Baturalp Buyukates, Ph.D.

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EMPLOYMENT

Assistant Professor — Birmingham, UK
University of Birmingham — Sep 2024 - Present
School of Computer Science

Postdoctoral Research Associate — Los Angeles, CA, USA
University of Southern California — Jan 2022 - Aug 2024
Information Theory and Machine Learning (vITAL) Research Lab
Host: Prof. A. Salman Avestimehr

Future IP Networking Research Intern — Murray Hill, NJ, USA
Nokia Bell Labs — Jun 2021 - Aug 2021

RESEARCH INTERESTS

Machine Learning (ML), Trustworthy Artificial Intelligence (AI), Human-Centred Computing, Distributed Systems, Wireless Communications, Networks, and Information Theory

Current Focus:
- Reliable and explainable (truthful) large language models (LLMs)
- Multi-agent and networked AI systems
- Privacy-preserving training/finetuning of foundation models
- Trustworthy federated/collaborative learning
- Responsible data economics and valuation for collaborative ML
- AI-driven sustainable goal-oriented communication networks

EDUCATION

University of Maryland — College Park, MD, USA
Ph.D., Electrical and Computer Engineering — Aug 2016 – Dec 2021
Advisor: Prof. Sennur Ulukus
Thesis: Age of Information in Large Networks, Distributed Computation, and Learning

Bilkent University — Ankara, Turkey
Bachelor of Science, Electrical and Electronics Engineering — Sep 2011 - Jan 2016
Minor, Economics

Telecom SudParis — Evry, France
Exchange Student, Computer and Communication Networks — Jan 2014 - Jun 2014

HONORS & AWARDS

- **CTTC Andrea Goldsmith Young Scholars Award** — Apr 2024
  Awarded by the IEEE Communications Society

- **George Harhalakis Outstanding Graduate Student Award** — Sep 2021
  Awarded by Institute of Systems Research, University of Maryland

- **Best Student Paper Award - First Place** — Sep 2021
  IEEE International Workshop on Signal Processing Advances in Wireless Communications

- **IEEE International Conference on Communications (ICC) Student Grant** May 2021
  Awarded by the US National Science Foundation (NSF)
- **Best Student Paper Award - Second Place** Nov 2020
  54th Asilomar Conference on Signals, Systems, and Computers
- **Future Faculty Program Fellowship, University of Maryland** Jan 2020 - Dec 2021
  Selected to receive a comprehensive training on career-long success in academia
- **Jacob K. Goldhaber Travel Grant, University of Maryland** Dec 2019
  For travels to scholarly, scientific, or professional conferences
- **Best Student Paper Award - Finalist** Nov 2019
  53rd Asilomar Conference on Signals, Systems, and Computers
- **Distinguished Graduate Fellowship, University of Maryland** Aug 2016 - Aug 2017
  Awarded by the Clark School of Engineering for Ph.D. studies
- **Research Excellence Award, Bilkent University** May 2016
  Awarded by the Department of Electrical and Electronics Engineering
- **Bilkent University Undergraduate Fellowship** Sep 2011 - Jan 2016
  Awarded for bachelor's degree studies

PUBLICATIONS

For a more up-to-date list here is a link to my Google Scholar page.

Book Chapters:

1. Z. Batool, **B. Buyukates,** R. Nourmohammadi, and K. Zhang, *Privacy Enhancing Technologies for Federated Learning,* in Federated Learning Systems: Towards Privacy-Preserving Distributed Artificial Intelligence, 2nd Edition, M. H. Rehman and M. M. Gaber, Eds., Springer Nature, 2025.

2. M. Bastopcu, **B. Buyukates,** and S. Ulukus, *Age of Information in Source Coding,* in Age of Information: Foundations and Applications, N. Pappas, M. A. Abd-Elmagid, B. Zhou, W. Saad, H. S. Dhillon, Eds., Cambridge Univ. Press, 2023.

Journal Papers:

1. A. Sheshmani, Y. You, **B. Buyukates,** A. Ziashahabi, and A. S. Avestimehr, *Renormalization Group Flow, Optimal Transport and Diffusion-based Generative Model*, American Physical Society Physical Review E, 111(1), January 2025. Available on ArXiv: 2402.17090.

2. **B. Buyukates,** J. So, H. Mahdavifar, and A. S. Avestimehr, *LightVeriFL: A Lightweight and Verifiable Secure Aggregation for Federated Learning*, IEEE Journal on Selected Areas in Information Theory, (5):285-301, April 2024.

3. **B. Buyukates,** E. Ozfatura, S. Ulukus, and D. Gunduz, *Gradient Coding with Dynamic Clustering for Straggler-Tolerant Distributed Learning,* IEEE Transactions on Communications, 71(6):3317-3332, June 2023.

4. **B. Buyukates,** M. Bastopcu, and S. Ulukus, *Version Age of Information in Clustered Gossip Networks,* IEEE Journal on Selected Areas in Information Theory, 3(1):85-97, March 2022.

5. M. Bastopcu, **B. Buyukates,** and S. Ulukus, *Selective Encoding Policies for Maximizing Information Freshness*, IEEE Transactions on Communications, 69(9):5714-5726, September 2021.

6. **B. Buyukates,** A. Soysal, and S. Ulukus, *Scaling Laws for Age of Information in Wireless Networks,* IEEE Transactions on Wireless Communications, 20(4):2413-2427, April 2021.

7. **B. Buyukates** and S. Ulukus, *Timely Distributed Computation with Stragglers,* IEEE Transactions on Communications, 68(9):5273-5282, September 2020.

8. **B. Buyukates,** A. Soysal, and S. Ulukus, *Age of Information in Multihop Multicast Networks,* Journal of Communications and Networks, special issue on Age of Information, 21(3):256-267, June 2019.

Peer-Reviewed Conference Papers:

1. Y. F. Bakman, D. N. Yaldiz, S. Kang, T. Zhang, **B. Buyukates,** A. S. Avestimehr, and S. P. Karimireddy, *Reconsidering LLM Uncertainty Estimation Methods in the Wild,* 63rd Annual Meeting of the Association for Computational Linguistics (ACL 2025), Vienna, Austria, July 2025. Available on ArXiv: 2506.01114.

2. E. Ceyani, H. Xie, **B. Buyukates,** C. Yang, A. S. Avestimehr, *FedGrAINS: Personalized Subgraph Federated Learning with Adaptive Neighbor Sampling,* SIAM International Conference on Data Mining (SDM), Alexandria, VA, May 2025.

3. D. N. Yaldiz, Y. F. Bakman, **B. Buyukates,** C. Tao, A. Ramakrishna, D. Dimitriadis, J. Zhao, A. S. Avestimehr, *Do Not Design, Learn: A Trainable Scoring Function for Uncertainty Estimation in Generative LLMs,* Findings of the Association for Computational Linguistics: NAACL 2025, Albuquerque, NM, April 2025. Available on ArXiv: 2406.11278.

4. Y. F. Bakman, D. N. Yaldiz, **B. Buyukates,** C. Tao, D. Dimitriadis, A. S. Avestimehr, *MARS: Meaning-Aware Response Scoring for Uncertainty Estimation in Generative LLMs,* 62nd Annual Meeting of the Association for Computational Linguistics (ACL 2024), Bangkok, Thailand, August 2024.

5. S. Han, **B. Buyukates,** Z. Hu, H. Jin, W. Jin, L. Sun, X. Wang, W. Wu, C. Xie, Y. Yao, K. Zhang, Q. Zhang, Y. Zhang, A. S. Avestimehr, C. He, *FedSecurity: A Benchmark for Attacks and Defenses in Federated Learning and Federated LLMs*, ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD), Barcelona, Spain, August 2024.

6. A. Ziashahabi, **B. Buyukates,** A. Sheshmani, Y. You, A. S. Avestimehr, *Frequency Domain Diffusion Model with Scale-Dependent Noise Schedule*, IEEE International Symposium on Information Theory, Athens, Greece, July 2024.

7. Y. F. Bakman, D. N. Yaldiz, **B. Buyukates,** C. Tao, D. Dimitriadis, A. S. Avestimehr, *Predicting Uncertainty of Generative LLMs with MARS: Meaning-Aware Response Scoring,* IEEE International Symposium on Information Theory, Athens, Greece, July 2024.

8. **B. Buyukates***, C.He*, S. Han, Z. Fang, Y. Zhang, J. Long, A. Farahanchi, and A. S. Avestimehr, *Proof-of-Contribution-Based Design for Collaborative Machine Learning on Blockchain,* IEEE International Conference on Decentralized Applications and Infrastructures, Athens, Greece, July 2023. **(Oral presentation)** *: equal contribution.

9. M. Bastopcu, **B. Buyukates,** and S. Ulukus, *Gossiping with Binary Freshness Metric*, IEEE Global Communications Conference, Madrid, Spain, December 2021.

10. **B. Buyukates,** M. Bastopcu, and S. Ulukus, *Age of Gossip in Networks with Community Structure,* IEEE International Workshop on Signal Processing Advances in Wireless Communications, Lucca, Italy, September 2021. **(Best Student Paper Award Winner)**

11. **B. Buyukates,** E. Ozfatura, S. Ulukus, and D. Gunduz, *Gradient Coding with Dynamic Clustering for Straggler Mitigation,* IEEE International Conference on Communications, Montreal, Canada, June 2021.

12. **B. Buyukates** and S. Ulukus, *Timely Communication in Federated Learning,* IEEE INFOCOM Workshop on Age of Information, May 2021.

13. E. Ozfatura, **B. Buyukates,** D. Gunduz, and S. Ulukus, *Age-Based Coded Computation for Bias Reduction in Distributed Learning,* IEEE Global Communications Conference, Taipei,

Taiwan, December 2020.

14. **B. Buyukates** and S. Ulukus, *Timely Updates in Distributed Computation Systems with Stragglers,* 54th Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, November 2020. **(Best Student Paper Award Second Place)**

15. **B. Buyukates,** M. Bastopcu, and S. Ulukus, *Optimal Selective Encoding for Timely Updates with Empty Symbol,* IEEE International Symposium on Information Theory, Los Angeles, CA, June 2020.

16. **B. Buyukates** and S. Ulukus, *Age of Information with Gilbert-Elliot Servers and Samplers,* Conference on Information Sciences and Systems, Princeton, NJ, March 2020.

17. M. Bastopcu, **B. Buyukates,** and S. Ulukus, *Optimal Selective Encoding for Timely Updates,* Conference on Information Sciences and Systems, Princeton, NJ, March 2020.

18. **B. Buyukates,** A. Soysal, and S. Ulukus, *Age of Information Scaling in Large Networks with Hierarchical Cooperation,* IEEE Global Communications Conference, Waikoloa, HI, December 2019.

19. **B. Buyukates,** A. Soysal, and S. Ulukus, *Age of Information in Multicast Networks with Multiple Update Streams,* 53rd Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, November 2019. **(Best Student Paper Award Finalist)**

20. **B. Buyukates,** A. Soysal, and S. Ulukus, *Age of Information Scaling in Large Networks,* IEEE International Conference on Communications, Shanghai, China, May 2019.

21. **B. Buyukates,** A. Soysal, and S. Ulukus, *Age of Information in Two-Hop Multicast Networks,* 52nd Asilomar Conference on Signals, Systems and Computers, Pacific Grove, CA, October 2018.

22. **B. Buyukates,** D. Sarica, and E. U. Saritas, *Self Calibration for Relaxation- and System-Induced Delays in X-space MPI,* 6th International Workshop on Magnetic Particle Imaging, Lubeck, Germany, March 2016.

Peer-Reviewed Workshop Papers:

1. M. Yang, I. Jarin, **B. Buyukates,** A. S. Avestimehr, A. Markopoulou, *Maverick-Aware Shapley Valuation for Client Selection in Federated Learning,* ISIT 2024 Workshop on Information-Theoretic Methods for Trustworthy Machine Learning (IT-TML), Athens, Greece, July 2024.

2. Y. F. Bakman, D. N. Yaldiz, **B. Buyukates,** C. Tao, D. Dimitriadis, A. S. Avestimehr, *MARS: Meaning-Aware Response Scoring for Uncertainty Estimation in Generative LLMs,* ICLR 2024 Workshop on Secure and Trustworthy Large Language Models, Vienna, Austria, May 2024.

3. **B. Buyukates,** J. So, H. Mahdavifar, and A. S. Avestimehr, *LightVeriFL: Lightweight and Verifiable Secure Federated Learning,* International Workshop on Federated Learning: Recent Advances and New Challenges in Conjunction with NeurIPS 2022 (FL-NeurIPS'22), New Orleans, LA, December 2022. **(Oral presentation)**

Preprints & Currently Under Review:

1. M. Yang, **B. Buyukates,** Y. Shen, A. Markopoulou, *Valuing Solo and Synergy in Federated Learning,* submitted.

2. Y. Turkmen, **B. Buyukates,** M. Bastopcu, *Balancing Information Accuracy and Response Timeliness in Networked LLMs,* submitted.

3. M. Yang, **B. Buyukates,** A. Markopoulou, *Rewarding the Rare: Maverick-Aware Shapley Valuation in Federated Learning,* submitted.

4. S. Li, S. Hou, and **B. Buyukates,** *Privacy-preserving Prompt Personalization in Federated Learning for Multimodal Large Language Models,* submitted. Available on ArXiv: 2505.22447.

5. S. Han, W. Wu, **B. Buyukates,** W. Jin, Y. Yao, Q. Zhang, A. S. Avestimehr, C. He, *Kick Bad Guys Out! Zero-Knowledge-Proof-Based Anomaly Detection in Federated Learning*, submitted. Available on ArXiv: 2310.04055.

6. S. Li, S. Hou, **B. Buyukates,** and A. S. Avestimehr, *Secure Federated Clustering,* submitted. Available on ArXiv: 2205.15564.

Doctoral Dissertation:

1. **B. Buyukates,** *Age of Information in Large Networks, Distributed Computation and Learning*, Department of Electrical and Computer Engineering, University of Maryland, December 2021.

TEACHING EXPERIENCE

Lecturer Birmingham, UK
University of Birmingham
Spring 2025, Artificial Intelligence I (627 students)

Graduate Teaching Assistant College Park, MD, USA
University of Maryland
Fall 2019, Signal and System Theory (ENEE 322),
Spring 2019, Information Theory (ENEE 627),
Fall 2018, Convex Optimization (ENEE 662),
Spring 2018, Digital Circuits and Systems Laboratory (ENEE 245).

HIGHER EDUCATION COURSES IN TEACHING & LEARNING

Teaching in UK HE Birmingham, UK
University of Birmingham Spring 2025
Engineering and Physical Sciences - Introduction to Teaching and Supporting Learning

Future Faculty Fellow College Park, MD, USA
University of Maryland Spring 2020 - Spring 2021

- **Future Faculty Program Seminar I - Spring 2020**
  - Emphasis on technical writing and effective presentations
  - Discussions on research diversification and ethics

- **Future Faculty Program II - Fall 2020**
  - Effective teaching and communication; principles of education and learning
  - Emphasis on developing a course; promoting active learning and critical thinking

- **Future Faculty Program III - Spring 2021**
  - Developing a successful research program and establishing/maintaining a research group
  - Finding funding opportunities and mentoring graduate students

MENTORING & ADVISING

- Yavuz Faruk Bakman (PhD Student, USC), Duygu Nur Yaldiz (PhD Student, USC)
  - *Uncertainty Estimation in Large Language Models (LLMs)*

- Emir Ceyani (PhD Student, USC), Sara Babakniya (PhD Student, USC)

- *Uncertainty-Aware Continual Learning for LLMs*
- Mengwei Yang (PhD Student, UC Irvine), Ismat Jarin (PhD Student, UC Irvine)
  - *Fair and Responsible Client Valuation in Federated Learning*
- Amir Ziashahabi (PhD Student, USC)
  - *Fourier-Space Diffusion Model*
- Shanshan Han (PhD Student, UC Irvine)
  - *Verifiable Outlier Detection and Removal in Federated Learning and Federated LLMs*
- Sizai Hou (PhD Student, HKUST)
  - *Secure Clustering and Personalization for Federated Learning*
- Jinhyun So (PhD Student. Now Assistant Professor at DGIST)
  - *Verifiable Secure Aggregation in Federated Learning*

SELECTED INVITED TALKS & CONFERENCE PRESENTATIONS
- "Maverick-Aware Shapley Valuation for Client Selection in Federated Learning"
  - The Third UK AI Conference, London, June 2025
- "Intent-Based, Efficient, and Trustworthy Networking with LLMs"
  - Ericsson Research UK, London, Feb 2025
- "Towards Trustworthy Language Models: Token-Based Uncertainty Estimation and Beyond"
  - Bilkent University, Turkey, Nov 2024
- "Do Not Design, Learn: A Trainable Scoring Function for Uncertainty Estimation in LLMs"
  - Second UK AI Conference, UK, Nov 2024
- "Foundations of Trustworthy Collaborative Machine Learning"
  - IEEE Communication Theory Workshop 2024, Canada, May 2024
  - Seminar, University of Delaware, DE, Feb 2024
  - Seminar, École de technologie supérieure (ÉTS), Canada, Feb 2024
  - ELLIIT Distinguished Lecture, Linköping University, Sweden, Oct 2023
  - Seminar, KTH Royal Institute of Technology, Sweden, Oct 2023
  - Seminar, University of Birmingham, UK, Oct 2023
- "Proof-of-Contribution-Based Design for Collaborative Machine Learning on Blockchain"
  - ProperData 3rd Annual Symposium, Sep 2023
  - IEEE International Conference on Decentralized Applications and Infrastructures, Jul 2023
  - Private AI Collaborative Research Institute Spring Workshop, Apr 2023
  - ProperData Institute, Apr 2023
  - Crypto Economics Security Conference, Nov 2022
- "LightVeriFL: Lightweight and Verifiable Secure Federated Learning"
  - Information Theory and Applications Workshop, Feb 2023
  - NeurIPS Workshop on Federated Learning, Dec 2022
- "Reinforcement Learning-Based Network Optimization for Hyper Connectivity"

- – Nokia Bell Labs, Aug 2021
- "Gradient Coding with Dynamic Clustering for Straggler Mitigation"
  - – IEEE ICC, Jun 2021
- "Timely Communication in Federated Learning"
  - – IEEE INFOCOM Workshop on Age of Information, May 2021

SERVICE & PROFESSIONAL ACTIVITIES

Affiliations
- Member of IEEE - IT Society, ComSoc

Organizing Committee Member
- The Third UK AI Conference 2025
  - – Program Committee Member
- IEEE International Conference on Decentralized Applications and Infrastructures (DAPPS) 2024
  - – Publicity Chair

Technical Committee Member
- IEEE INFOCOM - Age and Semantics of Information (ASoI) Workshop 2025
- IEEE INFOCOM - Age and Semantics of Information (ASoI) Workshop 2024
- IEEE INFOCOM - Age of Information (AoI) Workshop 2023

Session Chair
- IEEE DAPPS 2023 - Cryptographic Techniques and Security for Decentralized Systems

Technical Reviewer (journals):
- IEEE/ACM Transactions on Networking, IEEE Transactions on Communications, IEEE Transactions on Wireless Communications, IEEE Communications Letters, IEEE Access, IEEE Journal on Selected Areas in Communications (JSAC), IEEE JSAC Series on Machine Learning for Communications and Networks, IEEE Internet of Things Journal, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Information Forensics & Security, IEEE Journal on Selected Areas in Information Theory, IEEE Network Magazine, Journal of Parallel and Distributed Computing, Journal of Communications and Networks, Computer Networks and Communications, China Communications, IEEE Transactions on Vehicular Technology, MDPI Mathematics, MDPI Electronics, IEEE Transactions on Automatic Control, IEEE Transactions on Signal Processing

Technical Reviewer (conferences):
- NeurIPS 2025, 4th Workshop on Federated Learning for Computer Vision in Conjunction with CVPR 2025, ICLR 2024 Workshop on Secure and Trustworthy Large Language Models, NeurIPS 2023 & 2024 Datasets and Benchmarks, IEEE Global Communications Conference (GLOBECOM), IEEE Information Theory Workshop (ITW), IEEE International Symposium on Information Theory (ISIT), IEEE International Conference on Communications (ICC), IEEE International Conference on Computer Communications (INFOCOM), IEEE International Workshop on Signal Processing Advances in Wireless Communications (SPAWC), IEEE ICASSP.

SKILLS

- **Programming:** MATLAB, Python, C, LaTeX
- **Frameworks:** PyTorch, TensorFlow, Message Passing Interface (MPI)
- **Others:** Linux, Github, Jupyter Notebook
- **Languages:** Turkish (Native), English (Fluent), French (Beginner)

OUTREACH

Organiser - BSURE (Birmingham Summer Undergraduate Research Experience), Jul-Aug 2025
Mentor at Bilkent University Alumni Student Mentoring Program
Reviewer for USC Student Recognition Awards, Mar 2023
Judge for USC ECE 12th Annual Research Festival, Oct 2022
Judge for Stuart-Hobson Middle School, Washington D.C. Science Fair, Feb 2021
Committee Member in Bilkent University IEEE & Women in Engineering (WiE) Student Branches