TZU-SHENG (JASON) KUO

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RESEARCH INTERESTS

Human-Computer Interaction, Computer Vision, Machine Learning, Signal Processing

EDUCATION

National Taiwan University (NTU) Taipei, Taiwan

Bachelor of Science in Electrical Engineering**, Summa Cum Laude** 09/2014-present

GPA: 4.26 / 4.30

Rank: Top 1% (3rd / 256)

RESEARCH EXPERIENCE

Undergraduate Researcher, Multimedia Processing and Communications Lab 07/2016-present

Advisor: Prof. Homer H. Chen (Dept. EE, NTU and IEEE Fellow), Dr. Kuang-Tsu Shih (Dept. EE, NTU)

- Research Areas: **Signal Processing** and **Eye Tracking**
- Estimated the depth of gaze using eye trackers to enable 3D interactions
- Approximated the temporal variation of gaze fixation using Gaussian noise and estimated the depth based on eye vergence
- Proposed a model to calculate the minimal distance between two depths that are distinguishable with our method
- **1 paper accepted** by ***ICIP 2018***

Undergraduate Researcher, Vision and Learning Lab 09/2017-present

Advisor: Prof. Yu-Chiang Frank Wang (Dept. EE, NTU)

- Research Areas: **Computer Vision**, **Deep Learning**, and **Semantic Segmentation**
- Proposed a deep neural network that distinguishes the land covers, such as forests and water, within satellite images
- Modified the decoder of DeepLabv3+ by adopting the concept of Deep Layer Aggregation
- Proposed a soft label loss to mitigate boundary effects and developed a post-processing algorithm to refine predictions
- **1 paper accepted** by ***DeepGlobe Workshop in CVPR 2018***

Undergraduate Researcher, Interactive Graphics / Computer Graphics Lab 09/2017-present

Advisor: Prof. Bing-Yu Robin Chen (Dept. CSIE, NTU), Prof. Xing-Dong Yang (Dept. CS, Dartmouth College)

- Research Areas: **Human-Computer Interaction**, with focus on **Technical HCI**
- Project 1: Designed a pneumatic interface that emulates physical objects to provide haptic feedbacks in virtual reality
- Project 2: Designed a software tool with an autocomplete feature to assist makers in building virtual breadboard circuits
- **1 paper accepted** by ***UIST 2018***
- **1 paper** is currently **under review** by ***CHI 2019***

PUBLICATIONS AND PREPRINT

[4] Jo-Yu Lo, Da-Yuan Huang, **Tzu-Sheng Kuo**, Chen-Kuo Sun, Teddy Seyed, Jun Gong, Xing-Dong Yang, and Bing-Yu Chen, "AutoFritz: Autocomplete for Prototyping Virtual Breadboard Circuits," submitted to *ACM CHI Conference on Human Factors in Computing Systems (CHI 2019)*, 2019. [preprint]

[3] Shan-Yuan Teng, **Tzu-Sheng Kuo**, Chi Wang, Chi-Huan Chiang, Da-Yuan Huang, Liwei Chan, and Bing-Yu Chen, "PuPoP: Pop-up Prop on Palm for Virtual Reality," *Proceedings of the 31st ACM Symposium on User Interface Software and Technology (UIST 2018)*, pp. 5–17, 2018. [pdf]

[2] **Tzu-Sheng Kuo***, Keng-Sen Tseng*, Jia-Wei Yan*, Yen-Cheng Liu, and Yu-Chiang Frank Wang, "Deep Aggregation Net for Land Cover Classification," *IEEE International Conference on Computer Vision and Pattern Recognition Workshop on DeepGlobe (CVPRW 2018)*, 2018. [*co-first authors] [pdf]

[1] **Tzu-Sheng Kuo**, Kuang-Tsu Shih, Sheng-Lung Chung, and Homer H. Chen, "Depth from Gaze," *IEEE International Conference on Image Processing (ICIP 2018),* pp. 2910–2914, 2018. [pdf]

SELECTED HONORS AND AWARDS

Honorary Member, Phi Tau Phi Scholastic Honor Society - Given to students graduated **top 1%** in NTU EECS College 06/2018

Dean's List Award (5 times) - Given to students with top 5% GPA in each semester 09/2014-06/2018

Appier Scholarship (2 times) - Travel grant for ICIP 2018 and UIST 2018 08/2018

Chien Shih-Liang Memorial Scholarship - Given to 2 students in NTU EECS College each year 05/2018

Taiwan Ministry of Science and Technology Research Project Grant 07/2017-02/2018

Irving T. Ho Memorial Scholarship - Given to 1 senior student in NTUEE each year 10/2017

World Champion, Pagamo Calculus World Cup - The 1st place out of 2,000 participants from 45 countries 02/2016

Teaching Experience

Teaching Assistant, Computer Vision: from Recognition to Geometry - *Instructor: Prof. Yu-Chiang Frank Wang* 09/2018-present

Teaching Assistant, **Deep Learning for Computer Vision** - *Instructor: Prof. Yu-Chiang Frank Wang* 02/2018-06/2018

Teaching Assistant, **Machine Learning** - *Instructor: Prof. Hung-Yi Lee* 09/2017-01/2018

Teaching Assistant, **Signals and Systems** - *Instructor: Prof. Lin-Shan Lee* 02/2017-06/2017

Teaching Assistant, **Electronics I** - *Instructor: Prof. Liang-Hung Lu* 09/2016-01/2017

Working Experience

Software Engineering Intern, Cadence Design Systems, Inc. San Jose, CA, USA

Manager: Mr. Danny Ho, Mr. Kei-Yong Khoo 07-09/2017

- Verification and Development of Cadence Conformal Logic Equivalence Checking (LEC) Tool
- Focused on Gate-Level and RTL circuit design automation
- Received **Full-Time Return Offer**

Professional Services

External Reviewer - Reviewed conference papers for ICIP 2018, ICASSP 2018, and ACCV 2018 12/2017-present

External Reviewer - Reviewed a research grant proposal for Taiwan Ministry of Science and Technology 02/2017

Selected Term Projects

(details available at my website)

iTeach - Implemented an ios app in ReactNative and Redux to assist teachers in bringing a class together on mobile devices 02-06/2018

Action Recognition - Implemented CNN and RNN to recognize and localize actions in first-person videos 06/2018

Berkeley Pacman AI - Designed a Pacman AI that plays the game by itself using reinforcement learning 09-12/2017

Visualization of CNN - Implemented and compared popular CNN models using five visualization methods 06/2017

Music Mixer - Designed a digital circuit as music mixer on FPGA using Verilog 06/2017

Image Generation - Generate anime images from text using Conditional Generative Adversarial Network (CGAN) 05/2017

Image Stitching - Implemented algorithms that generate a panorama from multiple images 05/2017

Video to Caption - Designed CNN and RNN to generate captions from videos automatically 04/2017

High Dynamic Range Imaging - Implemented algorithms that generate an HDR image from multiple images 04/2017

Single Cycle MIPS Processor - Implemented a MIPS CPU in RTL using Verilog 12/2016

Functionally Reduced And-Inverter Graph (FRAIG) - Optimized digital circuit automatically using SAT engine 12/2015

Leadership and Teamwork Experience

Founder, MakerSpace of NTUEE [website] 08/2016-06/2018

- Motivated by the need of **rapid prototyping tools** outside restricted research labs of individual faculty, I founded this makerspace to assist students in doing their side projects. Beyond providing equipments, my team and I also organized **workshops** in the makerspace to teach students basic prototyping skills, such as the usages of Arduino and 3D Printers.

Chair, 2017 MakeNTU Makerthon [website] [recap] 08/2016-02/2017

- Inspired by the global maker movement and the democratization of technology, I launched the **1st nationwide makerthon** in Taiwan with **200** participants and **70k USD** in arrangement. I led **60** student volunteers and cooperated with **Taipei City Government** and **22 international companies**, including Google, Microsoft, Intel, etc.

Director, Academic Department of NTUEE Student Association [website] 06/2016-06/2017

- I led a team of **30** students to organize various academic affairs, including speeches, awards, NTU festival, NTUEE+ Project, etc., for over **800** students in the EE department.

Skills and Languages

Programming Languages/Tools: C++/C#, Python, Matlab, Javascript, CSS, html, Verilog, SPICE, Tensorflow, PyTorch, React, Unity, etc.
Languages: English (fluent), Chinese (native), Japanese (basic)

Selected Courses

(* denotes graduate-level courses)

Software: Deep Learning for Computer Vision*, Machine Learning and Having It Deep and Structured*, Machine Learning*, Introduction to Artificial Intelligence and Machine Learning, Networking and Multimedia Lab, Digital Visual Effects*, Web Programming, Digital Speech Processing, Data Structure and Programming, Algorithms, Operating System

Hardware: Computer Architecture, IC Design, Digital Circuit Design Lab, Switching Circuit and Logic Design, Circuits, Electronics, Electromagnetic, Signals and Systems, Introduction to Wireless and Mobile Networking, RF Microwave Wireless Systems

HCI: Human-Computer Interaction, Psychology, Design Thinking Workshop, Creative Thinking, Biology, Clinical Observation and Demand Exploration*

Mathematics: Calculus, Linear Algebra, Probability and Statistics, Differential Equation, Discrete Math, Complex Analysis