Beytullah Yıldız
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Academic Profile

Academic researcher and educator with over **15 years of experience in teaching, research, and scholarly publication** in Computer Science and Artificial Intelligence. Research expertise spans **deep learning, Large Language Models (LLMs), reinforcement learning, parallel and distributed computing, and scalable data-intensive systems**. Demonstrated record of **peer-reviewed publications**, **graduate thesis supervision**, and **curriculum development** at undergraduate and graduate levels. Strong commitment to integrating theoretical foundations with applied research and real-world AI systems.

Education

Ph.D. in Computer Science, 2007
Indiana University, Bloomington, IN

M.S. in Computer Science, 2001
Syracuse University, Syracuse, NY

B.S. in Electronics Engineering, 1997
Istanbul University, Istanbul, Türkiye

Research Interests

- Generative AI and Agentic AI
- Large Language Models (LLMs), Retrieval-Augmented Generation (RAG), and Tools
- Machine Learning and Deep Learning
- Transformer Architectures
- Reinforcement Learning
- Parallel, Distributed, and High-Performance Computing
- Scalable Big Data Systems

Academic Appointments

Turkish-Japanese Science and Technology University — *Associate Professor*
Ankara, Turkey | Jul 2026 – Present

- **Faculty member** in the Computer Engineering program / Artificial Intelligence and Digital Technologies Doctoral Program, with research spanning artificial intelligence, machine learning, and high-performance computing.
- Leads research on **generative models and agentic AI applications**, including LLM-based systems, tool-using agents, and retrieval-augmented architectures.
- Conducts research in **deep learning and reinforcement learning**, with emphasis on practical, domain-oriented applications.
- Works on **distributed and parallel computing, HPC, and big data systems** for large-scale model training and inference.
- **Contributes to curriculum design and the development** of AI/HPC research and teaching infrastructure, supporting the university's Turkey–Japan academic partnership.

Princeton University — *Postdoctoral Research Associate*

Princeton, NJ, USA | Oct 2024 – Jun 2026

- Conducted research on **generative AI**, retrieval-augmented generation (RAG), and **agentic AI** systems.
- **Built and evaluated pipelines** using open-source models alongside commercial APIs from OpenAI, Anthropic, and Google Gemini, comparing performance, cost, and deployment trade-offs.
- **Deployed and benchmarked models** on hyperscaler cloud infrastructure for large-scale experimentation.
- Applied and extended **modern agentic frameworks** and tooling to design multi-step, tool-using AI workflows.

Atilim University — *Assistant Professor / Associate Professor*

Ankara, Turkey | Oct 2019 – Sep 2024

- Designed and delivered **undergraduate and graduate courses** in Data Structures, Algorithms, Machine Learning, Data Science, Computer Networks, and Object-Oriented Programming.
- Conducted **independent and collaborative research** on deep learning, reinforcement learning, and large language models, resulting in publications in **IEEE Access, Concurrency and Computation**, and other peer-reviewed venues.
- Led research on **open-source LLMs**, including fine-tuning, quantization, and RAG-based architectures for domain-specific AI systems.
- Supervised **Ph.D. and M.Sc. theses** on question answering evaluation, abstractive summarization, time-series forecasting, and reinforcement learning.
- Developed AI-driven research prototypes, including healthcare and educational assistants, bridging academic research with applied systems.
- Contributed to curriculum modernization by integrating **recent advances in AI and generative models** into coursework.

Lawrence Berkeley National Laboratory — *Visiting Scholar and Postdoc*

Berkeley, CA | 2014 – 2015

- Conducted research on **large-scale scientific data processing** using bitmap indexing and parallel query execution.
- Utilized **HPC** systems (Hopper, Edison) for high-performance analytics on Lustre file systems.
- Published results in peer-reviewed venues focused on scalable and distributed computing.

Research and Industry Experience

Pikomtek / Mobtech / Beartell / SmartICT — *Machine Learning Consultant*

2022 – 2026

- Applied academic research in **LLMs**, **Transformers**, and **RL** to real-world systems in education, recruitment, and recommendation platforms.
- Designed AI systems that informed research directions and resulted in publishable methodologies and evaluation insights.

Presidency of the Republic of Turkey – *Software Department Deputy Director*

2008–2019 | Ankara, Turkey

- Led the **design and development of large-scale AI-enabled information systems** for public institutions, including one of the **earliest AI-based document classification systems**, resulting later academic work on **NLP** and text classification.
- Directed multidisciplinary technical teams in the **design of distributed and data-intensive systems**, integrating modern software engineering practices with scalable architectures.
- Designed and implemented **scalable data pipelines** and real-time monitoring infrastructures using the ELK stack, supporting high-throughput governmental information systems.
- Applied **distributed computing and storage technologies** (Hadoop, Ceph) to manage large volumes of structured and unstructured data.
- Deployed containerized applications using **Docker and Kubernetes**, contributing to early adoption of cloud-native paradigms in public-sector systems.
- Integrated best practices in **software version control, project management, and data engineering**.

Community Grids Laboratory, Indiana University – *Research Assistant*

2001–2007 | Bloomington, IN

- Conducted research on **distributed systems**, **Grid computing**, and **message-oriented middleware**, contributing to **scalable** and **fault-tolerant** architectures.
- Designed and implemented **message queuing systems** and distributed applications, improving system throughput and reliability.
- Built and maintained **Grid and Web Services**, focusing on interoperability, performance optimization, and service reliability.
- Contributed to peer-reviewed publications on distributed middleware, service orchestration, and scalable messaging infrastructures.

Publications

Journal Articles

- Bakır, D., Aktas, M. and Yildiz, B."A Model-Based Evaluation Metric for Question Answering Systems." International Journal of Software Engineering and Knowledge Engineering, (2025).
- Catak, F. O., Imran, M. A., Dalveren, Y., Yildiz, B., and Kara, A. "Radar Emitter Localization Based on Multipath Exploitation Using Machine Learning." IEEE Access, (2024).
- Briman, M. K. H., and Yildiz, B. "Beyond ROUGE: A Comprehensive Evaluation Metric for Abstractive Summarization Leveraging Similarity, Entailment, and Acceptability." International Journal on Artificial Intelligence Tools, (2024).
- Yildiz, B. "Reinforcement Learning Using Fully Connected, Attention, and Transformer Models in Knapsack Problem Solving." Concurrency and Computation: Practice and Experience, 34.9 (2022): e6509. DOI: 10.1002/cpe.6509.
- Yildiz, B. "Efficient Text Classification with Deep Learning on Imbalanced Data Improved with Better Distribution." Turkish Journal of Science and Technology, 17.1 (2022): 89-98. DOI: 10.55525/tjst.1068940.
- Tezgider, M., Yildiz, B., and Aydin, G. "Text Classification Using Improved Bidirectional Transformer." Concurrency and Computation: Practice and Experience, 34.9 (2022): e6486. DOI: 10.1002/cpe.6486.
- Yildiz, B., and Tezgider, M. "Improving Word Embedding Quality with Innovative Automated Approaches to Hyperparameters." Concurrency and Computation: Practice and Experience, 33.18 (2021): e6091. DOI: 10.1002/cpe.6091.

- Yildiz, B. "Optimizing Bitmap Index Encoding for High-Performance Queries." Concurrency and Computation: Practice and Experience, 33.18 (2021): e5943. DOI: 10.1002/cpe.5943.
- Yildiz, B., Wu, K., Byna, S., and Shoshani, A. "Parallel Membership Queries on Very Large Scientific Datasets Using Bitmap Indexes." Concurrency and Computation: Practice and Experience, 31.15 (2019): e5157. DOI: 10.1002/cpe.5157.
- Yildiz, B., and Fox, G. C. "Toward a Modular and Efficient Distribution for Web Service Handlers." Concurrency and Computation: Practice and Experience, 25.3 (2013): 410-426. DOI: 10.1002/cpe.2854.
- Yildiz, B. "Maturing the Distribution of Supportive Tasks in Web Service Framework: Security and Reliability." International Journal on Advances in Security, 6.1-2 (2013). Online: http://www.iariajournals.org/security/.
- Pallickara, S., Fox, G., Uyar, A., Liu, H., Rao, X., Walker, D., and Yildiz, B. "Performance of a Possible Grid Message Infrastructure." Concurrency and Computation: Practice and Experience, 17.2-4 (2005): 193-214. DOI: 10.1002/cpe.924.

Conference Proceedings

- Haider, U., and Yildiz, B. "A Novel Use of Reinforcement Learning for Elevated Click-Through Rate in Online Advertising." 2023 International Conference on Computational Science and Computational Intelligence (CSCI), pp. 64-70. IEEE, 2023.
- Bakir, D., Yildiz, B., and Aktas, M. S. "Developing and Evaluating a Model-Based Metric for Legal Question Answering Systems." 2023 IEEE International Conference on Big Data (BigData). IEEE, 2023.
- Saad, A. M. S. E., and Yildiz, B. "Reinforcement Learning for Intrusion Detection." International Conference on Computing, Intelligence and Data Analytics. Lecture Notes in Networks and Systems, vol. 643. Springer, Cham, 2022.
- Yildiz, B. "Enhancing Image Resolution with Generative Adversarial Networks." 7th International Conference on Computer Science and Engineering (UBMK). IEEE, 2022.
- Soyalp, G., et al. "Improving Text Classification with Transformer." 2021 6th International Conference on Computer Science and Engineering (UBMK). IEEE, 2021.
- Yildiz, B., and Tezgider, M. "Learning Quality Improved Word Embedding with Assessment of Hyperparameters." Euro-Par 2019: Parallel Processing Workshops: Euro-Par 2019 International Workshops, Göttingen, Germany, August 26–30, 2019, Revised Selected Papers 25. Lecture Notes in Computer Science, vol. 11997. Springer, Cham, 2020.
- Yildiz, B. "High-Performance Queries Using Compressed Bitmap Indexes." Euro-Par 2019: Parallel Processing Workshops: Euro-Par 2019 International Workshops, Göttingen, Germany, August 26–30, 2019, Revised Selected Papers 25. Lecture Notes in Computer Science, vol. 11997. Springer, Cham, 2020. DOI: 10.1007/978-3-030-48340-1_38.
- Tezgider, M., Yildiz, B. and Aydin, G. "Improving word representation by tuning Word2Vec parameters with deep learning model" In 2018 International Conference on Artificial Intelligence and Data Processing (IDAP), IEEE. 2018.
- Yildiz, B. "Reliability and Message Security for Distributed Web Service Handlers." Proceedings of the Seventh International Conference on Internet and Web Applications and Services (ICIW 2012), Stuttgart, Germany, 2012.
- Yildiz, B., and Fox, G. C. "Measuring Overhead for Distributed Web Service Handler." The Third International Conference on Computer Science and Information Technology, Chengdu, China, vol. 2, 2010, pp. 564-570.
- Yildiz, B., Fox, G., and Pallickara, S. "An Orchestration for Distributed Web Service Handlers." Proceedings of the Third IEEE International Conference on Internet and Web Applications and Services, Athens, Greece, June 2008, pp. 638-643. DOI: 10.1109/ICIW.2008.55.

- Yildiz, B., Pallickara, S., and Fox, G. "Experiences in Deploying Services Within the Axis Container." Proceedings of the IEEE International Conference on Internet and Web Applications and Services, Guadeloupe, French Caribbean, February 2006, pp. 168-174.
- Pallickara, S., Fox, G., Yildiz, B., Lee Pallickara, S., Patel, S., and Yemme, D. "On the Costs for Reliable Messaging in Web/Grid Service Environments." Proceedings of the First International Conference on e-Science & Grid Computing, IEEE Computer Society, Washington, DC, 2005, pp. 344-351.
- Burnap, P., Bulut, H., Pallickara, S., Fox, G., Walker, D., Kaplan, A., Yildiz, B., and Nacar, M. A. "Worldwide Messaging Support for High-Performance Real-Time Collaboration." Proceedings of the Fourth UK e-Science Programme All Hands Meeting, Nottingham, UK, September 2005, pp. 395-401.
- Aydin, G., Kaplan, A., Topcu, A. E., Yildiz, B., Balsoy, O., Pierce, M., and Fox, G. "An XML-Based System for Dynamic Message Content Creation, Delivery, and Control." Proceedings of the IASTED International Conference on Information and Knowledge Sharing, St. Thomas, US Virgin Islands, November 2002.

Book Chapters

- Yildiz, B. "Web Service and Container Architecture." In Research on Computer Science, Engineering & EE. VDM Verlag, 2009.
- Pallickara, S., Fox, G., Aktas, M., Gadgil, H., Yildiz, B., Oh, S., Patel, S., Pierce, M., and Yemme, D. "A Retrospective on the Development of Web Service Specifications." In Securing Web Services: Practical Usage of Standards and Specifications, edited by P. Periorellis. University of Newcastle Upon Tyne, Idea Group Inc., December 2006.
- Yildiz, B., and Ozutku, F. "T.C. Cumhurbaşkanlığında e-Devlet." In E-Devlet: Kamu Yönetimi ve Teknoloji İlişkisinde Güncel Gelişmeler, edited by M. Z. Sobacı and M. Yildiz. Nobel, 2012.
- Guler, T., and Yildiz, B. "Eğitsel Yazılımların Değerlendirilmesi ve Seçimi." In Öğretmen ve Öğretmen Adayları İçin Bilgisayara Giriş, edited by B. Akkoyunlu, pp. 191-208. Kriter Yayınları, Ankara, 2009.

Graduate Thesis Supervision

- Model Based Evaluation Metric For Text Analysis Based Question Answering Systems, Dilan Bakir, 2025
- Enhancing Retrieval-Augmented Generation: Optimizing Document Splits and Parameters for Improved Language Model Responses, Cabir Celik, 2024
- Leveraging Transformer Models for Enhanced Time Series Forecasting of Export Amounts, Cagri Coskun, 2024
- Advertisement Click Prediction Using Reinforcement Learning, Umair Haider, 2023
- A Comprehensive Evaluation Metric for Abstractive Summarization: Leveraging Similarity, Entailment, And Acceptability, Mohammed Khalid Hilmi Briman,2023
- Reinforcement Learning for Intrusion Detection, Ahmed Mohamed Saad Emam Saad,2021
- Abstractive Text Summarization Using Deep Learning, Hanan Wahhab Abbas Abbas, 2021

Courses Taught

- Data Structures
- Algorithms

- Introduction to Data Science
- Applied Machine Learning
- Computer Networks
- Object-Oriented Programming
- Parallel Computing

University Service & Leadership

- Peer Review Service: Served as a reviewer for international journals and conferences in the areas of Artificial Intelligence, Distributed Computing, and Data Analytics.
- Departmental and Institutional Committees: Actively contributed to the Curriculum Development Committee, Ph.D. Screening Committee, School of Engineering Ethics Committee, and served as Erasmus Student Exchange Program Coordinator.
- Student Advising: Provided academic advising and mentoring to approximately 50 undergraduate students in Software Engineering, supporting academic planning and professional development.
- Research Service: Participated as a reviewer and evaluator for competitive R&D project proposals, contributing to research quality assurance and funding decisions.