

# Xinming Shi

**Homepage:**  
<https://embeddedsky.github.io/xinmingshi.github.io//>

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## Research Interest

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- Evolvable hardware based on emerging electronic devices; Memristor-based neural networks; Genetic Programming

## Education

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<b>University of Birmingham</b> <i>Ph. D. in Computer Science</i>	Sep. 2019– Present <i>Birmingham, UK</i>
<b>Huazhong University of Science and Technology</b> <i>M.Eng. in Control Science and Engineering (Exempt from Admission Exam)</i>	Sep. 2016 – Jun. 2019 <i>Wuhan, China</i>
<b>Wuhan University of Technology</b> <i>B. Eng. in Electronic Engineering with <b>Highest Honors (Top 5%)</b></i>	Sep. 2012 – Jun. 2016 <i>Wuhan, China</i>
<b>Wuhan University</b> <i>B. Art. in English Literature</i>	Sep. 2014 – Jun. 2016 <i>Wuhan, China</i>

## Project Experience

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<b>Guangdong Provincial Key Laboratory Project</b> <i>"Brain-inspired reconfigurable computing"</i> <ul style="list-style-type: none"><li>• Proposed a novel tree-based circuit representation to evolve the analog circuits.</li><li>• Proposed a more efficient evolution algorithm to evolve the analog circuits.</li><li>• Proposed evolutionary memristive reconfigurable architectures for reservoir computing.</li><li>• Proposed memory-enhanced time delay reservoir and its memristive implementations.</li></ul>	Oct. 2019 – Present <i>Birmingham, UK</i>
<b>Huawei Ph.D. Internship Project</b> <i>"Intelligent compiler of brain-like chip"</i> <ul style="list-style-type: none"><li>• Worked on the compiler of brain-like chip and completed the summary report.</li></ul>	Dec. 2020 – Mar. 2021 <i>Shenzhen, China</i>
<b>Hubei Innovative Research Project</b> <i>"Theory and its application of autonomous control based on brain-like intelligence"</i> <ul style="list-style-type: none"><li>• Proposed a novel memristor model used in a memristor-based crossbar of spiking neural network.</li><li>• Worked on implementing the Deep Q Network into the hybrid memristor-capacitor crossbar.</li></ul>	May 2018 – Jun. 2019 <i>Wuhan, China</i>
<b>NSFC Project</b> <i>"Analysis and design of memristive circuit based on brain-like computing"</i> <ul style="list-style-type: none"><li>• Designed a memristor-based neuron circuit with homeostatic plasticity.</li><li>• Proposed a memristor-based neuron circuit with an adaptive firing rate.</li></ul>	May 2017 – May 2018 <i>Wuhan, China</i>
<b>Huawei Innovation Program</b> <i>"Neuromorphic processor architecture research based on memristor"</i> <ul style="list-style-type: none"><li>• Studied over 50 papers about neuromorphic computing and completed the summary report.</li></ul>	Jun. 2016 – Oct. 2016 <i>Wuhan, China</i>

## Work Experience

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<b>Teaching assistant of Evolutionary Computation and Its Application</b> <i>Southern University of Science and Technology</i> <ul style="list-style-type: none"><li>• Excellent Student Teaching Assistant Award</li></ul>	Feb. 2022–Jun. 2022 <i>Shenzhen, China</i>
<b>Four-month Part-time Internship</b> <i>Huawei 2012 Laboratories Central Research Institute</i> <ul style="list-style-type: none"><li>• Worked on the project of intelligent compiler of the brain-like chip.</li></ul>	Dec. 2020–Mar. 2021 <i>Shenzhen, China</i>
<b>Teaching assistant of Data Structures and Algorithms</b> <i>University of Birmingham</i>	Jan. 2020–Jun. 2020 <i>Birmingham, UK</i>

## Publications

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- **Xingming Shi**, Leandro L. Minku and Xin Yao, "Adaptive Memory-Enhanced Time Delay Reservoir and its Memristive Implementation," in *IEEE Transactions on Computers*, vol. 71, no. 11, pp. 2766-2777, 1 Nov. 2022, doi: 10.1109/TC.2022.3173151. **(Excellent Science and Technology Academic Paper presented by SZSTA)**
- **Xinming Shi**, Leandro L. Minku, and Xin Yao, "A Novel Tree-based Representation for Evolving Analog Circuits and Its Application to Memristor-based Pulse Generation Circuit," *Genetic Programming and Evolvable Machines*, 23, pp. 453–493, 2022, <https://doi.org/10.1007/s10710-022-09436-w>.
- **Xinming Shi**, Jiashi Gao, Leandro L. Minku, and Xin Yao, "Evolving Parsimonious Circuits Through Shapley Value-based Genetic Programming," in *Proceedings of the Genetic and Evolutionary Computation Conference Companion*, 2022, pp. 602–605.
- **Xinming Shi**, Jiashi Gao, Leandro L. Minku, James Jian Qiao Yu and Xin Yao, "Second-order Time Delay Reservoir Computing for Nonlinear Time Series Problems," *2021 IEEE Symposium Series on Computational Intelligence (SSCI)*, Orlando, FL, USA, 2021, pp. 1-8, doi: 10.1109/SSCI50451.2021.9659913.
- **Xinming Shi**, Zhigang Zeng, Le Yang and Yi Huang, "Memristor-Based Circuit Design for Neuron With Homeostatic Plasticity," in *IEEE Transactions on Emerging Topics in Computational Intelligence*, vol. 2, no. 5, pp. 359-370, Oct. 2018, doi: 10.1109/TETCI.2018.2829914.
- Le Yang, Zhigang Zeng, and **Xinming Shi**, "A memristor-based neural network circuit with synchronous weight adjustment," *Neurocomputing*, vol. 363, pp. 114–124, 201.
- **Xinming Shi** and Zhigang Zeng, "Memristor-Based Neuron Circuit with Adaptive Firing Rate," *2018 Eighth International Conference on Information Science and Technology (ICIST)*, Cordoba, Granada, and Seville, Spain, 2018, pp. 176-181, doi: 10.1109/ICIST.2018.8426182.
- Jiashi Gao, **Xinming Shi** and James Jian Qiao Yu, "Attn-CommNet: Coordinated Traffic Lights Control On Large-Scale Network Level," *2021 IEEE 33rd International Conference on Tools with Artificial Intelligence (ICTAI)*, Washington, DC, USA, 2021, pp. 289-293, doi: 10.1109/ICTAI52525.2021.00048.
- Jiashi Gao, **Xinming Shi** and James Jian Qiao Yu, "Social-dualcvae: Multimodal Trajectory Forecasting Based on Social Interactions Pattern Aware and Dual Conditional Variational Auto-encoder," *arXiv preprint*, arXiv:2202.03954.

## Patents

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- **Xinming Shi** and Xin Yao, "Automatic design method and device for analog circuit based on tree structure, equipment and medium," Pub Number: CN202110713376.7, Jun. 2021.
- **Xinming Shi** and Xin Yao, "Automatisches Entwurfsvorrichtung fur eine analoge Schaltung basierend auf enier Baumstruktur," Prioritat: 25.06.2021, Sep. 2022. (German patent)
- **Xinming Shi** and Zhigang Zeng, "A memristor-based neuron circuit with homeostatic plasticity", Huazhong University of Science and Technology, Pub Number CN107742153A, Feb. 2018.
- Huazhong Xu, Miaoke Chen, **Xinming Shi**, Hang Yang, Xiao Peng and Jian Luo, "Concentrated treatment of living oil fumes emissions" Wuhan University of Technology, Pub Number 201530152318.7, May. 2015.
- Huazhong Xu, Yixin Wang, **Xinming Shi**, Xipeng Yu, Xiao Peng, Miaoke Chen, "An emission device of living oil fumes", Wuhan University of Technology, Pub Number 201520324700.6, May. 2015.

## Talks

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<b>Conference proceeding talk of GECCO 2022</b>	Jul. 2022
<i>"Evolving Parsimonious Circuits Through Shapley Value-based Genetic Programming"</i> Boston, USA (Virtually participated)	
<b>Conference proceeding talk of SSCI 2021</b>	Dec. 2021
<i>"Second-order Time Delay Reservoir Computing for Nonlinear Time Series Problems"</i> Orlando, USA (Virtually participated)	
<b>Invited talk of Sustech-Huawei RAMS Technology Innovation Lab Mid-Year Meeting</b>	Jul. 2021
<i>"Novel EHW based Emerging Electronic Devices"</i>	Shenzhen, China
<b>Conference proceeding talk of ICIST 2018</b>	Jun. 2018
<i>"Memristor-Based Neuron Circuit with Adaptive Firing Rate"</i>	Cordoba, Spain

## Awards and Honors

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<b>Excellent Science and Technology Academic Paper</b>	
<i>Shenzhen Association for Science and Technology (SZSTA)</i>	2022
<b>Excellent Student Teaching Assistant Award</b>	
<i>Southern University of Science and Technology</i>	2022
<b>Outstanding Graduate Student Leader</b>	
<i>Huazhong University of Science and Technology</i>	2018
<b>Meritorious Winner of Mathematical Contest in Modeling (MCM)</b>	
<i>Consortium for Mathematics and Its Applications (COMAP)</i>	2015
<b>Second Prize of The 1st Delta Advanced Automation Contest</b>	
<i>Chinese Association of Automation</i>	2014
<b>Merit Student Award (2 times)</b>	
<i>Wuhan University of Technology</i>	2012–2014
<b>Prominent Student Award (top 5%)</b>	
<i>Wuhan University of Technology</i>	2012
<b>Scholarship for Outstanding Learning Achievement (top 5%)</b>	
<i>Wuhan University of Technology</i>	2012

## Professional Service

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### Memberships

- 2022–Present: SIGEVO Membership

### Committee Services

- 2021–Present: Committee Member of Conference Activities and Communications subcommittee in IEEE Computational Intelligence Society (CIS).