Skanda Koppula

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ETH Zürich, Fulbright Research Fellowship
Researcher at the Systems Group, Department of Computer Science. *Sept. 2018 - August 2019*

Massachusetts Institute of Technology
Masters of Eng. and BSc, Computer Science, MEng GPA: 5.0/5.0 *Sept. 2013 - June 2018*

Relevant courses: Hardware Architectures for Deep Learning, Applied Cryptography, Compilers, Machine Learning, Operating Systems, Computer Architecture, Computer Security, Bayesian Inference

Work Experience

NVIDIA Autonomous Driving R&D, Intern *May 2018 - September 2018*
- Added support for multi-camera vehicle feeds on NVIDIA's training and simulation pipelines.
- Decreased training time by 16% using custom data format to reduce disk reads and CRC overhead.

Google Acoustic Modeling Research Team, Intern *June 2017 - September 2017*
- Tested kernel factorization to improve cross-domain accuracy of neural language models.
- Developed approach to characterize memory and visualize hidden state of recurrent networks.

Yahoo, Software Engineering Intern *June 2016 - Aug. 2016*
- Improved malicious login attempt event detection by 7% with a pruned neural network.
- Implemented online updating of the login classifier using data from a multi-company threat feed.

Square Security, Software Engineering Intern *June 2015 - Aug. 2015*
- Built an in-production service to collect memory dumps from Square card readers
- Simplified firmware bug-fixing by parsing dumps into a human-readable source error trace.

Projects

MIT Driverless (Formula Student Racecar Team), Perception Lead *August 2016 - Present*
- Demonstrated a 85% mAP/0.8 IoU YOLOv3-based network for racetrack landmark localization.
- Trained and tested an supervised driving network for a Formula Student Electric racecar.
- Ongoing work is using A3C, on the Carla world simulator, to learn transferable driving policies.
- Developed PCBs and firmware for the first open-source automotive battery management system
- Won 2nd place at the 2017 U.S. Formula Student Electric competition (among 53 teams).

Research

MIT Energy Efficient Systems Lab, Master's Thesis *Sept. 2016 - June 2018*
- Achieved a $>$ 2x speed-up and $>$ 500x decrease in estimated energy consumption for real-time speaker identification by demonstrating an FPGA design capable of neural network inferencing and mel-frequency coefficient extraction.

ETH Zürich Systems Lab, Swiss Government Excellence Scholar *Sept. 2018 - June 2019*
- Ongoing work to demonstrate faster CNN inference using aggressive DRAM timing parameters and CNNs retrained for bit-error resilience.

Biomedical Cybernetics Lab, Student Researcher *May 2013*
- Applied Bayesian modeling to develop a genomic-environmental prognostic models to identify patients at-risk or pre-disposed to alcoholism, schizophrenia, and lung cancer.

Skills

Embedded Systems: **C/C++**, **x86 Assembly**.
Hardware and Digital Design: **Altium PCB Designer**, **Vivado HLS**, and **Bluespec Verilog**.
Miscellaneous: **Python** (**TensorFlow, PyTorch, numpy**), **Java**, **Scala**, **bash**.

Research publication list and references are available upon request!

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Publications

Understanding Recurrent Neural State Using Memory Signatures

- Skanda Koppula*, Khe Chai Sim, and Kean Chin (Google Inc.)
- 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2018).
- Full-text paper available at https://arxiv.org/abs/1802.03816

Energy-Efficient Speaker Identification With Low-Precision Networks

- Skanda Koppula*, James Glass, and Anantha P. Chandrakasan (MIT)
- 2018 IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP 2018).
- Full-text paper available at https://groups.csail.mit.edu/sls/publications/2018/Koppula1_ICASSP18.pdf

Robust Predictive Bayesian Analysis for Genome-Wide Association and Expression Studies

- Skanda Koppula*, Amin Zollanvari, Ning An, and Gil Alterovitz (MIT, Harvard Medical School)
- Proceedings of the American Medical Informatics Joint Summit (AMIA 2013)
- Full-text paper available at https://www.ncbi.nlm.nih.gov/pubmed/24303313

Technical Reports

Learning a CNN-based End-to-End Controller for a Formula SAE Racecar

- Skanda Koppula*, Kevin Chan (MIT)
- Technical Report from MIT Formula SAE Electric
- Full-text report available at https://arxiv.org/abs/1708.02215

Power-Based Side-Channel Attack for AES Key Extraction on the ATMega328 Microcontroller

- Utsav Banerjee*, Lisa Ho*, Skanda Koppula* (MIT)
- Technical Report from 6.858: Computer Systems Security.
- Full-text report available at https://people.csail.mit.edu/skoppula/papers/sidechannel.pdf

Bayesian Clustering and Topic Discovery: Adventures with Gene Expression Data

- Karen Yang*, Skanda Koppula* (MIT)
- Technical Report from 6.882: Bayesian Modeling and Inference.
- Full-text report available at https://people.csail.mit.edu/skoppula/papers/bayes.pdf