Liwen Zhang

College of Information Science and Engineering, Northeastern University, Shenyang, China
liwer.zhang@gmail.com https://liwerzhang.github.io

Education

Northeastern University **Sep. 2020 – Jun. 2023**
Master in Control Engineering, advised by Linying Xiang and Fei Chen *Shenyang, China*

Qingdao University of Technology **Sep. 2016 – Jun. 2020**
Bachelor of Engineering in Automation, GPA: 3.9 *Qingdao, China*

Publications

- **Liwen Zhang**, Linying Xiang and Fei Chen. "Controllability of Boolean Control Networks under Three Mixed Control Inputs." ***Preprint***.
- **Liwen Zhang**, Linying Xiang and Jiawei Zhu. "Relationship between Fragility and Resilience in Complex Networks." *Physica A: Statistical Mechanics and its Applications (**Physica A**)* 128039, 2022, ISSN 0378-4371, https://doi.org/10.1016/j.physa.2022.128039.
- Yubin Wang, Karnika Biswas, **Liwen Zhang**, Hakim Ghazzai and Yehia Massoud. "3D Autonomous Navigation of UAVs: An Energy-Efficient and Collision-Free Deep Reinforcement Learning Approach." *2022 IEEE Asia Pacific Conference on Circuits and Systems (**APCCAS**)*. **Accepted**.
- Fei Chen, **Liwen Zhang** and Linying Xiang. "A Method of Analysis of the Relationship between Fragility and Resilience of Complex Networks" *National Patent* . **Accepted**.

Experience

First Automobile Works Group (FAW) **Changchun, China**
Technical Engineer *Jun. 2023 – Present*

- Work on cost control and economic optimization of commercial vehicles.

Selected Projects

Controllability of Boolean Control Networks under Three Mixed Control Inputs | *NEU* **Oct. 2022**

- A necessary and sufficient condition was derived for the controllability of Boolean control networks by transforming the problem into a set controllability problem.
- The concept of a set state reachable matrix was proposed to measure the difficulty of network controllability.
- A necessary and sufficient condition for system controllability was derived based on the above concept.
- Tarjan's algorithm was utilized to reduce the dimensionality of the controllability matrix, thereby reducing the complexity of the controllability algorithm.

Relationship between Fragility and Resilience in Complex Networks. | *NEU* **Sep. 2020**

- The paper was accepted to ***Physica A*** and the patent was accepted to *National Patent*.
- Explained the phenomenon that the fragility will increase and the resilience will decrease when the network is attacked from a mathematical perspective.
- Provided analytical and numerical supporting evidence for the relationship that fragility and resilience of complex network subjects to a linear negative correlation in double logarithmic coordinates.

3D Autonomous Navigation of UAVs via Deep Reinforcement Learning | *KAUST* **March. 2022**

- The paper was accepeted to ***APCCAS 2022***.
- Proposed a novel deep reinforcement learning-based architecture for planning energy-efficient and collision-free paths for a quadrotor UAV, using a unique combination of remaining flight distance and local knowledge of energy expenditure to compute an optimized route, with the key element - Attention-based neural network based on the partial knowledge of the environment.

Honors, Awards and Service

- Outstanding Fellowships, Northeastern University (2021)
- National Encouragement Scholarship (2018, 2019)
- Reviewer for *CCC (2021, 2023)*
- National Finals Third Prize Shandong Province Division First Prize, The 13th National Undergraduate Smart Car Competition Creative Group
- Shandong Province First Prize, The 14th National Undergraduate Smart Car Competition Transformer-Third Round Group
- First Prize, The 9th Shandong Undergraduate Science and Technology Festival Intelligent Technology Application Design Competition
- Project leader of the national undergraduate innovation and entrepreneurship training project, "Design of automatic buoy drone based on GPS waypoints positioning and path planning"