

## Address

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## Git

Personal: akandykeller  
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## Programming

Python ★★★★★  
Matlab ★★★★★  
C/C++ ★★★★★  
SQL ★★★★★  
JavaScript ★★★★★

## Packages

Python  
PyTorch, Tensorflow,  
Scikit-learn, Pandas,  
Numpy, SciPy  
C++  
CUDA, Armadillo  
JavaScript  
D3.js

## Interests

Representations,  
Equivariance,  
Cognitive Science

## Languages

English ★★★★★  
French ★★★★★

## Personal

Calisthenics, Cooking,  
Overseas Experience  
(France - 2.5 Years)

# T. Anderson Keller

## Machine Learning Researcher

## Education

'18 - (Expected) '22 **Ph.D. Machine Learning and Deep Learning** [University of Amsterdam](#)  
Supervisor: Professor Max Welling

Research Interests: Probabilistic Generative Models, Unsupervised Learned Equivariance  
Publications: Self Normalizing Flows

'15 - '17 **M.S. Computer Science** [University of California San Diego, La Jolla, CA](#)

Supervisor: Professor Garrison Cottrell

Thesis: Comparison and Fine-grained Analysis of Sequence Encoders for Natural Language Processing

'11 - '15 **B.S. Computer Science w/ Honors** [California Institute of Technology, Pasadena, CA](#)

Related Coursework: Machine Learning, GPU Programming (CUDA), Stochastic Modeling

## Experience

June '16 - September '18 **Deep Learning Data Scientist** [Intel Nervana, San Diego, CA](#)

- Researched and developed new models using fast-weight associative memory.
- Facilitated algorithmic solutions for Intel's partnership with Ferrari Challenge North America
- Developer of Intel AI Lab NLP Architect open source repository and multiple open source computer vision model implementations. Contributed to neon and nGraph frameworks.

Summer '15 **Data Science for Social Good Summer Fellow** [University of Chicago, IL](#)

- Presented at KDD 2016 Applied Data Science Track. Project: <https://goo.gl/touSWT>
- Analyzed data related to 1.5 million Mexican home loan mortgages (>500 GB) to determine the personal and environmental influences of home abandonment in Mexico.

Summer '14 **Analytics Engineering Intern** [Lyve Minds Inc., Cupertino, CA](#)

- Developed supervised learning algorithm for automatic editing and summarization of user generated handheld video based on predicted level of interest.

Summer '12 **Undergraduate Researcher (Applied Physics)** [Caltech, Pasadena, CA](#)

- Researched the effect of interface materials on an acoustic lens in the production of "Sound Bullets", co-author of paper based on work.

## Publications

*Self Normalizing Flows* Beyond Backpropagation NeurIPS Workshop '20

- **T. Anderson Keller**, Jorn W.T. Peters, Priyank Jaini, Emiel Hoogetboom, Patrick Forré, Max Welling. *Self Normalizing Flows*. *arXiv:2011.07248*. 14 Nov 2020.  
<<https://arxiv.org/abs/2011.07248>>

*Fast Weight Long Short-Term Memory* arXiv Preprint '18

- **T. Keller**, S. Sridhar, X. Wang. *Fast Weight Long Short-Term Memory*. *arXiv:1804.06511*. 18 Apr 2018. <<https://arxiv.org/abs/1804.06511>>

*Designing Policy Recommendations to Reduce Home Abandonment in Mexico* KDD '16

- K. Ackermann, E. Reyes, S. He, **T. Keller**, P. van der Boor, R. Kahn. Designing Policy Recommendations to Reduce Home Abandonment in Mexico. *Proceedings of the 22nd ACM SIGKDD International Conference on Knowledge Discovery and Data Mining*. Pages 13-20. 13 Aug 2016. <<http://www.kdd.org/kdd2016/papers/files/adv0913-ackermannA.pdf>>

*Experimental Realization of a Nonlinear Acoustic Lens with a Tunable Focus* APL '14

- C. Donahue, P. Anzel, L. Bonanomi, **T. Keller**, C. Daraio. Experimental Realization of a Nonlinear Acoustic Lens with a Tunable Focus. *Appl. Phys. Lett.*, 104,014103. 9 Jan 2014. <<https://arxiv.org/abs/1308.1483>>

## Master's Thesis Supervision

'21 **Modeling the Emergence of Face Selective Cortical Regions** [Qinghe Gao](#)  
Employing generative models combined with novel topographic priors to study the emergence of topographically organized face-specific feature maps in modern CNNs. (Ongoing)

'20 **As Easy as APC** [Fiorella Wever](#)  
Researching the synergistic effects of self-supervised learning and data imputation for time-series classification of medical data with high sparsity. (Ongoing)

'20 **Spatio-Temporal Forecasting On Graphs w/ Incomplete Data** [Noah van Ginsven](#)  
Combining graph neural networks with data imputation for spatio-temporal forecasting.

'19 **Geometric Priors for Disentangling Representations** [Samarth Bhargav](#)  
Researching the use of non-euclidean priors as a supervisory signal for disentangled representation learning of topologically equivalent generative factors.

## Teaching Assistant Positions

Winter '20 **Leren (Bachelor's Machine Learning)** [University of Amsterdam](#)  
Designed practice problems for matrix derivatives and geometric interpretation of PCA.

Winter '19 **Machine Learning 2 (Master's)** [University of Amsterdam](#)  
Ran practical labs including implementations of ICA, message passing, EM & VAEs.

Winter '16 **Data Visualization** [University of California, San Diego](#)  
Designed homework assignments, demos, and class tutorials for D3.js & Bokeh.

## Patents

March '16 *Synopsis Video Creation Based on Relevance Score*

- <http://www.patentsencyclopedia.com/app/20160071549>

March '16 *Synopsis Video Creation Based on Video Metadata*

- <http://www.patentsencyclopedia.com/app/20160080835>

# Selected Projects

## Fall '20 Self Normalizing Flows

University of Amsterdam

- Derived a novel method for training unconstrained normalizing flow architectures using learned approximate gradients.
- Demonstrated significantly faster training while reaching the same likelihood as the corresponding exact gradient.
- Video: <https://www.youtube.com/watch?v=6Q3b3MergqI>
- Blog: <http://keller.org/research/2020-10-21-self-normalizing-flows/>

## Summer '17 - Summer '18 Ferrari Challenge Tracking and Classification

Intel AI Lab

- Closely collaborated with diverse teams across Intel to deliver live-inference pipeline for tracking and fine-grained classification of race cars from few labeled examples.
- Managed collection of a novel dataset for object tracking from drone footage.
- Trained and modified SSD model to deployment level accuracy on small objects.
- Implemented Matching Network for few-shot classification of race cars to work with SSD.
- Keynote: [https://youtu.be/pSZn\\_bYA1k?t=3990](https://youtu.be/pSZn_bYA1k?t=3990)
- Blog: <https://goo.gl/PmQss8>
- TWiML Podcast: <https://goo.gl/6NeMnp>

## Winter '17 Fast Weight Long Short-Term Memory

Intel AI Lab / Personal

- Developed and experimented with multiple novel Fast-Weight LSTM architectures to characterize synergistic effects between gated RNNs and fast weight associative memory.
- Showed faster learning and increased accuracy on associative recall tasks.
- Showed near equivalence with Memory Network attention mechanism on bAbI QA tasks.
- Preprint: <https://arxiv.org/abs/1804.06511>
- Git: [https://github.com/akandykeller/fast\\_weights](https://github.com/akandykeller/fast_weights)

## May '18 Intel AI Lab NLP Architect

Intel AI Lab

- Implemented end-to-end memory network for question answering and goal oriented dialog systems in nGraph. Replicated published results.
- Git: <https://goo.gl/gYcJiQ>

## Fall '16 - Spring '17 Analysis of Sequence Encoders for NLP

Master's Thesis

- Re-implemented and modified Skip-Thought and End-to-End Memory Network models to produce more powerful sentence representations for classification and Q&A tasks.
- Experimented with recurrent variational autoencoders in the Skip-Thought framework.
- Analyzed performance on original and auxiliary tasks for insight into embedding procedure.
- Git: <https://github.com/akandykeller/memn2n>
- Git: <https://github.com/akandykeller/skip-thoughts>
- Thesis: <https://escholarship.org/uc/item/0wg0r7hn>

## Spring '16 Learning Text Annotations w/ Sequence-to-Sequence Networks

Personal

- Trained a sequence to sequence network on (song-lyric, descriptive annotation) pairs scraped from genius.com. Translated ordinary language into song lyrics.
- Git: <https://github.com/akandykeller/GeNet>