Yuchen Zhang

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Education

Zhejiang University of Technology   Sep. 2017 – Current

- Major: Ph.D., Control Science and Engineering.
- Supervisor: Prof. Li Yu and Prof. Bo Chen.
- ETCS: 39.   GPA: 3.71/4.0.   Ranking: 4/98.

Zhejiang University of Technology   Sep. 2013 – Jun. 2017

- Major: Bachelor of Engineering, Electrical Engineering and Automation.
- Supervisor: Prof. Li Yu.
- ETCS: 210.   GPA: 3.27/4.0.   Ranking: 32/121.

Hangzhou Xuejun High school of Zhejiang Province   Sep. 2010 – Jun. 2013

Experience

City University of Hong Kong   Jul. 2018 – Oct. 2018

- Type: Visiting Student.
- Supervisor: Prof. Daniel W. C. HO (Department of Mathematics)
- Project: Secure Estimation and Control of Networked Systems under Cyber-Attacks.

Research Interests

1. **Distributed estimation for large-scale interconnected systems**.

   With the great development of communication and sensor technology, the systems we seek to design and control have becoming increasingly large-scale. To simplify the analysis of large-scale systems, various system decomposition techniques are used to divide the overall system into interconnected subsystems with lower dimensions and overlapping states. Distributed estimation for large-scale interconnected systems is an important theoretical issue in systems and control. However, most of the existing work does not take into account the overlap of system states, which contains redundant information that can be used to further improve the estimation performance.

2. **Secure estimation for large-scale interconnected systems**.

   The monitoring for large-scale system is of significant importance, while the communication and computation constraints for subsystems make it difficult to achieve satisfactory estimation performance. Furthermore, with the fusion of cyber into physical processes, the system is more vulnerable to malicious attacks which do exist and happen during the routine operation. However, the detection of various types of attacks within an acceptable time is not reasonable for energy constrained subsystems. Therefore, how to design resilient estimator for large-scale interconnected systems to mitigate the influence of cyber attacks is theoretically and practically meaningful.

3. **Distributed fusion estimation for binary sensor systems**.

   Binary sensors compress the measurement information into two possible values as outputs and have been commonly employed in many practical applications including environmental awareness, medical monitoring and localization. There are two most important advantages that make binary sensors potential to replace traditional

sensors in some cases. They are firstly cost-effective, which means numerous binary sensors can be deployed to achieve acceptable performance at a low cost. Meanwhile, the communication cost of binary sensors is minimal since each sensor only transmits one bit of information at each time. The bandwidth constraint problem, in this sense, can be avoided naturally in network communication environments by using binary sensors. Therefore, we shall study the distributed fusion estimation problem under binary sensors.

Programs

Distributed Secure State Estimation for Large Scale Interconnected Cyber-Physical Systems under Cyber Attacks. Jan. 2020 – Dec. 2023

- Type: National Natural Science Foundation of China.
- Leader: Li Yu.
- Participation: Major Member.

Cyber-Attack Detection and Secure State Estimation in Cyber-Physical Systems: From Perspective of Distributed Fusion. Jan. 2020 – Dec. 2023

- Type: National Natural Science Foundation of China.
- Leader: Bo Chen.
- Participation: Major Member.

Attack Detection and Secure State Estimation for Networked Fusion Systems. Jan. 2020 – Dec. 2023

- Type: Zhejiang Provincial Natural Science Foundation of China.
- Leader: Bo Chen.
- Participation: Major Member.

Publications

Papers in international journals

9. Xinhao Yan, Bo Chen, Yuchen Zhang, Li Yu. (Submitted Paper, Under Review). Guaranteeing Differential Privacy in Distributed Fusion Estimation. **IEEE Transactions on Aerospace and Electronic Systems**.

8. Yuchen Zhang, Bo Chen, Li Yu, Daniel W. C. Ho. (Submitted Paper, Under Review). Distributed Estimation for Time-varying Interconnected Dynamic Systems with Arbitrary Coupling Structures. **IEEE Transactions on Control of Network Systems**.

7. Yuchen Zhang, Bo Chen, Li Yu. (Submitted Paper, Under Review). Distributed Zonotopic Estimation for Interconnected Systems: A Fusing Overlapping States Strategy. **Automatica**.

6. Daxing Xu, Bo Chen, Yuchen Zhang, Li Yu. (Submitted Paper, Under Review). Distributed Anti-Eavesdropping Fusion Estimation under Energy Constraints. **IEEE Transactions on Automatic Control**.

5. Zhongyao Hu, Bo Chen, Yuchen Zhang. (2022). IEEE Transactions on Instrumentation and Measurement. **IEEE Transactions on Instrumentation and Measurement**, 71: 1-11. DOI: 10.1109/TIM.2022.3149327.

4. Xinhao Yan, Yuchen Zhang, Daxing Xu, Bo Chen. (2022). Distributed Confidentiality Fusion Estimation Against Eavesdroppers. **IEEE Transactions on Aerospace and Electronic Systems**. DOI: 10.1109/TAES.2021.3124194.

3. Yuchen Zhang, Bo Chen, Li Yu, Daniel W. C. Ho. (2021). Distributed Kalman Filtering for Interconnected Dynamic Systems. **IEEE Transactions on Cybernetics**. DOI: 10.1109/TCYB.2021.3072198.

2. Yuchen Zhang, Bo Chen, Li Yu. (2020). Distributed Fusion Kalman Filtering under Binary Sensors. **International Journal of Robust and Nonlinear Control**, 30(6): 2570-2578. DOI: 10.1002/rnc.4874.

1. Yuchen Zhang, Bo Chen, Li Yu. (2020). Fusion Estimation under Binary Sensors. **Automatica**, 115: 108861. Doi: 10.1016/j. automatica.2020.108861.

Papers at international conferences

1. **Yuchen Zhang**, Bo Chen, Li Yu, & Haiyu Song. (2019, August). Bounded Recursive Optimization Approach for Pose Estimation in Robotic Visual Servoing. In International Conference on Intelligent Robotics and Applications (pp. 488-497). Springer, Cham. Doi: 10.1007/978-3-030-27526-6_43.

Patents

3. Bo Chen, **Yuchen Zhang**, Li Yu, Wenan Zhang, Zhen Hong. (2019). Bounded Recursive Optimization Based Robotic Pose Estimation Approach. CN 201910896428.1 (**Authorized**).
2. Bo Chen, **Yuchen Zhang**, Li Yu, Wenan, Zhen Hong. (2019). Binary Sensor Based Bounded Recursive Optimization Fusion Filtering for Blood Oxygen Content Estimation. CN 201910896450.6 (**Authorized**).
1. Bo Chen, **Yuchen Zhang**, Li Yu, Zhen Hong, Wenan Zhang. (2019). Binary Sensor Based Fusion Kalman Filtering for Blood Oxygen Content Estimation. CN 201910896449.3 (Accepted).

Presentations and Seminars

2. Oral Presentation in International Conference on Intelligent Robotics and Applications. Shenyang, China, 2019.
1. Oral Presentation in the 37th China Control Conference. Guangzhou, China, 2019.

Awards and Scholarship

3. National scholarship for doctoral students (2020).
2. ZJUT Graduate First-class Scholarship (2018).
1. Zhejiang Province of National Undergraduate Electronic Design Contest (2015, Third Price).