T., **Charapko A.**, Ailijiang A., Demirbas M.
   https://arxiv.org/pdf/2403.09445, 2024

2. *FleetDB: Follow-the-workload Data Migration for Globe-Spanning Databases*
   Charapko A., Ailijiang A., Demirbas M.

3. *Does the Cloud Need Stabilizing?*
   Demirbas M., **Charapko A.**, Ailijiang A.
   https://arxiv.org/pdf/1806.03210

SELECT PRESENTATIONS

- University of Cambridge Computer Laboratory Systems Research Group Seminar
  Cambridge, UK, March 2025
  Invited Presentation: *Mitigating the Risks of Metastable Failures in Distributed Systems*

- USENIX SRECon Americas 2024
  San Francisco, CA, March 2024
  Invited Presentation: *It is OK to be Metastable* – https://youtu.be/8Uh2BHUmVUE

- Salesforce Tech Monday
  January 2023
  Invited Presentation: *Metastable Failures in the Wild*

- Roblox Research Seminars
  August 2022
  Invited Presentation: *Performance, Efficiency, and Reliability Tradeoffs in the Cloud*

- High Performance Transaction Systems (HPTS'22) Gong Show
  Pacific Grove, California, October 2022 *Metastable Failures in the Wild*

- Red Hat Tech Exchange & Demo Tuesdays
  December 2020.
  Invited Presentation: *Flexible Quorums in Distributed Consensus*

- USENIX Workshop on Hot Topics in Storage and File Systems
  Renton, Washington, July 2019.
  Workshop paper presentation: *Linearizable Quorum Reads in Paxos*

- IEEE International Conference on BigData
  Seattle, Washington, December 2018.
  Workshop paper presentation: *Adapting to Access Locality via Live Data Migration in Globally Distributed Datastores*

- The 37th International Conference on Distributed Computing Systems (ICDCS)
  Atlanta, Georgia, June 2017.
  Conference paper presentation: *Lightweight, Incremental, and Retrospective Distributed Snapshots Using Loosely Synchronized Clocks*

- Seminar on Current Trends in Computing Technology
  University of North Florida, Jacksonville, FL, February 2017.
  Invited presentation: *Lightweight, Incremental, and Retrospective Distributed Snapshots Using Loosely Synchronized Clocks*

- The 9th IEEE International Workshop on Multimedia Information Processing and Retrieval, Anaheim, USA, December 2013.
  Conference paper presentation: *Predicting Key Recognition Difficulty in Polyphonic Audio*

- UNF CCEC Research Colloquium
  School of Computing, University of North Florida, October 2013.
  Collaboration in Interdisciplinary Research: Experiences and Challenges

TEACHING

- **CS 620: Operating Systems Fundamentals**
  Spring 2024, Spring 2025
- **CS 780/880: Special Topics. Game Development**
  Spring 2024, Spring 2025
- **CS 722/822: Cloud Computing Systems**
  Fall 2021, Fall 2022, Fall 2023, Fall 2024, Fall 2025
- **CS 780/880: Special Topics. Cloud Computing Systems**
  Fall 2020
- **CS 980: Special Topics. Planetary-Scale Systems**
  Spring 2021, Spring 2022, Spring 2023

PROFESSIONAL SERVICE

- **Program Committee**
  - The 43rd International Symposium on Reliable Distributed Systems (SRDS), 2024
  - The 15th ACM Symposium on Cloud Computing (SoCC), 2024
  - The 45th IEEE International Conference on Distributed Computing Systems (ICDCS), 2025
  - The 44th International Symposium on Reliable Distributed Systems (SRDS), 2025
- **Editorial Board**
  - Journal of Systems Research (JSys), Distributed Consensus Area, 2021 - Present
- **External Journal Reviewing**
  - Journal of Parallel and Distributed Computing (2022, 2023)
  - IEEE/ACM Transactions on Networking (2021)
  - IEEE Transactions on Parallel and Distributed Systems (TPDS) (2019, 2020, 2023, 2025)
  - IEEE Networking Letters (2020)
  - Distributed and Parallel Databases (2020)
  - International Journal of Parallel, Emergent and Distributed Systems (2020)
  - Acta Informatica (2020)
  - Transactions on Services Computing (2025)
  - IEEE Transactions on Network and Service Management (2024)
- **Outreach**
  - DistSys Reading Group - a weekly paper reading group and blog attracting wide participation from academia and industry
- **University Service**
  - Organizer of the Computer Science Symposium and Project Showcase, 2022 – Present

SCHOLARSHIPS & AWARDS	• NSF CAREER Award for project titled *"Mitigating the Risks of Metastable Failures in Distributed Systems"*, 2025
	• Best Paper Runner-up, *The 33rd International Conference on Computer Communications and Networks (ICCCN)*, 2024
	• SUNY Buffalo CSE Best Dissertation Runner-up, 2020
	• SUNY Buffalo Presidential Fellowship, 2015 - 2019
	• University of North Florida Presidential Scholarship, 2009 - 2013

INDUSTRY EXPERIENCE	• **Visiting Researcher & Engineer**, Microsoft, July 2018 - July 2020
	• **Independent Consultant**, 2015 - 2019
	– Software engineering consulting and training
	– Ongoing maintenance of existing software systems
	• **Applications Developer**, Elyk Innovation, Inc., 2012 - 2015
	– Designed and developed web, mobile and desktop applications for the clients in the medical, financial, construction and retail businesses.
	– Maintained existing software systems.
	• **Student Consultant**, Vistakon, a division of Johnson & Johnson, Inc., 2014
	– Designed and prototyped mobile versions of the production scheduling and quality control software systems.

TECHNICAL SKILLS	• **Programming Languages:** Java, PHP, C, C++, Go, JavaScript, Python, Scala, C#, Visual Basic, MATLAB, bash...
	• **Databases:** Apache Cassandra, Azure Cosmos DB, MySQL/MariaDB, Microsoft SQL Server, MongoDB
	• **Miscellaneous:** TLA+, LaTex, ZooKeeper, Android, LAMP/WAMP stacks, Linux, HTML.

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