Alexander Joseph Andonian

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EDUCATION

Ph.D. in Electrical Engineering and Computer Science August 2019 - 2024
Interests: Computer Vision, Deep Learning, Artificial Intelligence
Awarded 2019 *Great Educators* & 2023 *Pillar AI Collective* Fellowships
Thesis: *Multimodal Representation Learning for Agentic AI Systems*
Massachusetts Institute of Technology
Advisor: Aude Oliva; Committee: Phillip Isola, Jacob Andreas

M.S. in Electrical Engineering and Computer Science 2019 - 2021
Thesis: *Emergent Capabilities of Generative Models: Software 3.0 and Beyond*
Massachusetts Institute of Technology
GPA 5.0/5.0

B.S. Neuroscience, Physics, Mathematics August 2013 - May 2017
Joint Neuroscience-Physics Honors Thesis
Summa Cum Laude, Phi Beta Kappa, Sigma Xi
Bates College, Lewiston ME
GPA 3.98/4.00

EXPERIENCE

Co-Founder & CEO - Reelize AI 2023 - 2024
Bootstrapped my vision for Reelize, a video creative copilot from initial idea to revenue generation.

- Developed novel VLM approaches for agent-centric long-form video understanding and short-form video creation/editing
- Built and optimized full-stack application infrastructure to support video hosting, multiplexed model serving, autoscaling processing pipelines, and in-browser editing with remote 4K rendering
- Led business and product development, marketing efforts and fundraising through educational sources such as MIT Sandbox

Research Scientist Intern - Google X/DeepMind Fall, 2022, 2023
Virtual internship mentored by Vedant Misra, Behnam Neyshabur and Ethan Dyer

- Research internship with Blueshift Team on the science of large language models (LLMs) and deep learning
- As a core contributor to Project *Minerva*, I developed self-consistent composite reasoning strategies for improved LLM evaluation performance on math and science benchmarks

Founding AI Researcher - Poly AI 2023
Led AI efforts for Poly, an early-stage, YC-backed startup building AI design tools.

- Helped build and manage infrastructure for a 128+ GPU compute cluster
- Built code-base for large-scale, distributed training and inference
- Developed novel contrastive learning methods for "asset sets" representations
- Forwarded novel VLM-based approaches to support vector graphic (SVG) generation

Research Scientist Intern - DeepMind Summer, 2022
Virtual internship mentored by Relja Arandjelovi, Arthur Mensch, Olivier J Hnaff, Jean-Baptiste Alayrac, Andrew Zisserman

- Graduate Research Internship with the DeepMind Computer Vision team.

- Developed feature-alignment and self-training methods for state-of-the-art zero-shot open-vocabulary object detection.
- Summer project extension led to successful patent filing and paper publication.

Applied Science Intern - Amazon Summer, 2021
Virtual internship mentored by Shixing Chen and Raffay Hamid.

- Graduate Research Internship in the field of Computer Vision, and Machine Learning/Deep Learning.
- Developed method for robust cross-modal (vision-language) representation learning utilizing progressive self-distillation.
- Summer project extension led to successful patent filing and oral paper presentation.

Creative Technologies Lab Intern - Adobe Research Summer, 2020
Virtual internship mentored by Bryan Russel, Richard Zhang, and Jun-Yan Zhu

- Developed a novel computer vision method at the intersection of generative modeling and unsupervised representation learning.
- Summer project extension led to successful patent filing and publication

Principal Research Assistant - Dr. Aude Oliva, Ph.D. 2017-2019
Computational Perception and Cognition Group
Computer Science and Artificial Intelligence Laboratory (CSAIL), MIT

- Designed, implemented, and evaluated deep learning models for action recognition, temporal reasoning and visual set abstraction in videos.
- Devised and applied models for the novel task of cross-view semantic segmentation to improve spatial understanding and navigation skills of embodied agents in simulated and real 3D environments such as House3D and Matterport3D.
- Developed and maintained the Moments in Time Dataset infrastructure (website, evaluation server, etc.) responsible for showcasing and distributing the video dataset.
- Coordinated and ran the Moments in Time Recognition Challenge at CVPR'18, which was jointly held with the ActivityNet Challenge 2018.
- Co-mentored two visiting students and supervised their introduction to vision research.
- Provided software design, programming and system administration support to ongoing research projects and resources across the lab.

Visiting Student in NeuroAI Lab - Dr. Dan Yamins, Ph.D. Summer, 2017
Affiliated with Stanford Artificial Intelligence Lab (SAIL)
Department of Computer Science and Psychology, Stanford University

- Acquired comprehensive knowledge of popular deep learning frameworks, particularly TensorFlow and PyTorch, through one-on-one code reviews with PI.
- Developed two python packages now actively used by all members of the lab to run and record highly reproducible deep learning experiments.
- Attended SDL reading group talks and participated in weekly lab meetings.

Student in TECBio REU - Dr. Chakra Chennubhotla, Ph.D. Summer, 2016
Department of Computational and Systems Biology, University of Pittsburgh

- Developed bioimage informatics tools for quantifying intratumor heterogeneity in multiplexed fluorescence tissue data.
- Mentored high school student attending DiSCoBio summer academy.
- Led journal club discussions and weekly lab meetings.
- Presented work at undergraduate research symposiums.
- Participated in a mentored team-based ethics forum.

Peer Tutor in the Sciences 2015 - 2017
Academic Resource Commons, Bates College

- Worked directly with students seeking additional academic support, particularly in the neuroscience department.

- Attended and participated in training sessions on various aspects of pedagogy and learning support.

Neurology Assistant - Dr. Diana Apetauerova, M.D. Summer, 2015
Movement Disorders Department, Lahey Hospital, Burlington, MA

- Observed movement disorders clinic, deep brain stimulation, grand rounds and attended teaching conferences and lectures.

Research Assistant - Dr. Vicki Rosen, Ph.D., Chair Summer, 2013
Department of Developmental Biology, Harvard University School of Dental Medicine

- Studied a novel regulatory mechanism in the BMP signaling pathway, presented findings at weekly lab meetings and co-authored publication.

PUBLICATIONS

Omnipedia: using the manual of style to automate article review, Samuel J Klein, Alex Andonian, Sayer Tindall, Michael Zargham. Advancing Natural Language Processing for Wikipedia workshop @EMNLP (2024).

A Systematic Comparison of fMRI-to-video Reconstruction Techniques, Camilo Luciano Fosco, Ben Lahner, Alex J Andonian, Bowen Pan, Aude Oliva. First Workshop on Controllable Video Generation@ ICML24

Three ways to improve feature alignment for open vocabulary detection, Relja Arandjelovi*, Alex Andonian*, Arthur Mensch, Olivier J. Hnaff, Jean-Baptiste Alayrac, Andrew Zisserman. arXiv preprint arXiv:2210.07229, (2023).

Brain Netflix: Learning Representations to Accurately Reconstruct Videos from Brain Signals Camilo Luciano Fosco, Ben Lahner, Bowen Pan, Emilie L Josephs, Alex J Andonian, Alex Lascelles, Aude Oliva. **ECCV '24**. 2024

Mass Editing Memory in a Transformer, Kevin Meng, Arnab Sen Sharma, Alex Andonian, Yonatan Belinkov, David Bau. *International Conference on Learning Representations* **(ICLR '23)**. 2023

Robust Cross-Modal Representation Learning with Progressive Self-Distillation, **Alex Andonian**, Shixing Chen, Raffay Hamid.*Computer Vision and Pattern Recognition* (**CVPR'22**) *(oral)*. 2022

Locating and Editing Factual Knowledge in Autoregressive Transformers, Kevin Meng, **Alex Andonian**, Yonatan Belinkov, David Bau. *Advances in Neural Information Processing Systems* **(NeurIPS '22).** 2022

GPT-NeoX: Large Scale Autoregressive Language Modeling in PyTorch. **Alex Andonian** Stella Biderman, Sid Black, Preetham Gali, Leo Gao, Eric Hallahan, Josh Levy-Kramer, Connor Leahy, Lucas Nestler, Kip Parker, Michael Pieler, Shivanshu Purohit, Tri Songz, Phil Wang, and Samuel Weinbach. http://github.com/eleutherai/gpt-neox. 2021

Word from Paint, **Alex Andonian***, David Bau*, Audrey Cui, YeonHwan Park, Ali Jahanian, Aude Oliva, Antonio Torralba.

Paint by Word, David Bau*, **Alex Andonian***, Audrey Cui, YeonHwan Park, Ali Jahanian, Aude Oliva, Antonio Torralba. *arXiv preprint.* arXiv:2103.10951. 2021.

Contrastive Feature Loss for Image Prediction, **Alex Andonian**, Taesung Park, Bryan Russell, Richard Zhang, Phillip Isola, and Jun-Yan Zhu. *AIM* workshop

at ICCV 2021. Awarded patent.

Generative adversarial networks unlock new methods for cognitive (neuro)-science, Lore Goetschalckx, Alex Andonian, Johan Wagemans. *Trends in Cognitive Sciences.* 2021

VA-RED^2: Video Adaptive Redundancy Reduction, Bowen Pan, Camilo Fosco, **Alex Andonian**, Rameswar Panda, Rogerio S, Feris, Yue Meng, Chung-Ching Lin, Aude Oliva. *International Conference in Learning Representations* **(ICLR'21)**. 2021.

We Have So Much In Common: Modeling Semantic Relational Set Abstractions in Videos, **Alex Andonian***, Camilo Fosco*, Mathew Monfort, Allen Lee, Rogerio Feris, Carl Vondrick, and Aude Oliva. *European Conference on Computer Vision* (**ECCV'20**). arXiv:2008.05596. 2020. Patent in progress.

Deepfake Caricatures: Using Distortion To Expose Doctoring, **Alex Andonian**, Camilo Fosco, Xi Wang, Allen Lee, Aude Oliva. Patent in progress.

Language Model Embeddings in the Brain, Ben Lahner, **Alex Andonian**, Alex Lascelles, Radoslaw Martin Cichy, Gemma Roig, N Apurva Ratan Murty, Kshitij Wivedi, Aude Oliva. To be submitted in 2022.

Unsupervised Learning from Video with Deep Neural Embeddings, Chengxu Zhuang, Tianwei She, **Alex Andonian**, Max Sobol Mark, Daniel Yamins. *Computer Vision and Pattern Recognition* (**CVPR'20**). arXiv:1905.11954. 2020.

Spatially organized genomic and physiological heterogeneity of the olfactory bulb mitral cell layer. Daniel Paseltiner, Henry Loeffler, **Alex Andonian**, Abigail Leberman, Travis J. Gould, and Jason B. Castro. *bioRXiv preprint* https://doi.org/10.1101/2020.01.13.903823. 2020.

GANalyze: Toward Visual Definitions of Cognitive Image Properties. Alex Andonian*, Lore Goetschalckx*, Aude Oliva, Phillip Isola. *International Conf. on Computer Vision* (**ICCV'19**). 2019.

Multi-Moments in Time: Learning and Interpreting Models for Multi-Action Video Understanding Mathew Monfort, Kandan Ramakrishnan, **Alex Andonian**, Barry A McNamara, Alex Lascelles, Bowen Pan, Dan Gutfreund, Rogerio Feris, Aude Oliva. In revision for *IEEE transaction on Pattern Analysis and Machine Intelligence* (**TPAMI**). arXiv preprint arXiv:1911.00232. 2019.

Cross-view Semantic Segmentation for Sensing Surroundings. Bowen Pan, Jiankai Sun, Ho Yin Tiga Leung, **Alex Andonian**, Bolei Zhou. *IEEE Robotics and Automation Letters* 5 (3), 4867-4873.

Examining Class Dependant Sub-Paths in Deep Neural Networks. Mathew Monfort, Kandan Ramakrishnan, Alex Andonian, Aude Oliva. *Journal of Vision.* 2019.

The Algonauts Project: A Platform for Communication between the Sciences of Biological and Artificial Intelligence. Radoslaw Martin Cichy, Gemma Roig, Alex Andonian, Kshitij Dwivedi, Benjamin Lahner, Alex Lascelles, Yalda Mohsenzadeh, Kandan Ramakrishnan, Aude Oliva. *arXiv preprint* arXiv:1905.05675.

2019.

A deep learning based method for large-scale classification, registration, and clustering of in-situ hybridization experiments in the mouse olfactory bulb. Alex Andonian, Dan Paseltiner, Travis Gould, Jason Castro. *Journal of Neuroscience Methods.* 2018

Temporal Relational Reasoning in Videos. Bolei Zhou, **Alex Andonian**, Aude Oliva, Antonio Torralba. *European Conference on Computer Vision* (**ECCV**). 2018.

Moments in Time Dataset: one million videos for event understanding. Mathew Monfort, **Alex Andonian**, Bolei Zhou, Sarah Adel Bargal, Tom Yan, Kandan Ramakrishnan, Lisa Brown, Quanfu Fan, Dan Gutfruend, Carl Vondrick, Aude Oliva. *IEEE transaction on Pattern Analysis and Machine Intelligence* (**TPAMI**), (doi:10.1109/TPAMI.2019.2901464). 2018.

Informatics Tools for Quantifying Intratumor Heterogeneity in Multiplexed Fluorescence Tissue Data. Alex Andonian. Presented at *Council on Undergraduate Research's Research Experiences for Undergraduates Symposium.* National Science Foundation's Atrium, Arlington, Virginia. October 2016.

N-linked glycosylation of the bone morphogenetic protein receptor type 2 (BMPR2) enhances ligand binding. Jonathan W. Lowery, Jose M. Amich, **Alex Andonian**, Vicki Rosen. *Cellular and Molecular Life Sciences.* 2013.

WORKSHOPS, TUTORIALS & CHALLENGES

First LLM Armenian Summer School: Immersive edu experience in Yerevan. 2024
MIT Speed Up Green Up AI Hackathon: Efficient ML at MIT IAP. 2020
Spoken Moments: Multi-Modal Video Analysis Workshop at ECCV'20. 2020
Multi-Moments in Time: Multi-Label Action Detection Challenge at ICCV'19. 2019
The Algonauts Project: Explaining the Human Visual Brain. 2019
GANocracy: Theory, Practice and Artistry of Deep Generative Modeling. 2019
Moments in Time: Video Recognition Challenge held at CVPR'18. 2018

PRESS COVERAGE

MIT News: Toward machine learning that can reason about everyday actions. 2020
MIT News: Brainstorming energy-saving hacks on MITs new supercomputer. 2020
MIT News: What makes an image memorable? Ask a computer. 2019
VentureBeat: Designing AI that can track objects over time. 2018
MIT News: Helping computers fill in the gaps between video frames. 2018
MIT News: Artificial intelligence in action. 2018
MIT Technology Review: The Next Big Step for AI? Understanding Video. 2017

AWARDS & DISTINCTIONS

Navy SBIR 24.1 - Topic N241-054, *ONR - Office of Naval Research* 2024
- Awarded phase 1: *Probabilistic Forecasts of High Impact Weather on Medium Range to Subseasonal Timescales using Artificial Intelligence.*

MIT-Pillar AI Collective Fellowship, *MIT* 2023
- A program for final-year PhD students in AI, Machine Learning, and Data Science that provides funding and support to promote the commercialization of their innovations.

Winning proposal to the *2021 SystemsThatLearn@CSAIL* initiative 2021
- Awarded 25,000 dollars of funding to support ongoing research on *models that learn from models and GANs for de-biasing models.*

Winning proposal to the *2020 SystemsThatLearn@CSAIL* initiative 2020

- Awarded 25,000 dollars of funding to support ongoing research in *image/video forensics and deepfake detection.*

MIT Speed Up Green Up AI Hackathon Winner 2020
- Developed and optimized a deepfake detection that showed the greatest speedup (10x) using MIT's Satori compute cluster.

Great Educators Fellowship, *MIT* 2019
- Academic graduate fellowship awarded to distinguished MIT EECS candidates.

NSF Graduate Research Fellowship Program 2017
- Awarded NSF GRFP Fellowship (honorable mention) for proposed work in bioinformatics and computer vision.

Dana Scholar for Academic Excellence, Leadership, Service 2014 - 2017
- The program grants the Charles A. Dana Award to ten men and ten women from each first-year Bates class. These students, the Dana Scholars, are recognized with the award for their academic excellence and promise, their leadership potential, and their service to the College and the community.

The Judith Magyar Isaacson '65 Prize 2017
- Awarded annually to the senior who has demonstrated high academic achievement in digital and computational studies and mathematics.

Dean's List for Academic Excellence 2013 - 2017

Bates Dept. of Physics & Astronomy Distinguished Junior Prize 2016
- Awarded to junior physics majors with the highest GPA.

RELEVANT COURSEWORK

MIT: 6.840 - Theory of Computation Fall 2020
MIT: 6.825 - Hardware for Deep Learning; 6.864 - Advanced NLP Winter 2020
MIT: 6.867 - Machine Learning; 6.869 - Advances in Computer Vision Fall 2019
Stanford (self-study): CS231n - CNNs for CV; CS224n NLP with DL Summer 2019

TECHNOLOGY SKILLS

Programming Languages: Python, JS/Typescript, Rust, C, MATLAB, Java, Mathematica, Scheme, shell scripting.
Web/App Development: React/NextJS/AstroJs, FastAPI, MySQL/PostgreSQL
Machine Learning: PyTorch, Jax/TensorFlow, Scikit-Learn, Numpy/SciPy/Pandas.
Software: Docker, Git, LaTeX, Vim, Tmux, uv/ruff, VirtualBox.

TEACHING & COMMUNITY OUTREACH

Graduate Teaching Assistant Spring 2022
Served as a TA for MIT's Computer Vision Course (6.819/6.869).

STEM Lab Coordinator May 2016 - 2017
Stephen Belleau, GT Teacher, NBCT
Farwell Elementary School and Geiger Elementary School, Lewiston, Maine.
- Developed and taught robotics and computer science curriculum.
- Organized and led "an hour of code" sessions sponsored by Code.org.

Big Brother Mentor September 2014 - 2017
Big Brothers Big Sisters
Community Concepts, Lewiston, ME

- Mentored at-risk middle/high school student.

EXTRA-CURRICULAR ACTIVITIES	Bates College Orchestra: *Concertmaster*	2013 - 2017
	Bates College Weightlifting Club: *Co-founder, Competitive Powerlifter*	2014 - 2017
	Alpine Skiing, Downhill Mountain Biking, Endurance Challenges	2002 - present
	Violin and Chamber Music Studies	1998 - present