Basem Rizk

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Education

University of Southern California (USC), U.S.A. **Aug 2021-Dec 2023**
Master of Science in Computer Science (Artificial Intelligence) GPA: 3.76
Dean's Scholarship

- **Courses:** Theory of Machine Learning(PhD), Deep Learning and Its Applications, Machine Learning Apps for Medical Data(PhD), Advanced NLP(PhD), Machine Learning, Analysis of Algorithms, Foundations of AI, and Web Technologies.

German University in Cairo (GUC), Egypt **Sep 2015-Aug 2020**
Bachelor of Science in Computer Science and Engineering GPA: 3.9 "High Honors"

- **Electives** include Machine Learning, Rule-based and Constraint Programming, Computer Vision, Computer Security, Intro to Biomed Engineering, Intro to Deep Learning with Self-driving cars, Game-dev in Unity, and Affective Computing Seminar.

Work Experience

Applied AI Engineer, CodeRabbit, San Francisco, CA **Jan 2026- Present**

AI Engineer, Redblock, San Ramon, CA **June 2024-Jan 2026**

- Led the development from the ground-up of on-premise Agentic AI solution to automate reliably identity tasks of any web application lying between computer-use and RPA.
- Achieved with my agent 28%+ better than the top-performing competitor agents on in-house identity tasks benchmark, with a remarkable 0% fault rates.
- Built pre-liminary agent to explore the available features in web-apps and automate repetitive tasks in SAS Applications.
- Filed a number of provisional patents for methodology, novel approach as well as use cases in the domain.

AI/ML Research Scientist, Learning Sciences Lab, Institute for Creative Technologies (ICT) **May 2023-May 2024**

- Crafted an optimized pipeline for video content analysis and understanding, fusing 10+ CV and NLP methods ranging from Sentence Segmentation and Key-Frame Selection to Dense Captioning and Graph Construction (PI. Dr. Ben Nye).
- Built downstream task heads on top of the pipeline for tasks such as Video Type Classification, Competencies Detection, and Multi-modal Reference-based Prompting.
- Designed an algorithm to query database of videos and interactively inject new domain-specific knowledge employing knowledge graphs on the basis of lexical databases.

NLP Research Assistant, CUTE LAB NAME, NLP Group, Information Sciences Institute (ISI) **Dec 2022-May 2024**

- Investigated companion bots for tracking Python notebook development using large language models (LLMs) and improved quality of generated corresponding question-answer pairs by 80%. (PI. Dr. Jonathan May and Dr. Jay Pujara).
- Built with team of 3, an LLM-based moderator agent that persuades users to apply non-violent communication strategies through DARPA Civil Sanctuary applied research (PI. Dr. Jonathan May and Dr. Kristina Lerman).
- Designed and developed a configurable dynamic prompting framework that allows hooking up endpoints and APIs.

AI/ML Lead, NASA S.U.I.T.S Challenge, Team AEGIS (USC/UA, USC/UCBerkeley) **Jan 2022-June 2023**

- Led AI division to construct off-cloud Digital Assistant on local server, communicating with Microsoft Hololens 2, playing Augmented Reality (AR) solution to reduce cognitive load and fatigue of astronauts throughout procedures on EVA missions.
- Architected and implemented a client-agnostic framework employing open-source libraries for speech-to-text, dialogue management, and text-to-speech.
- Received great feedback from experts' trials on the Rock Yard Site at Johnson Space Center and from a panel of astronauts.

Founding Software Engineer Intern (AI/ML Oriented), TadHealth, Marina Del Ray, CA **May 2022-Jul 2022**

- Devised starting blocks and outlined System Specifications Requirements (SRS) for future blocks of confidential AI-powered system, including an extensible web-scraping component, database management system, and NLP-oriented controller.

Computer Vision Research Assistant, Signal Analysis and Interpretation Lab (SAIL), USC **May 2022-Jul 2022**

- Leveraged attention and pose detection libraries to enable analysis in 300+ videos of interactions between potential autistic kids and caregivers.

Teacher Assistant (Adjunct Lecturer), GUC, Egypt **Sep 2020-Jul 2021**

- Taught the practical sessions to students and graded assessments in Constraint Programming (Graduate Course) and as part of a team, in Software Engineering Lab and Advanced Databases courses.
- Expanded curriculum by adding Google OR-Too, designed final project, and supervised students during implementation.

Speech Recognition Research Intern, Institute for Information Systems, Germany **Mar 2019-Jun 2019**

- Compiled and evaluated ASR on a number of machine architectures while studying underlying ML models' architectures.
- Trained FB Wav2Letter model, from scratch, achieving 79% accuracy on LibriSpeech other-test dataset.
- Investigated performance and compared against previous data by the institute through a bachelor thesis titled "Evaluation of State of Art ASR Engines with Local Inferencing," selecting the institute's ASR system choice for the smart speaker project.
- Gained 23+ citations (including Amazon Alexa and Meta AI Research) per followed conference paper and resulting thesis.

Research and Publications

Basem Rizk, Joel Walsh, Mark Core, and Benjamin Nye **April 2024**
From Videos to Knowledge Graphs-Framework to Marry Methods for Multimodal Content Analysis and Understanding
DOI: arXiv:2510.01513v1

Spencer Lin, Miru Jun*, **Basem Rizk***, Karen Shieh, Scott Fisher, and Sharon Mozgai **Oct 2024**
Optimizing SIA Development: A Case Study in User-Centered Design for Estuary, a Multimodal Socially Interactive Agent Framework
DOI: 10.1145/3706599.3707399 - CHI EA '25 Extended Abstracts 2025

Harsha Vardhan Khurdula, **Basem Rizk**, and Indus Khaitan **Oct 2024**
Beyond Visual Understanding: Introducing PARROT-360V for Vision Language Model Benchmarking
DOI: 10.48550/arXiv.2411.15201, COLING Industry Track Proceedings 2025

Harsha Vardhan Khurdula*, **Basem Rizk***, Indus Khaitan, Aviral Srivastava, and Rajvardhan Khaitan **Oct 2024**
PARROT: Performance Assessment of Reasoning and Responses On Trivia for LLM Benchmarking

Spencer Lin*, **Basem Rizk***, Miru Jun*, Andy Artze, Caitlin Sullivan, Sharon Mozgai, and Scott Fisher **July 2024**
Estuary: A Framework For Building Multimodal Low-Latency Real-Time Socially Interactive Agents
DOI: 10.1145/3652988.3696198 - ACM IVA Demos 2024

Hyundong Cho, Shuai Liu, Taiwei Shi, Darpan Jain, **Basem Rizk**, Yuyang Huang, Zixun Lu, Nuan Wen, Jonathan Gratch, Emilio Ferrera, and Jonathan May **Feb 2024**
Scalable Conversational Moderation: Promoting Constructive Dialogue to Reduce Online Polarization
DOI: 10.18653/v1/2024.naacl-long.415 - NAACL 2024

Basem Rizk, Anthony Guerra, Rohit Penumarti, and Ajitesh Srivastava **May 2023**
Alzheimer's Disease Classification Using Volume Correlations and Multi-Atlas Spatio-Contextual Graph Isomorphism Networks

René Peinl*, **Basem Rizk***, and Robert Szabad **Sep 2020**
Open Source Speech Recognition on Edge Devices
DOI: 10.1109/ACIT49673.2020.9208978 - ACIT'2020 & IEEE Xplore

Basem Rizk (Thesis) **Aug 2019**
Evaluation of state-of-the-art open-source ASR engines with local inferencing
DOI: 10.13140/RG.2.2.34901.37603, GUC Thesis Journal 2020

Projects

Alzheimer's Disease (AD) Classification **2023**

- Achieved SOTA competitive results with 74.8% recall by novel approach of considering volume correlations with multi-atlas spatio-contextual GINs in 3-way AD from structural MRI images classification on ADNI dataset split.

Emotion Recognition Per Context Modeling Reproduction Study **2022**

- Reproduced (Lee and Lee, 2021) work as part of a team of 2 to detect emotions in conversations, employing pre-trained language models without requiring structured knowledge bases.
- Generated 20% of 2 datasets based on English-Arabic subtitles alignment and showed comparable accuracies of both to English datasets in evaluation.

Dependency Trees Parsing Using Neural Networks **2022**

- Reproduced (Chen et al., 2014) with ARC-Standard and ARC-Eager transition-based parsing with PyTorch on CoNLL data and experimented with learning word embeddings.

Constrained Compensation System for GUC **2019**

- Ranked best project in class, modeled as Constraint Satisfaction Problem (CSP) in Prolog CLPFD, interfacing with Django API.
- Architected as model engine and query formatter. SQL tables are created, then Prolog queries are formatted and issued.

^ Note: underlined words are hyperlinked to sources.
*** denotes equal contribution.**

Skills

- **Programming:** Python, Java, Prolog/CHR, Javascript/TS, C#, C/C++, SQL, Haskell/Lambda, System Verilog, Assembly, Bash
- **Libraries/Frameworks:** Pytorch, Scikit-Learn, Tensorflow/Keras, Numpy, Pandas, Transformers, Scrapy, Android, Unity, NodeJs, CLPFD, Slurm/HPC
- **Leadership:** Viterbi Grad Leader **-** Director, USC MENA Student Assembly - Founder, GUC Speech Club - Head, INSIDER GUC News & Reporting Committee - AI/ML Division Lead, Team AEGIS (USC/UCBerkeley) NASA SUITS (Team AEGIS)

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