

# DENIZ BAYAZIT

## PhD Candidate

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Swiss, Turkish

## RESEARCH INTERESTS

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My research focuses on natural language processing and artificial intelligence, with a particular interest in the underlying mechanisms and behavior of Large Language Models (LLMs). I am also interested in understanding the dynamics of LLM training, aiming to identify key factors that influence generalization and decision-making processes. My work seeks to contribute to advancing the interpretability and robustness of AI systems.

## EDUCATION

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### PhD in Computer Science

EPFL - École Polytechnique Fédérale de Lausanne

📅 Sep 2021 - Present

📍 Lausanne, Switzerland

- **Depth area:** AI/NLP
- **Coursework:** Reinforcement Learning, Machine Learning, Topics in NLP

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### MSc & BSc in Computer Science

Brown University

📅 Sep 2016 - May 2021

📍 Providence, RI, USA

- **Graduate:** AI/ML Pathway (GPA: 4.00/4.00).
- **Undergraduate:** AI/ML and Data Science Pathways with Honors (GPA: 3.89/4.00).  
Thesis: *Generalizing Natural Language Instruction Following to Aerial Robots and Arbitrary Environments*.
- **Coursework:** AI, DL, RL, Reintegrating AI, Language Processing in Humans and Machines, Special Topics in Computational Linguistics & Computer Vision, Lexical Semantics, Introduction to Linguistics, Logic for Systems

## RESEARCH EXPERIENCE

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### Doctoral Research Assistant

EPFL NLP

📅 Sep 2021 - Present

📍 Lausanne, Switzerland

**Advisor:** Antoine Bosselut [[PI Website](#)] [[EPFL NLP Lab Website](#)]

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### Undergraduate & Graduate Research Assistant

H2R & LUNAR Laboratory

📅 June 2018 - May 2021

📍 Providence, RI, USA

**Advisor:** Stefanie Tellex [[PI Website](#)] [[H2R Lab Website](#)], Ellie Pavlick [[PI Website](#)] [[LUNAR Lab Website](#)]

## PUBLICATIONS & PREPRINTS

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- *Discovering Knowledge-Critical Subnetworks in Pretrained Language Models*. **EMNLP 2024**.  
D Bayazit, N Foroutan, Z Chen, G Weiss, A Bosselut. [[PDF](#)]
- *Could ChatGPT get an Engineering Degree? Evaluating Higher Education Vulnerability to AI Assistants*. **arXiv 2024**.  
B Borges\*, N Foroutan\*, D Bayazit\*, A Sotnikova\* et al. [[PDF](#)]
- *MEDITRON-70B: Scaling Medical Pretraining for Large Language Models*. **arXiv 2023**. Z Chen et al.  
[Top ML Papers of the Week \(by dair.ai\)](#). [[PDF](#)] [[Code](#)]
- *PeaCoK: Persona Commonsense Knowledge for Consistent and Engaging Narratives*. **ACL 2023**.  
S Gao, B Borges, S Oh, D Bayazit, S Kanno, H Wakaki, Y Mitsufuji, A Bosselut.  
[Outstanding Paper Award](#). [[PDF](#)] [[Code](#)]
- *Spatial Language Understanding for Object Search in Partially Observed Cityscale Environments*. **RO-MAN 2021**.  
K Zheng, D Bayazit, R Mathew, E Pavlick, S Tellex.  
[[PDF](#)] [[Website](#)]
- *Grounding Language to Landmarks in Arbitrary Outdoor Environments*. **ICRA 2020**.  
M Berg\*, D Bayazit\*, R Mathew, A Rotter-Aboyoun, E Pavlick, S Tellex.  
[[PDF](#)] [[Video](#)] [[Data](#)]
- *Flight, Camera, Action! Using Natural Language and Mixed Reality to Control a Drone*. **ICRA 2019**.  
B Huang, D Bayazit, D Ullman, N Gopalan, S Tellex.  
[[PDF](#)] [[Video](#)] [[Code](#)] [[Data](#)]

## TECHNICAL SKILLS

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**Programming Languages:** Python [*PyTorch, TensorFlow, scikit, pandas, transformers ...*] (fluent); C, Scala, Java (familiar)

**Operating Systems:** Linux, Mac OS

**Version Control & Cloud Computing:** Git, Bitbucket, Docker

**Miscellaneous:** Vim, Amazon Mechanical Turk, SQL, Excel,  $\LaTeX$

## SELECTED RESEARCH PROJECTS

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### Discovering Knowledge-Critical Subnetworks in Pretrained Language Models

PI: Antoine Bosselut

We explore whether pretrained language models contain *knowledge-critical* subnetworks—sparse subgraphs whose removal suppresses specific memorized knowledge. We propose a multi-objective differentiable masking technique for weights and neurons to discover these subnetworks, enabling precise removal of targeted knowledge while preserving most of the model's original functionality.

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### Could ChatGPT get an Engineering Degree? Evaluating Higher Education Vulnerability

PI: Antoine Bosselut

We examine the challenges of AI assistants in higher education through the lens of vulnerability. We assess this by compiling a dataset of assessment questions from 50 EPFL STEM courses and evaluating how well GPT-3.5 and GPT-4 can answer them. Our findings show the need to rethink assessment design in response to advances in GenAI.

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### ScalarBERT: Probing BERT's Compositionality for Scalar Value Prediction

PI: Ellie Pavlick

We analyzed the compositionality of grounded representations in BERT by training probes for scalar prediction tasks, such as predicting prices and ratings, using data from two sources: (1) Distributions over Quantities and (2) Amazon Product Reviews. Specifically, we evaluated how effectively BERT combines scalar adjectives with nouns to predict the correct final scalar value.

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### Grounding Language to Landmarks in Arbitrary Outdoor Environments

PI: Stefanie Tellex & Ellie Pavlick

This work tackles the challenge of generalizing robot instructions to new environments. We propose a framework that parses landmark references, assesses semantic similarities in a map, and converts natural language commands into drone motion plans. This enables robots to follow commands in unfamiliar environments, allowing untrained users to control them in large, outdoor areas using unconstrained natural language.

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## HONORS & AWARDS

- *Honorable Mention* for the Computing Research Association's (CRA) Outstanding Undergraduate Researcher Award 2020.
- Interdisciplinary Team Undergraduate Teaching and Research Award (Summer 2019, Fall 2019).

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## PROFESSIONAL SERVICE

### Reviewer:

- EMNLP 2024
- CSRR ACL 2022 Workshop
- ICRA 2021
- ML-RSA NeurIPS 2020 Workshop
- ICRA 2020

### Mentorship:

- IC Buddy Program @EPFL 2022
- Out in CS @Brown 2021
- WiCS @Brown 2020

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## TEACHING EXPERIENCE

### Graduate TA - Modern NLP

EPFL

📅 Spring 2023, 2024

📍 Lausanne, Switzerland

**Instructor:** Antoine Bosselut. **Course Code:** CS 552. [Website]

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### Graduate TA - Introduction to NLP

EPFL

📅 Fall 2022, 2023, 2024

📍 Lausanne, Switzerland

**Instructor:** Jean-Cédric Chappelier, Martin Rajman, Antoine Bosselut. **Course Code:** CS 431. [Website]

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### Graduate TA - Language Processing in Humans and Machines

Brown University

📅 Spring 2021

📍 Providence, RI, USA

**Instructor:** Ellie Pavlick, Roman Feiman. **Course Code:** CSCI 2952I/CLPS 1850.

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### Undergraduate TA - Artificial Intelligence

Brown University

📅 Fall 2019

📍 Providence, RI, USA

**Instructor:** George Konidaris. **Course Code:** CSCI 1410.

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## LANGUAGE SKILLS

- **Fluent:** English, French, Turkish
- **Elementary:** Spanish, Japanese