

# TZU-SHENG (JASON) KUO

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## RESEARCH INTERESTS

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

## EDUCATION

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### 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% ( 3<sup>rd</sup> / 256 )**

## RESEARCH EXPERIENCE

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### 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

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- [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

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<b>Honorary Member, Phi Tau Phi Scholastic Honor Society</b> - Given to students graduated <b>top 1%</b> in NTU EECS College	06/2018
<b>Dean's List Award (5 times)</b> - Given to students with top 5% GPA in each semester	09/2014-06/2018
<b>Appier Scholarship (2 times)</b> - Travel grant for ICIP 2018 and UIST 2018	08/2018
<b>Chien Shih-Liang Memorial Scholarship</b> - Given to 2 students in NTU EECS College each year	05/2018
<b>Taiwan Ministry of Science and Technology Research Project Grant</b>	07/2017-02/2018
<b>Irving T. Ho Memorial Scholarship</b> - Given to 1 senior student in NTUEE each year	10/2017
<b>World Champion, Pagamo Calculus World Cup</b> - The 1 <sup>st</sup> 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
<ul style="list-style-type: none"><li>- Verification and Development of Cadence Conformal Logic Equivalence Checking (LEC) Tool</li><li>- Focused on Gate-Level and RTL circuit design automation</li><li>- Received <b>Full-Time Return Offer</b></li></ul>	

## 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

(details available at my website)

Founder, MakerSpace of NTUEE	08/2016-06/2018
<ul style="list-style-type: none"><li>- Motivated by the need of <b>rapid prototyping tools</b> 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 <b>workshops</b> in the makerspace to teach students basic prototyping skills, such as the usages of Arduino and 3D Printers.</li></ul>	
Chair, 2017 MakeNTU Makeathon	08/2016-02/2017
<ul style="list-style-type: none"><li>- Inspired by the global maker movement and the democratization of technology, I launched the <b>1st nationwide makeathon</b> in Taiwan with <b>200</b> participants and <b>70k USD</b> in arrangement. I led <b>60</b> student volunteers and cooperated with <b>Taipei City Government</b> and <b>22 international companies</b>, including Google, Microsoft, Intel, etc.</li></ul>	
Director, Academic Department of NTUEE Student Association	06/2016-06/2017
<ul style="list-style-type: none"><li>- I led a team of <b>30</b> students to organize various academic affairs, including speeches, awards, NTU festival, NTUEE+ Project, etc., for over <b>800</b> students in the EE department.</li></ul>	

## 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