

# Zhichao Lu

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## EDUCATION

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**Michigan State University**, East Lansing, Michigan, USA

Ph.D in Electrical and Computer Engineering

Sep 2014 - Aug 2020

- Advisor: Prof. *Kalyanmoy Deb*

**Michigan State University**, East Lansing, Michigan, USA

B.S in Electrical and Computer Engineering

Sep 2009 - Dec 2013

- Graduated with honor; GPA: 3.86 / 4.0

## EXPERIENCE

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**Post-doc Research Fellow**, *SUSTech*, Shenzhen, Guangdong, China

Oct 2020 – Now

- Evolutionary machine learning, notably machine learning assisted evolutionary algorithms, automated machine learning, and in particular evolutionary neural architecture search.

**Algorithm Developer Intern**, *Siemens PLM Software*, E. Lansing, MI, USA

May 2018 – Aug 2018

- Developed a large-scale combinatorial optimization algorithm for the capacitor placement problem on a circuit board, achieved 10 times reduction in search cost with comparable results to expert systems.
- Designed a customized operator to use gradient information within an evolutionary framework, leading to an improved convergence by a factor of 5 times on a series of engineering design problems.

## RESEARCH GRANTS

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- 2022 - 2023: Surrogate-Assisted Evolutionary Multi-Objective Deep Neural Architecture Search, **Principal Investigator**, CNY 160,000, National Natural Science Foundation of China (Youth Program), China
- 2021 - 2022: Research and Applications of Evolutionary Multi-Objective Deep Neural Architecture Search, **Principal Investigator**, CNY 80,000, China Postdoctoral Science Foundation (General Program), China
- 2020 - 2021: Evolutionary Computation Based Deep Neural Architecture Search for Microchips, **Co-Investigator**, CNY 1,280,000, Huawei Hisilicon, China

## MANUSCRIPTS IN PROGRESS

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- [Zhichao Lu](#), R. Cheng, S. Huang, H. Zhang, C. Qiu and F. Yang, Evolutionary Multiobjective Neural Architecture Search for Hardware-aware Semantic Segmentation, *IEEE Transactions on Neural Networks and Learning Systems* (**TNNLS**), 2021. (*under review*)

## JOURNAL PUBLICATIONS

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- [Zhichao Lu](#), G. Sreekumar, E. Goodman, W. Banzhaf, K. Deb, and V. N. Boddeti, Neural Architecture Transfer, *IEEE Transactions on Pattern Analysis and Machine Intelligence* (**TPAMI**), 2021.
- [Zhichao Lu](#), I. Whalen, Y. Dhebar, K. Deb, E. Goodman, W. Banzhaf and V. N. Boddeti, Multi-Objective Evolutionary Design of Deep Convolutional Neural Networks for Image Classification, *IEEE Transactions on Evolutionary Computation* (**TEVC**), 2021.
- S. Zhu, L. Xu, E. Goodman and [Zhichao Lu](#), A New Many-Objective Evolutionary Algorithm based on Generalized Pareto Dominance, *IEEE Transactions on Cybernetics* (**TCYB**), 2021.
- A. Sinha, [Zhichao Lu](#), K. Deb, and P. Malo, Bilevel Optimization based on Iterative Approximation of Multiple Mappings, *Journal of Heuristics*, 2020.
- [Zhichao Lu](#), K. Deb, and A. Sinha, Uncertainty Handling in Bilevel Optimization for Robust and Reliable Solutions, *International Journal of Uncertainty, Fuzziness and Knowledge-Based Systems*, 2018.

## CONFERENCE PUBLICATIONS

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1. S. Huang, Zhichao Lu, R. Cheng, and C. He, FaPN: Feature-aligned Pyramid Network for Dense Image Prediction, *International Conference on Computer Vision (ICCV)*, 2021.
2. T. Wang, R. Zhang, Zhichao Lu, F. Zheng, R. Cheng, and P. Luo, End-to-End Dense Video Captioning with Parallel Decoding, *International Conference on Computer Vision (ICCV)*, 2021.
3. S. Hu, R. Cheng, C. He, and Zhichao Lu, Multi-objective Neural Architecture Search with Almost No Training, *Evolutionary Multi-Criterion Optimization*, 2021.
4. S. Zhu, L. Xu, E. Goodman, K. Deb, and Zhichao Lu, The (M-1)+1 framework of relaxed Pareto dominance for evolutionary many-objective optimization, *Evolutionary Multi-Criterion Optimization*, 2021.
5. Zhichao Lu, K. Deb, E. Goodman, W. Banzhaf, and V. N. Boddeti, NSGANetV2: Evolutionary Multi-Objective Surrogate-Assisted Neural Architecture Search, *European Conference on Computer Vision (ECCV)*, **Oral** presentation, 2020.
6. Zhichao Lu, I. Whalen, V. N. Boddeti, Y. Dhebar, K. Deb, E. Goodman, and W. Banzhaf, NSGA-Net: Neural Architecture Search using Multi-Objective Genetic Algorithm (Extended Abstract), *International Joint Conference on Artificial Intelligence (IJCAI)*, 2020.
7. Zhichao Lu, K. Deb, and V. N. Boddeti, MUXConv: Information Multiplexing in Convolutional Neural Networks, *IEEE Conference on Computer Vision and Pattern Recognition (CVPR)*, 2020.
8. Zhichao Lu, I. Whalen, V. N. Boddeti, Y. Dhebar, K. Deb, E. Goodman, and W. Banzhaf, NSGA-Net: Neural Architecture Search using Multi-Objective Genetic Algorithm, *Genetic and Evolutionary Computation Conference (GECCO)*, 2019. (**Best Paper Award**)
9. Zhichao Lu, K. Deb, and H. Singh, Balancing Survival of Feasible and Infeasible Solutions in Constraint Evolutionary Optimization Algorithms, *IEEE Congress on Evolutionary Computation (CEC)*, 2018.
10. Zhichao Lu, K. Deb, E. Goodman, and J. Wassick, Solving a Supply-chain Management Problem using a Bilevel Approach, *Genetic and Evolutionary Computation Conference (GECCO)*, 2017.
11. B. Barnhart, Zhichao Lu, M. Bostian, A. Sinha, K. Deb, L. Kurkalova, M. Jha, and G. Whittaker, Handling Practicalities in Agricultural Policy Optimization for Water Quality Improvements, *Genetic and Evolutionary Computation Conference (GECCO)*, 2017.
12. Zhichao Lu, K. Deb, and A. Sinha, Finding Reliable Solutions in Bilevel Optimization Problems under Uncertainties, *Genetic and Evolutionary Computation Conference (GECCO)*, 2016. (Best Paper Award Runner-up)
13. Zhichao Lu, K. Deb, and A. Sinha, Handling Decision Variable Uncertainty in Bilevel Optimization Problems, *IEEE Congress on Evolutionary Computation (CEC)*, 2015.
14. K. Deb, Zhichao Lu, C. B. McKesson, C. C. Trumbach, and L. DeCan, Towards Optimal Ship Design and Valuable Knowledge Discovery under Uncertain Conditions, *IEEE Congress on Evolutionary Computation (CEC)*, 2015.

## BOOK CHAPTERS

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1. K. Deb, A. Sinha, P. Malo, Zhichao Lu, Approximate Bilevel Optimization with Population-Based Evolutionary Algorithms. In: Dempe S., Zemkoho A. (eds) *Bilevel Optimization*. Springer Optimization and Its Applications, vol 161. Springer, Cham, 2020. (ISBN 978-3-030-52118-9)

## HONORS AND AWARDS

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CVPR ActivityNet Event Dense-Captioning Challenge Runner Up	2021
SUSTech Presidential Outstanding Postdoctoral Award	2021
MSU College of Engineering GOF Fellowship	2020
GECCO Best Paper Award (Evolutionary Machine Learning Track)	2019
MSU Graduate School Dissertation Completion Fellowship	2019
GECCO Best Paper Award Nomination (Real-world Application Track)	2016
MSU Engineering Distinguished Fellowship	2014
MSU Walker Memorial Engineering Scholarship	2012
MSU Yates Memorial Engineering Scholarship	2010 - 2012

## TALKS AND PRESENTATIONS

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- ECCV Conference, August 2020, [oral presentation](#) on “NSGANetV2: Evolutionary Multi-Objective Surrogate-Assisted Neural Architecture Search”.
- NAS workshop of CVPR Conference, June 2020, [oral presentation](#) on “Neural Architecture Transfer”.
- NAS workshop of CVPR Conference, June 2020, [oral presentation](#) on “MUXConv: Information Multiplexing in Convolutional Neural Networks”.

## PROFESSIONAL ACTIVITIES

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### Conference Organizers:

- EMO 2021: *Online Platform Co-Chair*, International Conference Series on Evolutionary Multi-Criterion Optimization, Shenzhen, China.
- EMO 2019: *Local Organizing Committee*, International Conference Series on Evolutionary Multi-Criterion Optimization, East Lansing, MI, USA.

### Conference Program Committee/Reviewer:

- IEEE Conference on Computer Vision and Pattern Recognition (CVPR)
- IEEE Conference on Computer Vision and Pattern Recognition (CVPR) NAS Workshop
- Genetic and Evolutionary Computation Conference (GECCO)
- IEEE Congress on Evolutionary Computation (CEC)
- International Conference Series on Evolutionary Multi-Criterion Optimization (EMO)

### Journal Reviewer:

- IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
- IEEE Transactions on Evolutionary Computation (TEVC)
- IEEE Transactions on Medical Imaging (TMI)
- IEEE Transactions on Artificial Intelligence (TAI)
- IEEE Computational Intelligence Magazine (CIM)
- Swarm and Evolutionary Computation
- Complex & Intelligent Systems
- International Journal of Machine Learning and Cybernetics
- NeuroComputing
- Memetic Computing

## TECHNICAL SKILLS

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Python, MATLAB, PyTorch, Tensorflow, Shell, Android, Vim, Git, Linux

## REFERENCES

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### **Dr. Kalyanmoy Deb**

Koenig Endowed Chair Professor  
Dept. of Electrical and Computer  
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### **Ranny Sidhu**

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