

# Farrin Marouf Sofian

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## Research Interests

Generative foundation models and world models, test-time steering, and reward-guided fine-tuning, across images, video, language, and science.

## Education

### University of California, Irvine

Ph.D. in Computer Science

Irvine, CA

9/2023 – 6/2028 (Expected)

- **Advisor:** Stephan Mandt
- GPA: 3.96/4.0

### Koç University

B.Sc. in Computer Science | Mathematics Minor

Istanbul, Turkey

9/2019 – 6/2023

## Publications

\* Denotes equal contribution.

### Conference Papers

- [1] **Hierarchical Variational Policies for Reward-Guided Diffusion** 2026  
K. Pandey\*, **FM. Sofian\***, J. Groeneveld, F. Draxler, S. Mandt  
Neural Information Processing Systems (**NeurIPS**) · [arXiv](#)
- [2] **Control-Augmented Autoregressive Diffusion for Data Assimilation** 2026  
P. Srivastava, **FM. Sofian**, F. Immorlano, K. Pandey, S. Mandt  
Neural Information Processing Systems (**NeurIPS**) · [arXiv](#)
- [3] **Parallel Token Prediction for Language Models** 2026  
F. Draxler, J. Will, **FM. Sofian**, T. Karaletsos, S. Mandt  
International Conference on Learning Representations (**ICLR**) · [arXiv](#) · [Code](#)
- [4] **Variational Control for Guidance in Diffusion Models** 2025  
K. Pandey\*, **FM. Sofian\***, F. Draxler, T. Karaletsos, S. Mandt  
International Conference on Machine Learning (**ICML**) · [arXiv](#) · [Code](#)
- [5] **GECTurk: Grammatical Error Correction and Detection Dataset for Turkish** 2023  
A. Kara, **FM. Sofian**, A. Bond, G. G. Sahin  
**IJCNLP-AAACL** · [arXiv](#) · [Code](#)

### Under Review & Preprints

- [6] **Representation-Augmented Diffusions** 2026  
**FM. Sofian\***, K. Pandey\*, S. Mandt  
Under review
- [7] **Parallel Language Models via Variational Decoding** 2026  
F. Draxler\*, RC. Geyer\*, D. Geyfman\*, **FM. Sofian\***, J. Will\*, et al.  
Under review · [arXiv](#) · [Project](#)
- [8] **Variational Test-time Optimization for Diffusion Synchronization** 2026  
H. Lee\*, **FM. Sofian\***, K. Pandey, S. Mandt  
Under review · [arXiv](#) · [Project](#)
- [9] **SonicDiffusion: Audio-Driven Image Generation and Editing with Pretrained Diffusion Models** 2024  
BC. Biner, **FM. Sofian**, UB. Karakaş, D. Ceylan, E. Erdem, et al.  
Preprint · [arXiv](#) · [Project](#) · [Code](#)

Work & Research Experience

Graduate Researcher at Mandt Lab  
University of California, Irvine

9/2023 – Present  
Irvine, California

- **Foundation Model Training**
  - Co-led Representation-Augmented Diffusions: **70x** faster training, **10x** fewer sampling steps [6].
  - Led post-training of 1.3B and 3B parallel LLMs on NVIDIA GH200 GPUs (200K GPU-hour Swiss AI grant), outperforming identically trained autoregressive models with **2.3–5.7x** faster inference [7].
- **Test-time Scaling**
  - Co-led a training-free optimal-control method to synchronize diffusion trajectories under a task reward, cutting color/style inconsistency by **42.7%/26.7%** [8].
- **Reward Fine-tuning**
  - Co-led hierarchical variational policies that amortize diffusion guidance into a lightweight policy network, matching per-sample optimization quality at **5–7x** lower inference cost [1].
  - *AI for Science*: co-built control-augmented data assimilation for autoregressive diffusion on PDEs and weather, with up to **83%** lower RMSE [2].

AI Resident  
Chan Zuckerberg Initiative

11/2024 – 9/2025  
Remote

- **Test-time Scaling**: co-led a general-purpose, training-free variational-control framework for diffusion guidance:  $\approx$ **35%** better LPIPS and  $\approx$ **86%** lower runtime than the best blind-deblurring baseline [4].
- **Advisors**: Stephan Mandt and Theofanis Karaletsos

Machine Learning Engineer Intern  
Adobe

6/2024 – 9/2024  
San Jose, California

- Built and optimized the RAG pipeline for the AI assistant in Adobe Acrobat across diverse PDF structures.
- Made the pipeline **9x** faster and cut input-token costs by up to **73 cents** per question.

Awards, Honors & Grants

Swiss AI Compute Grant, 200K NVIDIA GH200 GPU hours for Parallel LMs [7] (post-training lead)  
Winner, Beall Butterworth Product Development Competition  
Selected, Chan Zuckerberg Initiative AI Residency Program  
UCI Dean’s Fellowship  
Vehbi Koç Scholar for outstanding academic performance, Koç University

2026  
2026  
2025  
2024  
2019 – 2023

Mentoring & Invited Talks

Hyunsoo Lee  
Undergraduate, Seoul National University

2/2026 – 9/2026

- Co-developed a test-time variational inference method for diffusion synchronization [8].

Katherine Anne Frieleds  
Undergraduate, Computer Science @ UCI; now PhD student, University of Oxford

10/2024 – 2025

- Mentored her on getting started in AI research and guided her BirdCLEF Kaggle project, which she led.

Crystal Tran & Billy Li  
Undergraduates, Data Science @ UCI; Crystal now teaching at CSULB

2025

- Led and mentored their applied data science projects in the Data @ UCI club.

Talk: Generative Modeling with Diffusion Models: From Images to Climate Science  
Data @ UCI

2025

Teaching

- **CS 178: Introduction to Machine Learning**2025, 2026
- **CS 301: Programming Language Concepts**2023
- **CS 132: Advanced Programming**2023