

JUNG HWAN (JOHN) HEO

johnheo@usc.edu | (213) 880-0856 | Los Angeles, CA 90007 | <https://github.com/johnheo1128>

EDUCATION

University of Southern California, Viterbi School of Engineering — Los Angeles, CA **May 2023**
B.S., Computer Engineering & Computer Science Cumulative GPA: 3.83/4.00

- **Awards:** USC Full-Tuition Trustee Scholar, Provost's Research Fellow (2x), W.V.T. Rusch Honors Research Program, Exceptional Academic Funding (2x), Dean's list (6x)
- **Relevant Coursework:** Mathematics of Machine Learning, Graduate Probability, Graduate Linear Algebra, Data Structures and Algorithms, Computer Systems Organization, Parallel and Distributed Computation

WORK EXPERIENCE

HAN Lab at Massachusetts Institute of Technology (Prof. Song Han) — Cambridge, MA **May 2022 - Present**
Research Intern

- Implement ADMM algorithm and Iterative Magnitude Pruning (IMP) for fine grained and channel pruning
- Design task-specific knowledge distillation algorithms for Transformer model compression

SPORT Lab at USC (Prof. Massoud Pedram) — Los Angeles, CA **August 2021 - Present**
Provost Research Fellow

- Conducted algorithm-hardware co-design for sparse convolutional neural network (CNN) acceleration
- Developed compiler optimization scripts, sparsity-aware convolution dataflow, and FPGA architecture
- **Heo, J.H.*; Fayyazi, A.*; Esmaili, A.; Pedram, M.** Sparse Periodic Systolic Dataflow for Lowering Latency and Power Dissipation of Convolutional Neural Network Accelerators. ACM/IEEE ISLPED '22 August 1–2, 2022, Boston, MA, USA. <https://doi.org/10.1145/3531437.3539715>

Rhoman Aerospace Corporation — Pasadena, CA **June 2021 - August 2021**
Embedded Machine Learning Intern

- Build and iteratively optimize LSTM predictive maintenance model using AWS EC2, Lambda, S3, and DynamoDB
- Deploy model as an API using Python Flask in a Docker container and host on a GPU-powered cloud instance
- Run hardware-in-the-loop simulations to record flight control performance and validate model efficiency

Korea Advanced Institute of Science and Technology (Prof. Hyunjoo Lee) — Daejeon, S. Korea **May 2020 - August 2020**
Visiting Research Intern

- Implemented evolutionary algorithms and designed an objective function that quantifies fitness values based on electrochemical properties of dopamine
- Optimized voltammetry waveforms of a neurochemical sensor to improve adsorption efficiency metric by 11%
- Completed an [oral presentation](#) of the findings in front of the professor and fellow lab members

Research in Science & Engineering (RISE) Practicum — Boston, MA **May 2018 - August 2018**
Pre-college Researcher

- Modeled connectivity of pyramidal neural networks under neurodegenerative states using NEURON software
- Built severity prediction models through ML regression algorithms in Python and MATLAB
- [Presented](#) at the final symposium with 40+ attendees and professors from BU's Computational Neuroscience Dept.

PROJECTS

MLtherapy (1st place, USC IEEE IoT Hackathon 2021) **April 2021**

- Designed a cloud-based ML pipeline for emotion detection using Microsoft Azure's Face API
- Configured backend IoT infrastructure with the ReactJS framework using HTTP routing and ad-hoc AJAX calls

Neurologue.ai (Interdisciplinary prize, 23rd Annual USC Undergraduate Symposium) **August 2020 - May 2021**

- Led a team of 11 members in a research project to develop a multimodal dementia detection model combining Speech Recognition and Natural Language Processing
- Trained SVM, DNN, XGBoost models on a 200+ patient speech dataset recognized by the NIH with 78% accuracy
- [Presented](#) at the annual symposium with a panel of Professors and PhDs in the Computer Science Dept.

DeepPiCar **May 2020 - August 2020**

- Implemented CNN Vision architecture from NVIDIA's DAVE-2 system with OpenCV and Tensorflow
- Built a toy self-driving car with Google edge TPU to accelerate training time by 2x and achieve 85% accuracy

ACTIVITIES

Co-Founder & VP of Projects, *Shift SC*

August 2021 - Present

- Co-founded an undergraduate student organization focused on human-centered and socially responsible technology
- Spearhead the development of AI Ethics curriculum with the aim to be adopted as USC's official elective course
- Advise three other project leads on a weekly basis to provide professional guidance and research strategies

Publication: "Ethical Review in the Age of Artificial Intelligence"

June 2020-December 2020

- Reviewed fundamental techniques of Recommender Systems, Computer Vision, and Natural Language Processing
- Evaluated cost-benefit structures by leveraging applications with its ethical ramifications such as privacy and bias
- [Published](#) and [presented](#) findings at AIRES Virtual Conference 2021 with 80+ attendees worldwide

USA Computing Olympiad (Ranked Gold Division in March 2020)

May 2019-March 2020

- Implemented algorithms in C++ including shortest path (DFS, BFS, Dijkstra), dynamic programming, and more
- Optimized algorithm efficiency with time complexity analysis across multiple data structures such as arrays, trees, priority queues, and hashmaps

Publication: A study on Functionalized Cancer Scanning Contrast Agents in PET

December 2017-May 2018

- Researched application of carbon nanotubes in target delivery systems and Positron Emission Tomography imaging for cancer and dementia therapeutics
- [Published](#) a research abstract to American Physical Society (Log number: NWS18-2018-000103)

SKILLS

- **Programming Languages:** C/C++, Python, CUDA, Verilog, MATLAB, HTML/CSS
- **Technologies:** Pytorch, Hugging Face Transformers, Weights and Biases, Pandas, NumPy, Docker
- **Interests:** Tennis, Skiing, Soccer, Cooking, Existential Philosophy, Space Exploration, Marvel Movies