

# ZICHANG HE

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## EDUCATION

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**University of California, Santa Barbara (UCSB), CA, USA** Sep. 2018 – 2023 (Expected)

Pursing Ph.D. in *Electrical and Computer Engineering*, GPA: 3.92/4.0;

**Northwestern Polytechnical University (NWPU), Xi'an, China** Sep. 2014 – Jun. 2018

B.Eng. in *Detection, Guidance and Control Technology*

## RESEARCH EXPERIENCES

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**Uncertainty & Data Analysis Lab, UCSB** Sep. 2018 – Present

*Graduate Research Assistant*, Supervisor: Prof. Zheng Zhang

**Research Interests:** Uncertainty Quantification (UQ) & Tensor Analysis with applications on Design Automation, Machine Learning, and Quantum Computing.

- **AI safety verification based on quantum annealing.** Demonstrated a novel neural network verification approach based on SAT encoding and quantum annealer with a validation on D-Wave architecture.
- **Tensor Learning.** Proposed a tensor regression model for high-dimensional uncertainty quantification with automatic tensor rank determination and adaptive sampling.
- **Risk-aware engineering design.** Certified the robustness of engineering designs via tractable chance-constrained programming based on polynomial relaxation and polynomial optimization.
- **Fast simulation of electronic & photonics circuits.** Accelerated simulations via building precise but cheap surrogate models, dealing with high-dimensionality uncertainty, mixed-type uncertainty, and distributionally shifted data.
- **Experimental design for the high-dimensional data.** Proposed the active learning methods for tensor learning problems including both parameter estimation and data recovery.

**NASA Quantum Artificial Intelligence Laboratory at KBR, Remotely** Jun. 2021 – Present

*Research intern* Supervisor: Dr. Salvatore Mandrà

**Research interests:** Developing tensor contraction algorithms for quantum computation.

**Intelligent Information Processing Lab, NWPU** Sep. 2015 – Jun. 2018

*Undergraduate Research Assistant*, Supervisors: Prof. Wen Jiang & Prof. Yong Deng

**Research interests:** Uncertainty analysis; Information fusion; Quantum decision theory.

- **Decision process modeling.** Proposed evidential and quantum frameworks to model decision making processes, which can explain lots of paradoxes in the classical probability theory.
- **Uncertainty representations.** Proposed effective uncertainty representation models to solve information fusion and decision making problems under epistemic uncertainty.

**The Hong Kong Polytechnic University, Hong Kong** Jul. 2017 – Aug. 2017

*Visiting Researcher*, Supervisor: Prof. Felix T.S. Chan

## PUBLICATIONS [[GOOGLE SCHOLAR](#)]

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- **Z. He** and Z. Zhang, “High-dimensional uncertainty quantification via rank- and sample-adaptive tensor regression,” submitted to *International Applied Computational Electromagnetics Society (ACES) Symposium 2021*. (**Invited paper**)
- **Z. He** and Z. Zhang, “High-dimensional uncertainty quantification via rank- and sample-adaptive tensor regression,” submitted to *IEEE Trans. Components, Packaging and Manufacturing Technology (T-CMPT)*. arXiv:2103.17236 (**Invited paper**)

- **Z. He**, B. Zhao and Z. Zhang, “Active sampling for accelerated MRI with low-rank tensors,” arXiv:2012.12496
- **Z. He** and Z. Zhang, “High-dimensional uncertainty quantification via active and rank-adaptive tensor regression,” *IEEE Electrical Performance of Electronic Packaging and Systems (EPEPS)*, San Jose, CA, Oct. 2020. **(Best Student Paper Award)**
- **Z. He** and Z. Zhang, “When chance constraint meets polynomial: A surrogate-assisted yield-aware optimization,” In preparation for *International Conf. Computer Aided Design (ICCAD)*, 2021.
- **Z. He**, W. Cui, C. Cui, T. Sherwood and Z. Zhang, “Efficient uncertainty modeling for system design via mixed integer programming,” *International Conf. Computer Aided Design (ICCAD)*, Westminster, CO, Nov. 2019. (acceptance rate 23.8%)
- **Z. He**, F.T.S. Chan, and W. Jiang, “A quantum framework for modelling subjectivity in multi-attribute group decision making,” *Computers & Industrial Engineering*, 124 (2018): 560-572.
- **Z. He** and W. Jiang, “An evidential Markov decision making model,” *Information Sciences*, 467 (2018): 357-372.
- **Z. He** and W. Jiang, “An evidential dynamical model to explain the interference effects of categorization on decision making results,” *Knowledge-Based Systems*, 150 (2018): 139-149.
- **Z. He**, W. Jiang. and F.T.S. Chan, “Evidential supplier selection based on interval data fusion,” *International Journal of Fuzzy Systems*, 20 (2018): 1159-1171.
- **Z. He** and W. Jiang, “A new belief Markov chain model and its application in inventory prediction,” *International Journal of Production Research*, 56 (2018): 2800-2817.
- W. Jiang, Y. Cao, L. Yang and **Z. He**, “A Time-space domain information fusion method for specific emitter identification based on Dempster-Shafer evidence theory,” *Sensors* 17 (9) (2017): 1972.
- Y. Tang, D. Zhou, **Z. He** and S. Xu, “An improved belief entropy-based uncertainty management approach for sensor data fusion,” *International Journal of Distributed Sensor Networks*, 13(7) (2017): 1550147717718497.
- **Z. He** and W. Jiang, “Quantum mechanical approach to modelling reliability of sensor reports,” *IEEE Sensors Letters*, 1 (2017): 1-4.
- Y. Tang, D. Zhou, S. Xu and **Z. He**, “A weighted belief entropy-based uncertainty measure for multi-sensor data fusion,” *Sensors*, 17 (4) (2017): 928.

## SELECTED HONORS & AWARDS

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| • Best student paper award at IEEE EPEPS Conference                              | 2020       |
| • Outstanding Teaching Assistant award in the department of ECE, UCSB            | 2020, 2021 |
| • Graduate Fellowship in the department of ECE, UCSB                             | 2018       |
| • Meritorious Winner in Interdisciplinary Contest in Modeling (awarded by COMAP) | 2016       |

## OTHERS

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**Programming skills:** Python, Matlab, C, C++, R, Mathematica, Keil, LaTeX, etc.

### Teaching:

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| • Teaching assistant of <i>ECE 15A</i> (Foundations of Logic Design), UCSB | Winter 2020, 2021 |
| • Teaching assistant of <i>ECE 139</i> (Probability & Statistics), UCSB    | Spring 2019       |

### Independent reviewer of journals:

- *IEEE Transactions on Computer-Aided Design of Integrated Circuits and Systems (TCAD)*
- *IEEE Transactions on Cybernetics*
- *Information Sciences*
- *Computers & Industrial Engineering*
- *Science China Information Sciences*

**Graduate courses:** Linear Systems, Machine Learning, Convex Optimization; Optimal Estimation and Detection, Scientific Computing, Matrix & Tensor Analysis, Game Theory, etc.