Zen Zhengxuan **Wu**

Cognitive Science · Artificial General Intelligence · Social Science

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Education and Academic Achievements

Stanford University

2018 - 2020 (expected)

M.S. in Management Science & Engineering, specialized in Computational Social Science — *GPA: 4.06/4.00*

- Completing the degree while working full-time through Honor Cooperate Program (HCP).

University of Pennsylvania

2015 - 2017

M.S. in Computer Science, specialized in Robotics

- 3rd Place out of 51 teams in Robotics Competition (Robokey) 2015.

Case Western Reserve University

2012 - 2015

B.S. in Aerospace Engineering, double major in Mechanical Engineering — *GPA: 3.74/4.00*

- Advisor: Prof. James S. T'ien
- Dean's List for academic achievement in every semester
- Published Thesis: *Upward Spreading Flame on Corrugated Ashless Filter Paper*

National Standardized Tests

- GRE: Verbal 163/170, 93%; Math 170/170, 96%; Writing 4.5/6.0, 81%
- Scored 800/800 on each of four SAT Subject Tests.

Teaching

- Teaching Assistant, CIS 521 (Machine Learning), Fall 2016
- Teaching Assistant, ENGR 210 (Introduction to Circuits and Instrumentation), Fall 2014
- Teaching Assistant, EMAE 181 (Dynamics), Fall 2013

Research and Projects Experience

Stanford Social Neuroscience Laboratory

Mar 2018 - Present

Advisors: Prof. Jamil Zaki; Prof. Desmond C. Ong

- **Probabilistic Programming**: Improving generative models to simulate human-like emotion inferences.
- **Intuitive Physics**: Building knowledge-based deep generative models to infer friction with multimodal inputs.
- **Emotion Recognition with Deep Learning**: Led the development of the Transformer-based multimodal memory fusion model.
- **Stanford Emotional Narratives Dataset (SEND)**: Jointly led the collection of the dataset, analyzed semantics of emotions of the dataset, and built emotion recognition deep networks with LSTMs and VRNNs.
- **Web Annotation**: Built a web-based video annotation interface for collecting large video dataset.

Stanford Computational Social Science Laboratory

Mar 2018 - Present

Advisors: Prof. Michal Kosinski; Dr. Poruz Khambatta

- **Reasoning of Human Learning**: Characterizing and analyzing person perception accuracy of political views from facial images.
- **Sexual Orientation and Gender Atypicality**: Using machine learning and big data analytics to study with social traits among 15M Facebook users.

Stanford Human-Computer Interaction Laboratory

Mar 2018 - Present

Advisors: Prof. Michael Bernstein; Dr. Geza Kovacs

- **HabitLab**: Enhanced HabitLab, a personalized productivity intervention system on Chrome browser.
- **Conservation of Online Procrastination**: Contributed to analyzing time redistribution effects caused by interventions.
- **Adaptive Interventions**: Improved interventions with adaptive aggressive levels.
- **Prediction of User Behavior**: Built models to predict changes in users' intervention preferences over time using Transformer.

Social Cognition in Morality

Mar 2018 - Present

Advisors: Prof. Piotr Winkielman; Yueyi Jiang (Ph.D. Candidate)

- **Monetary and Moral Decisions**: Investigating how social influence shifts gamble preferences for monetary and moral decisions using linear mixed model.
- **Word Embeddings with Semantics of Emotions**: Built deep learning methods to disentangle semantics of emotions in word embeddings.

Robotics and Mechatronics

May 2014 - May 2017

Advisors: Prof. Haim H. Bau; Prof. Roger D. Quinn

- **Robotic Cell Injector**: Built automatic multi-cells injector with optimized by traveling salesman algorithm.
- **Robotic Hawk-like Kite**: Constructed skeleton structure of the kite using carbon fiber.

Biomedical Informatics and Biomedical Image Computing

Mar 2015 - Mar 2016

Advisors: Prof. Christos Davatzikos; Dr. Brian Cole

- **Genetic Annotator**: Worked on cloud-based distributed genetic annotator aimed at scalability (110M data points).
- **Large Scale Processing**: Built large scale data processing with Scala and Apache Spark clustering.
- **Biomedical Imaging Processing**: Developed multilayers SVMs feed forward model for AD/ASD diseases (working on 3D fMRI images).

Computational Fluid Dynamics in Space Combustion

Sept 2012 - May 2015

Advisors: Prof. James S. T'ien

- **Flame Propagation**: Analyzed flame propagation on wavy samples, and discovered *Flamelet* phenomenon.
- **Low Oxygen Indexing**: Used LabView to control oxygen mass percentage in combustion chamber, and studied low oxygen index of materials under different mass flow.

Work Experience

VMware, Inc.

July 2017 - Present

Software Engineer, Virtual Storage Team

Palo Alto, CA

- Working on backend development of supporting persistent volumes for Kubernetes users.
- Led a project in Secure Shell (SSH) logging system with fault tolerance.
- Built Jenkins CICD pipeline for zero downtime application deployment.
- Worked on building kernel module detecting CPU time slips and cloud virtual machines networking.

Swift Capital (acquired by PayPal Holdings, Inc. in 2018)

May 2016 - Sept 2016

Machine Learning Intern

Philadelphia, PA

- Led a project in fraud detection including implementing machine learning algorithms, analyzing trade-offs among different modeling approaches.
- Enabled parallel training of machine learning models with Apache Spark Stream Framework.
- Implemented feature selection mechanism with xenon (FICO) data mining tools.

New Oriental Education & Technology Group Inc.

May 2015 - Sept 2015

Instructor

Hangzhou, China

- Taught reading, writing and speaking for SAT and TOEFL.

Skills and Technologies

- **Program Languages**: Python, C++/C, C, Java, x86 Assembly, Matlab, Arduino, TypeScript, Haskell, Bash.
- **Machine Learning**: Discriminative and Generative Models (CNN/RNN/LSTM/VAE/GAN/HMM); Reinforcement Learning (Multi-arm Bandit).
- **AI + Big Data**: PyTorch, scikit-learn, Keras, TensorFlow, NumPy, Pandas, H2O, MapReduce (Hadoop).
- **Natural Language Processing:**: NLTK, Word Embeddings (word2vec), GloVe, ELMo, BERT, Parsing, Language Models, WordNet.
- **Data Mining**: PyData, SciPy, SNAP, Visualization (D3.js/ggplot2/Plotly), SQL, NoSQL (Mongo), NetworkX, Jupyter.
- **Data Science**: Mixed Linear Model, Hierarchical Logistic Regression, A/B Testings, Experiment Design, Crowdsourcing (MTurk).
- **Server + Database**: Node.js, Flask, MongoDB, PostgreSQL, Kubernetes, Docker, Google Cloud, AWS EC2, CUDA, Azure, Jenkins CICD.
- **Web + Mobile**: HTML/CSS/JS, Polymer, React, Webpack, Apache, Android (Java), Xcode.
- **Language**: Fluent English and Chinese (Mandarin). Intermediate Japanese and Spanish.

Selected Publications and Manuscripts

[1] E. Stalcup, J. T'ien, J. Jordan, **Z. Wu**, and G. Nastac, "Upward flame spread and extinction over wavy solids," Submitted to Combustion Science and Technology.

[2] G. Kovacs, **Z. Wu**, and M. S. Bernstein, "Not now, ask later: Users weaken their behavior change regimen over time, but believe they will imminently re-strengthen it," Submitted to CHI 2020.

[3] **Z. Wu**, Y. Jiang, and X. Zhang, "Probing patterns of informal ties in patronage networks: A social network analysis approach," Submitted to ICWSM 2020. [Online]. Available: http://zen-wu.social/papers/wordvec2019wu.pdf

[4] D. C. Ong, **Z. Wu**, T. Zhi-Xuan, M. Reddan, I. Kahhale, A. Mattek, and J. Zaki, "Modeling emotion in complex stories: the Stanford Emotional Narratives Dataset," IEEE Journel of Transaction of Affective Computing. [Online]. Available: https://web.stanford.edu/~dco/publications.html

[5] **Z. Wu**, X. Zhang, T. Zhi-Xuan, J. Zaki, and D. C. Ong, "Attending to emotional narratives," *IEEE Affective Computing and Intelligent Interaction (ACII)*, 2019, https://arxiv.org/abs/1907.04197.

[6] **Z. Wu** and Y. Jiang, "Disentangling latent emotions of word embeddings on complex emotional narratives," in *CCF International Conference on Natural Language Processing and Chinese Computing*. Springer, 2019, pp. 587–595. [Online]. Available: https://arxiv.org/abs/1908.07817

[7] G. Kovacs, D. M. Gregory, Z. Ma, **Z. Wu**, G. Emami, J. Ray, and M. S. Bernstein, "Conservation of procrastination: Do productivity interventions save time or just redistribute it?" in *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems*. ACM, 2019, p. 330. [Online]. Available: https://dl.acm.org/citation.cfm?id=3300560

[8] G. Kovacs, **Z. Wu**, and M. S. Bernstein, "Rotating online behavior change interventions increases effectiveness but also increases attrition," *Proc. ACM Hum.-Comput. Interact.*, vol. 2, no. CSCW, Nov. 2018. [Online]. Available: https://dl.acm.org/citation.cfm?id=3274364

[9] **Z. Wu** and M. Kosinski, "Homosexual women are not masculine," Manuscript In Preparation.

[10] **Z. Wu**, P. Khambatta, and M. Kosinski, "Testing the effectiveness of real-time feedback on person perception accuracy," Manuscript In Preparation.

[11] E. Nook, C. Chwyl, I. Kahhale, **Z. Wu**, and J. Zaki, "Interpersonal emotion differentiation," Manuscript In Preparation.

[12] Y. Jiang, **Z. Wu**, A. Ryazanov, and P. Winkielman, "Social influence shifts gamble preferences for monetary and moral decisions," Manuscript In Preparation.

[13] A. Mattek, M. Smith, **Z. Wu**, I. Kahhale, M. Reddan, D. Ong, and J. Zaki, "Modeling facial movements that track emotion inference," Manuscript In Preparation.

[14] J. T'ien, J. Jordan, **Z. Wu**, and G. Nastac, "An experimental study of upward flame spread over wavy thin solids," in *10th National U.S. National Combustion Meeting*, 2017. [Online]. Available: http://zen-wu.social/papers/james2015.pdf

[15] **Z. Wu**, "Upward spreading flame on corrugated ash-less filter paper," *Honored Senior Project Report, Mechanical and Aerospace Engineering, Case Western Reserve University*, 2015.