Philip Wootaek Shin

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PROFESSIONAL EXPERIENCE

Dolby Laboratories **Sunnyvale, CA**

Advanced Technology Group Imaging Research Intern. May 2023 – August 2023

- Topic: Floor Plan Construction for Multiple Perspective Video using Object Based Latent Vector Aggregation
  - Specifics: User Generate Content (UGC) floor plan retrieval.
  - "Floor Plan Construction System and Method" - US Patent Application
  - Manager: Guan-Ming Su

LG Display (Full Time) **Paju, Korea**

Research Engineer (OLED TV Operating Circuit Design Team/Vision Algorithm Task) Jul. 2021 – July 2022

- Upgrade Deep-Learning-based Automatic Defect Object Detection Model Development using OLED Panel Images.
  - Main Issues: Tiny Defect Detection, Small Dataset Training due to Periodic Panel Modification, and Data Imbalance.
  - Improve the current detection rate by 10% and optimize data augmentation for detection system.
- Design Deep-Learning based Automatic Classification Model to Defect TFT Panel Images.
  - Main Issues: Edge Inference using CPU, Huge image size with small size defects, and Data Imbalance.
  - Enhance a commercialized in-usage tool by 5%, crop and resize the image for improvement in classification.
- Devise a Pilot Defect Recognition Tool based on Super Resolution.
  - Main Issues: Low-resolution image for human eye and gray scale level indistinguishable for human eye.
  - Develop a deep learning pilot system to automatically convert low-resolution indistinguishable image to high resolution.
- Built Anomaly Detection Automatic Email System that sends detection of stains.
  - Main Issues: Indistinguishable Stain Detection, Border Line Detection, and Database management.
  - Constructed a Real-time Anomaly Detection System from the pilot auto-email system, maintained the current email system.
- Develop a Multi-anomaly Detection Tool for user-friendly interface to train and test different models.
  - Main Issues: Deployment of different anomaly detection strategy in one interface, optimization of each method
  - Designed a GUI interface for in-house usage and differentiated individual anomaly detection methods.

DataStreams Corporation (Full Time) **Seongnam, Korea**

Assistant Research Engineer (Data Governance Team/AI Part Leader) July 2019 – June 2021

- Built a Term/Dictionary Recommendation System using Machine Learning and Natural Language Processing.
  - Main Issues: Small Dataset due to NDA with Client; needed both English and Korean recommendation systems.
  - Implemented API to connect the technical glossary and the recommendation system.
  - Designed a UI/UX interface for top 5 terms recommendation for terms and domain in the glossary.
- Designed and programmed a Machine Learning-based Catalog System for Recommendation.
  - Main Issues: No state-of-the-art recommendation tool and difficulty in measuring the accuracy of recommendation.
  - Implemented 4 different recommendation techniques for data catalogs.
  - Constructed a database-based user tracking system for user's personalized data and recommendation.
- Developed and implemented data virtualization commercialized tool with various DBMS support.
  - Main Issues: Expansion of different DBMS and optimization, and customization for clients.
  - Implemented a Hadoop-based virtualization tool and a Query repository for handling and managing different data.
  - Experimented an AI-based caching algorithm and scheduling method for the constructed system.
- Achievements: 4 publications, 3 Korean patent registrations, 1 U.S. patent application; August 2020 Employee of the Month Award

RESEARCH EXPERIENCE

The Pennsylvania State University **University Park, PA**

Graduate Research Assistant, Microsystem Design Lab Aug. 2023 – May 2026(Expected)

- **Research Area: Computer Vision, Video Processing, Generative AI, Diffusion Model**
- Co-advised by Dr. Vijaykrishnan Narayanan and Dr. John Sampson

The University of Texas at Austin **Austin, TX**

Graduate Research Assistant, Laboratory for Image & Video Engineering (LIVE) Aug. 2022 – May 2023

- Project by Netflix; Advised by Dr. Alan Bovik
- Worked on Video processing/Video Quality Assessment and Deep Neural Network.

The Pennsylvania State University. **University Park, PA**

Graduate Research Assistant, Microsystem Design Lab Aug. 2018 – May 2019

•Funded by C-BRIC (Center for Brain Inspired Computing); Co-advised by Dr. Vijaykrishnan Narayanan and Dr. John Sampson
•Analyzed Distributed Deep Neural Network Systems and Edge Computing using visual data and time series data.
•Explored Multi-View Deep Neural Network, created CAD based 3D time series data using Unity, and tested weighted-average pooling using Shannon entropy.
•Published 2 research papers and attended the annual C-BRIC conference (Theme 3: Distributed Intelligence).

Undergraduate Research Assistant, Microsystem Design Lab Aug. 2017 – May 2018

•Researched Non-Boolean Computing (Coupled Oscillator) for corner detection (Fast Corner 9 Detection) in different images.
•Explored different corner and edge detection methods for hardware in MATLAB and Verilog.
•Conducted Honors research (bachelor's thesis) with Dr. Vijaykrishnan Narayanan and Dr. John Sampson

Graduate Teaching Assistant, CMPSC 360 - Discrete Mathematics for Computer Science Aug. 2017 – Dec. 2017

•Held weekly office hours to help students understand concepts of discrete mathematics and quiz problems.
•Created quiz problems and answer sheets and managed course graders to grade students' quizzes.
•Delivered lectures and helped students solve the questions in weekly recitations.

PUBLICATIONS

- **P.W. Shin***, A.N.Sridhar*, J. Sampson, and V. Narayanan, "A Generative Exploration of Cuisine Transfer," **UNDER REVIEW**
- **P.W. Shin***, J.Ahn*,W.Yin, J. Sampson, and V. Narayanan, "Unveiling and Mitigating Bias in AI: A Comparative Analysis of Text-to-Image Generation Models," **UNDER REVIEW**
- **P.W. Shin**, K. Han, and G. Kil, "SuperQuery: Single Query Access Technique for Heterogeneous DBMS," International Conference on Database Systems for Advanced Applications (DASFAA), 732-735, Sept. 2020.
- **P.W. Shin**, J. Lee, and S.H. Hwang, "Data Governance on Business/Data Dictionary using Machine Learning and Statistics," 2020 International Conference on Artificial Intelligence in Information and Communication (ICAIIC), Feb. 2020.
- **P.W. Shin**, J. Lee, J. Kim, D. Shin, Y. Lee, and S.H. Hwang, "Applying Big Data and Artificial Intelligence on Defense Metadata using Multi Repository Meta-Data Management," *Journal of Internet Computing and Services,* Feb. 2020.
- **P.W. Shin**. J. Lee, and S. Chun, "Domain Recommendation System using Big Data and Deep Learning," Fall Presentation Contest by the Korean Society for Internet Information, Nov. 2019.
- **P.W. Shin**, J. Sampson, and V. Narayanan, "Context-Aware Collaborative Object Recognition for Distributed Multi Camera Time Series Data," Proceedings of the 10th International Symposium on Information and Communication Technology, Dec. 2019.
- J. Choi, Z. Hakimi, **P. W. Shin**, J. Sampson, and V. Narayanan, "Context-aware Convolutional Neural Network over Distributed System in Collaborative Computing," Proceedings of the 56th Annual Design Automation Conference (DAC), Jun. 2019.

EDUCATION

The Pennsylvania State University **University Park, PA**
Doctor of Philosophy in Computer Science and Engineering. Aug. 2023 – Present

- Advisor: Vijaykrishnan Narayanan, Jack Sampson

The University of Texas at Austin **Austin, TX**
Doctor of Philosophy in Electrical and Computer Engineering. Aug. 2022 – May 2023

- UT Graduate Excellence Fellowship (2022 Fall, 2023 Spring).
- Temple Foundation Graduate MCD Engineering Fellowship (2022- 2025)

Pennsylvania State University **University Park, PA**
Master of Science in Computer Science and Engineering. Aug. 2017 – May 2019

- Master's Thesis: Context Aware Collaborative Object Recognition for Multi Camera Time Series Data

Bachelor of Science in Computer Engineering **(GPA: 3.92/4.00)** Aug. 2014 – May 2018

- Bachelor's Thesis: Coupled Oscillator-based FAST Corner Detection
- **Graduated with a Magna Cum Laude**
- **Schreyer Honors College**; Dean's List for All Semesters
  - *Grader,* CMPSC 360 – Discrete Mathematics for Computer Science Jan. 2017 – May 2017
  - *Grader,* CMPSC 101 – Introduction to Python Sept. 2016 – Dec. 2017

SCHOLARSHIPS & AWARDS

Pennsylvania State University

- **Scholarships:** GE Company for Future Scholarship Engineering (2017-2018), Schumacher Honors Scholarship (2017-2018), Riegel Family Trustee Scholarship, Honors College Scholarship (2016-2017), Dixon Scholarship in Engineering (2016-2017), Madden Memorial Scholarship (2015-2016)
- **Awards:** President's Freshman Award (Mar. 2015), President Sparks Award (Apr. 2016)

DataStreams Corporation

- 2020 August: Employee of the Month

PATENTS

Korean Patents Registered

- Data Catalog Providing Method and System for Providing Recommendation Information using Artificial Intelligence Recommendation Model (Patent No. 10-2249466) – Apr. 2021
- Data Domain Recommendation Method and Method for Constructing Integrated Data Repository Management system using Recommended Domain (Patent No. 10-2153259) – Sept. 2020
- Method and Apparatus for Recommending Vocabulary from Data Dictionary based on Natural Language Proccessing (Patent No. 10-2132142) – Jul. 2020

U.S. Patent Pending

- Data Catalog Providing Method and System for providing Recommendation Information using Artificial Intelligence Recommendation Model (Application No. 17384869)

ADDITIONAL INFORMATION:

Graduate Courses Taken:

- Penn State
  - Topics in Computer Vision/Computer Vision II (CSE 586/EE 554)
  - Algorithm Design and Analysis (CSE 565)
  - Binary-Level Program Analysis (CSE 597)
  - Computer Networks (CSE 514)
  - Computer Security (CSE 543)
  - Fundamentals of Computer Architecture (CSE 530)
  - Topics in Computer Architecture (CSE 539)
  - Technology and AI for Agricultural and Ecological Science (ENT 530**)**

- UT Austin
  - Advanced Topics in Computer Vision (ECE 381V)
  - Digital Video (ECE 381K)
  - Probability and Stochastic Process I (ECE 381J)
  - Vision System (PSY 380E)

Undergraduate Honors Credits:

- CMPEN 431(Introduction to Computer Architecture): Conducted a survey and wrote reports for 3 recommended conference papers.
- EE 353 (Signals and Systems: Continuous and Discrete-Time): MATLAB implementation project and a bode plot project.
- CMPSC451(Numerical Computation): MATLAB project on interpolation from graduate level course MATH523 (Numerical Analysis)
- CMPEN 494H (Research Project): Microsystem Design Lab undergraduate research assistant
- EE 403W (Capstone Design): Designed a system to communicate Amazon Echo (Alexa) with multiple Raspberry Pis
  - Connected via a local area network, the gateway is linked between Amazon Web Services (AWS) and a network terminal called Ngrok
  - Planned future improvements such as ZigBee configuration and image recognition for various applications

Technical Skills: Python, PyTorch, TensorFlow, C++ and MATLAB
Languages: Korean (native fluency) and English (full-professional proficiency)
LinkedIn: https://www.linkedin.com/in/philipwshin/