

# Berk Tınaz

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## RESEARCH INTERESTS

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- **AI for Sciences, Generative AI:** image reconstruction with transformers and diffusion models
- **Foundation Models:** mechanistic interpretability of vision-language models, reasoning and self-reflection in LLMs
- **Theory for Deep Learning:** generalization guarantees for shallow ReLU networks

## EDUCATION

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- **University of Southern California (USC)** Los Angeles, CA  
*Ph.D. Student in Electrical and Computer Engineering; GPA: 4.00/4.00* Aug 2020 – Present  
*Master of Science in Electrical and Computer Engineering; GPA: 4.00/4.00* Aug 2020 – Dec 2022  
*Advisor: Prof. Mahdi Soltanolkotabi*
- **Bilkent University** Ankara, TR  
*Bachelor of Science in Electrical and Electronics Engineering; GPA: 3.95/4.00* Sep 2016 – June 2020  
*Graduation Rank: 5/153*

## RESEARCH EXPERIENCE

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- **Amazon (Machine Learning Accelerator, Selling Partner Services)** San Diego, CA  
*Research Intern. Mentors: Kevin Chen and Hua Li* May 2024 - Aug 2024
  - Worked on identifying best strategies for knowledge injection into LLMs through continual pre-training and retrieval augmented generation (RAG). Performed multiple-choice question and human evaluations of the adapted models.
- **AI Foundations for Sciences Center (AIF4S) at USC** Los Angeles, CA  
*Research Assistant. Advisor: Prof. Mahdi Soltanolkotabi* Jan 2022 - Current
  - **Large Language Models:** Worked on improving LLMs via self-feedback and self-revision loops (i.e. without external verifier). Explored how self-generated negative trajectories can be utilized to improve reasoning capabilities of foundation models.
  - **Generative AI:** Worked on sample-adaptive latent diffusion posterior sampling for solving inverse problems, incorporating forward model information into training of diffusion models to ensure data-consistency, accelerating MRI reconstruction via transformer-convolution hybrid architecture.
  - **Machine Learning Theory:** Working on global convergence of learning linear target functions with small initialized shallow ReLU networks.
- **Signal Analysis and Interpretation Lab (SAIL) at USC** Los Angeles, CA  
*Research Assistant. Advisor: Prof. Shrikanth Narayanan* Sep 2020 - Dec 2021
  - Modeling and detection of personal attributes: Improved detection and classification performance of RetinaNet on OpenImages by augmenting the data with Mask-RCNN bounding box predictions.
- **National Magnetic Resonance Research Center (UMRAM)** Ankara, TR  
*Undergraduate Researcher. Advisor: Prof. Tolga Çukur* Oct 2018 - Apr 2020
  - Semi-supervised learning of accelerated multi-contrast MRI synthesis, undersampled across both contrast sets and k-space coefficients by leveraging randomized sampling masks across training subjects. Achieved competitive performance compared to fully-sampled training.
- **Imperial College London** London, UK  
*Research Intern at iBUG. Advisor: Prof. Maja Pantic and Dr. Stavros Petridis* July 2018 - Sept 2018
  - Contributed to the development of a novel audio-visual dataset, and detection of blinks and mouth openings in videos. Integrated a face detection algorithm to an existing face alignment tool which increased the performance over 45° poses.

## SELECTED PUBLICATIONS

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- [1] Z. Fabian\*, **B. Tinaz\***, and M. Soltanolkotabi, “Adapt and diffuse: Sample-adaptive reconstruction via latent diffusion models,” in *Forty-first International Conference on Machine Learning (ICML)*, 2024. [Online]. Available: <https://openreview.net/forum?id=V3OpGwo68Z>.
- [2] Z. Fabian, **B. Tinaz**, and M. Soltanolkotabi, “Diracdifffusion: Denoising and incremental reconstruction with assured data-consistency,” in *Forty-first International Conference on Machine Learning (ICML)*, 2024. [Online]. Available: <https://openreview.net/forum?id=ibwxzYCep9>.
- [3] Z. Fabian, **B. Tinaz**, and M. Soltanolkotabi, “Humus-net: Hybrid unrolled multi-scale network architecture for accelerated mri reconstruction,” in *36th Conference on Neural Information Processing Systems (NeurIPS)*, 2022. [Online]. Available: <https://arxiv.org/abs/2203.08213>.
- [4] M. Yurt, S. Dar, **B. Tinaz**, M. Ozbey, Y. Korkmaz, and T. Cukur, “A semi-supervised learning framework for jointly accelerated multi-contrast mri synthesis without fully-sampled ground-truths,” in *29th annual meeting of International Society for Magnetic Resonance Imaging (ISMRM)*, Virtual Conference, May 2021.
- [5] M. Yurt, **B. Tinaz**, M. Ozbey, S. U. H. Dar, and T. Çukur, “Semi-supervised learning of multi-contrast MR image synthesis without fully-sampled ground-truth acquisitions,” in *Medical Imaging Meets NeurIPS*, Virtual Conference, Dec. 2020.

## HONORS AND AWARDS

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- **Simons Institute**: Accepted to the “Modern Paradigms in Generalization” long program as a visiting student.
- **Machine Learning Summer Schools**: Attended to CIFAR DLRL (2021), MLSS (2021), and Princeton ML Theory (2022) summer schools.
- **USC ECE Ph.D. Screening Exam**: Ranked 1<sup>st</sup> among test takers, 2021
- **Bilkent University Graduate Research Conference (GRC)**: Best paper award for the publication “Semi-supervised learning of mutually accelerated multi-contrast MRI synthesis without fully-sampled ground-truth”, 2021
- **USC Viterbi School of Engineering/Graduate School Fellowship**: Full tuition waiver & stipend during the first year of Ph.D. program, 2020
- **Bilkent University Comprehensive Scholarship and High Honor Student**: Full tuition waiver & stipend during the B.Sc. program. High honor student for 8 consecutive semesters, 2016-2020
- **IEEEExtreme 11.0 Programming Competition**: Ranked 3<sup>rd</sup> in Turkey as a team of three, 2017
- **Nationwide University Entrance Exam (LYS)**: Ranked 139<sup>th</sup> among 2 million students in Turkey, 2016

## ACADEMIC SERVICE

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- **Reviewer**: COLT '23, NeurIPS '24, ICML '24, AAAI '25, ICLR '25

## SKILLS

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- **Language**: English (fluent, TOEFL iBT: 109/120), Turkish (native)
- **Programming**: Python, MATLAB, L<sup>A</sup>T<sub>E</sub>X, C/C++, R
- **Libraries**: PyTorch, NumPy, Matplotlib, Scikit-Learn, OpenCV

## TEACHING EXPERIENCE

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- **University of Southern California (USC)** Los Angeles, CA  
*Teaching Assistant*
  - EE562 Random Processes in Engineering (Spring 2022): holding office hours and discussion sessions, preparing and grading homeworks and exams.
  - EE546 Mathematics of High-Dimensional Data (Fall 2023): holding office hours, preparing homeworks.