

Yuxuan Xia

Contact Information

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Research Interests

My research interests include Bayesian inference and machine learning in general, and sensor fusion and object tracking in particular. My current research focuses on multiple (extended) object tracking, multi-sensor fusion, and simultaneous localization and mapping with lidar and radar for autonomous systems.

Google Scholar stats (up to 2025 July): Citations: 1300+, h-index: 22, i10-index: 30.

Education

- **Ph.D. in Signals and Systems**
Chalmers University of Technology, Gothenburg, Sweden, 2022
Main supervisor: Prof. Lennart Svensson; Co-supervisor: Dr. Karl Granström.
Doctoral thesis: *Poisson multi-Bernoulli mixtures for multiple object tracking*.
- **Lic. Eng. in Signals and Systems**
Chalmers University of Technology, Gothenburg, Sweden, 2020
Licentiate thesis: *Conjugate priors for Bayesian object tracking*.
- **M.Sc. in Communication Engineering**
Chalmers University of Technology, Gothenburg, Sweden, 2017
Supervisor: Dr. Karl Granström.
Master thesis: *A study of Poisson multi-Bernoulli mixture conjugate prior in multiple target estimation*.
- **B.Sc. in Internet of Things Engineering**
Jiangnan University, Wuxi, China, 2015

Working Experience

- **Research Assistant Professor**
Smart Sensor Fusion Laboratory, Department of Automation and Intelligent Sensing,
Shanghai Jiao Tong University, Shanghai, China, 2024 Oct –
- **Industrial Postdoctoral Researcher**
Zenseact (Volvo Cars) and Linköping University, Linköping, Sweden, 2023 Nov – 2024 Sep
Academic advisor: Prof. Gustaf Hendeby; Industrial advisor: Dr. Erik Stenborg.
Project: Building HD maps for autonomous driving using crowdsourcing.
- **Postdoctoral Researcher**
Chalmers University of Technology, Gothenburg, Sweden, 2022 Sep – 2023 Oct
Advisor: Prof. Lennart Svensson.
- **Research Intern**
Mitsubishi Electric Research Laboratories, Cambridge, Massachusetts, U.S., 2019 Jun – 2019 Dec
Advisor: Dr. Pu (Perry) Wang, Dr. Karl Berntorp (now with Symbotic).
Project: Extended object tracking with automotive radar.

- **Project Assistant**

Chalmers University of Technology, Gothenburg, Sweden, 2017 Oct – 2018 Jan

- **Software Engineer Intern**

Remarkable Universal Network, Wuxi, China, 2014 Sep – 2015 Mar

Teaching Experience

- **Information Fusion**, Graduate course at Shanghai Jiao Tong University, 2025

Role: Examiner, lecturer, course material development.

- **Multi-Object Tracking for Automotive Systems**, Graduate course on edX, 2018 – 2023

Role: Coordinator, course material development, including all the exercises and assignments.

- **Sensor Fusion and Nonlinear Filtering**, Graduate course at Chalmers, 2018 – 2021

Role: Teaching Assistant, course material development.

- **Deep Machine Learning**, Graduate course at Chalmers, 2020

Role: Teaching Assistant.

Supervised Master Theses

- *Multi-object tracking based on multi-sensor multi-Bernoulli densities fusion*, Volvo Group, 2023

- *Model-based tracking of multiple merging and diverging highway lanes*, Zenseact, 2023

- *Deep decentralised multi-object tracking*, Chalmers, 2022

- *Deep extended object models*, Chalmers, 2022

- *Sequentially connected 2D assignments using Lagrangian dual methods*, Chalmers, 2022

- *Transforming the field of multi-object tracking*, Chalmers, 2021

Presentation Experience

- **Invited Lecture**

Data Association

International Conference on Information Fusion (Bootcamp), 2025.

- **Tutorial**

Poisson Multi-Bernoulli Mixtures for Multiple Target Tracking

International Conference on Information Fusion 2020 – 2025.

International Conference on Multisensor Fusion and Integration for Intelligent Systems 2024 – 2025.

- **Seminar**

Data Association in Multiple Object Tracking: Challenges and Solutions

KTH Royal Institute of Technology, Stockholm, 2025.

Poisson Multi-Bernoulli Mixtures for Multi-Object Tracking

Southeast University, Nanjing, 2024.

University of Electronic Science and Technology of China, Sichuan, 2025.

Bayesian Multi-Lane Tracking and Fusion Using Lane Marking Detections

Zenseact, Gothenburg, 2024.

University of Electronic Science and Technology of China, Sichuan, 2025.

Conjugate Priors for Bayesian Object Tracking

Zenseact, Gothenburg, 2021 and Linköping University, Linköping, 2022.

- **Paper Presentation**

International Conference on Information Fusion 2017 – 2020, 2023 – 2024.

International Conference on Multisensor Fusion and Integration for Intelligent Systems 2024 – 2025.

International Conference on Acoustics, Speech and Signal Processing 2020, 2023.

Radar Conference 2020.

Sensor Array and Multichannel Signal Processing Workshop 2020.

Grants and Awards

- **Shanghai Magnolia Youth Talent Program**, 2025

A prestigious initiative by the Shanghai municipal government to support outstanding young professionals and scholars contributing to the city's innovation and development.

- **Industrial postdoctoral fellowship**

Wallenberg AI Autonomous System and Software Program, PI, 2.2 MSEK, 2023

- **Paper awards**

International Conference on Multisensor Fusion and Integration for Intelligent Systems, 2024

International Conference on Information Fusion, 2021

Sensor Array and Multichannel Signal Processing Workshop, 2020

- **Adlerbert 60th anniversary scholarships**

Chalmers University of Technology, 60000 SEK, 2016

Awarded based on high GPA (1 of the 17 awardees).

- **Avancez scholarships**

Chalmers University of Technology, 85% tuition fee reduction, 2015

Professional Service

- **Conference Reviewer**

International Conference on Information Fusion

IEEE International Conference on Acoustics, Speech and Signal Processing

IEEE Intelligent Vehicle Symposium

IEEE International Conference on Intelligent Transportation Systems

IEEE International Conference on Multisensor Fusion and Integration for Intelligent Systems

- **Journal Reviewer**

IEEE T-SP, T-AES, T-ITS, T-IV, T-VT, T-ASE, T-WC, T-IP

IEEE/CAA J. Automatica Sinica, IEEE OJSP, Sensors Journal, Access, RAL, SPL, SL

Elsevier IF, EAAI, KBS, SP, DSP; IET SP, RSN; ISIF JAIF

Languages and Coding Skills

- **Languages:** Chinese (mother tongue), English (Fluent in speech and writing).

- **Coding Skills:** familiar with MATLAB, Python (PyTorch); experiences in C/C++, ROS, C#, SQL.

References

- Lennart Svensson
Full Professor
Department of Electrical Engineering, Chalmers University of Technology
Email: lennart.svensson@chalmers.se
- Ángel F. García-Fernández
Associate Professor
Information Processing and Telecommunications Center, Universidad Politécnica de Madrid
Email: angel.garcia.fernandez@upm.es
- Jason L. Williams
Director of Sensor Fusion
Whipbird Signals.
Email: jlwilliams@alum.mit.edu

Journal Publications

1. ***Yuxuan Xia**, Ángel F. García-Fernández, Johan Karlsson, Kuo-Chu Chang, Ting Yuan, Lennart Svensson.
Probabilistic GOSPA: A metric for performance evaluation of multi-object filters with uncertainties.
IEEE Transactions on Aerospace and Electronics Systems, 2025.
2. Jiayin Deng, Zhiqun Hu, **Yuxuan Xia**, Zhaoming Lu, Xiangming Wen.
Roadside 3-D extended object tracking by fusing sparse radar points and pixel keypoints.
IEEE Sensors Journal, 13(1), 26132 – 26151, 2025.
3. Yu Ge, Ossi Kalltiokallio, **Yuxuan Xia**, Ángel F. García-Fernández, Hyowon Kim, Jukka Talvitie, Mikko Valkama, Henk Wymeersch, Lennart Svensson.
Batch SLAM with PMBM data association sampling and graph-based optimization.
IEEE Transactions on Signal Processing, 73, 2139 – 2153, 2025.
4. Karl Granström, Lennart Svensson, **Yuxuan Xia**, Jason L. Williams, Ángel F. García-Fernández.
Poisson multi-Bernoulli mixtures for sets of trajectories.
IEEE Transactions on Aerospace and Electronics Systems, 61(2), 5178–5194, 2025.
5. ***Yuxuan Xia**, Ángel F. García-Fernández, Lennart Svensson.
Markov chain Monte Carlo data association for sets of trajectories.
IEEE Transactions on Aerospace and Electronics Systems, 60(6), 7804–7819, 2024.
6. Hyowon Kim, Ángel F. García-Fernández, Yu Ge, **Yuxuan Xia**, Lennart Svensson, Henk Wymeersch.
Set-type belief propagation with applications to Poisson multi-Bernoulli SLAM.
IEEE Transactions on Signal Processing, 72, 1989–2005, 2024.
7. Weiyi Xiong, Jianan Liu, Tao Huang, Qing-Long Han, **Yuxuan Xia**, Bing Zhu.
LXL: LiDAR excluded lean 3D object detection with 4D imaging radar and camera fusion.
IEEE Transactions on Intelligent Vehicles, 9(1), 79–92, 2024.
8. ***Yuxuan Xia**, Ángel F. García-Fernández, Florian Meyer, Jason L. Williams, Karl Granström, Lennart Svensson.
Trajectory PMB filters for extended object tracking using belief propagation.
IEEE Transactions on Aerospace and Electronic Systems, 59(6), 9312–9331, 2023.
9. Juliano Pinto, Georg Hess, William Ljungbergh, **Yuxuan Xia**, Henk Wymeersch, Lennart Svensson.
Deep learning for model-based multi-object tracking.
IEEE Transactions on Aerospace and Electronic Systems, 59(6), 7363–7379, 2023.
10. Ángel F. García-Fernández, **Yuxuan Xia**, Lennart Svensson.
Poisson multi-Bernoulli mixture filter with general target-generated measurements and arbitrary clutter.
IEEE Transactions on Signal Processing, 71, 1895–1906, 2023.
11. Jianan Liu, Liping Bai, **Yuxuan Xia**, Tao Huang, Bing Zhu, Qing-Long Han.
GNN-PMB: A simple but effective online 3D multi-object tracker without bells and whistles.
IEEE Transactions on Intelligent Vehicles, 8(2), 1176–1189, 2022.
12. ***Yuxuan Xia**, Lennart Svensson, Ángel F. García-Fernández, Jason L. Williams, Daniel Svensson, Karl Granström.
Multiple object trajectory estimation using backward simulation.
IEEE Transactions on Signal Processing, 70, 3249–3263, 2022.
13. Jianan Liu, Weiyi Xiong, Liping Bai, **Yuxuan Xia**, Tao Huang, Wanli Ouyang.
Deep instance segmentation with automotive radar detection points.
IEEE Transactions on Intelligent Vehicles, 8(1), 84–94, 2022.
14. ***Yuxuan Xia**, Karl Granström, Lennart Svensson, Maryam Fatemi, Ángel F. García-Fernández, Jason L. Williams.
Poisson multi-Bernoulli approximations for multiple extended object filtering.
IEEE Transactions on Aerospace and Electronic Systems, 58(2), 890–906, 2022.

15. Juliano Pinto, **Yuxuan Xia**, Lennart Svensson, Henk Wymeersch.
An uncertainty-aware performance measure for multi-object tracking.
IEEE Signal Processing Letters, 28, 1689–1693, 2021.
16. Ángel F. García-Fernández, Jason L. Williams, Lennart Svensson, **Yuxuan Xia**.
A Poisson multi-Bernoulli mixture filter for coexisting point and extended targets.
IEEE Transactions on Signal Processing, 69, 2600–2610, 2021.
17. Ángel F. García-Fernández, Lennart Svensson, Jason L. Williams, **Yuxuan Xia**, Karl Granström.
Trajectory Poisson multi-Bernoulli filters.
IEEE Transactions on Signal Processing, 68, 4933–4945, 2021.
18. ***Yuxuan Xia**, Pu Wang, Karl Oskar Erik Berntorp, Lennart Svensson, Karl Granström, Hassan Mansour, Petros T. Boufounos, Philip Orlik.
Learning-based extended object tracking using hierarchical truncation measurement model with automotive radar.
IEEE Journal of Selected Topics in Signal Processing, 15(4), 1013–1029, 2021.
19. ***Yuxuan Xia**, Karl Granström, Lennart Svensson, Ángel F. García-Fernández, Jason L. Williams.
Multi-scan implementation of the trajectory Poisson multi-Bernoulli mixture filter.
Journal of Advances in Information Fusion, 14(2), 213–235, 2019.
20. Karl Granström, Lennart Svensson, Stephan Reuter, **Yuxuan Xia**, Maryam Fatemi.
Likelihood-based data association for extended object tracking using sampling methods.
IEEE Transactions on Intelligent Vehicles, 3(1), 30–45, 2017.

Conference Publications

1. Alfred Wärnsäter, **Yuxuan Xia**, Yuan Ting, Johan Karlsson.
Efficient approximation of the trajectory GOSPA metric via graph-structured optimal transport.
IEEE Radar Conference, 2025.
2. Jan Krejčí, Oliver Kost, **Yuxuan Xia**, Lennart Svensson, Ondřej Straka.
Model-based multi-object visual tracking: Identification and standard model limitations.
International Conference on Information Fusion, 2025.
3. Yu Ge, Ossi Kaltiokallio, Hui Chen, Jukka Talvitie, **Yuxuan Xia**, Giyyarpuram Madhusudan, Guillaume Larue, Lennart Svensson, Mikko Valkama and Henk Wymeersch.
Target handover in distributed integrated sensing and communication.
IEEE International Conference on Communications, 2025.
4. **Yuxuan Xia**, Ángel F. García-Fernández, Lennart Svensson.
Hybrid PHD-PMB trajectory smoothing using backward simulation.
International Conference on Multisensor Fusion and Integration for Intelligent Systems, 2024.
5. **Yuxuan Xia**, Erik Stenborg, Junsheng Fu, Gustaf Hendeby.
Bayesian simultaneous localization and multi-lane tracking using onboard sensors and a SD map.
International Conference on Information Fusion, 2024.
6. Guanhua Ding, Jianan Liu, **Yuxuan Xia**, Tao Huang, Bing Zhu, Jinping Sun.
LiDAR point cloud-based multiple vehicle tracking with probabilistic measurement-region association.
International Conference on Information Fusion, 2024.
7. Yuchuan Jin, Theodor Stenhammar, David Beijmer, Axel Beauvisage, **Yuxuan Xia**, Junsheng Fu.
Towards accurate ego-lane identification with early time series classification.
International Conference on Information Fusion, 2024.
8. Jianan Liu, Guanhua Ding, **Yuxuan Xia**, Jinping Sun, Tao Huang, Lihua Xie, Bing Zhu.
Which framework is suitable for online 3D multi-object tracking for autonomous driving with automotive 4D imaging radar?
IEEE Intelligent Vehicles Symposium, 2024.

9. **Yuxuan Xia**, Ángel F. García-Fernández, Lennart Svensson.
An efficient implementation of the extended object trajectory PMB filter using blocked Gibbs sampling.
International Conference on Information Fusion, 2023.
10. Lechi Li, Chen Dai, **Yuxuan Xia**, Lennart Svensson.
Deep fusion of multi-object densities using transformer.
IEEE International Conference on Acoustics, Speech and Signal Processing, 2023.
11. Weiyi Xiong, Jianan Liu, **Yuxuan Xia**, Tao Huang, Bing Zhu, Wei Xiang.
Contrastive learning for automotive mmWave radar detection points based instance segmentation.
IEEE International Conference on Intelligent Transportation Systems, 2022.
12. Ángel F. García-Fernández, **Yuxuan Xia**, Lennart Svensson.
A comparison between PMBM Bayesian track initiation and labelled RFS adaptive birth.
International Conference on Information Fusion, 2022.
13. Juliano Pinto, Georg Hess, William Ljungbergh, **Yuxuan Xia**, Lennart Svensson, Henk Wymeersch.
Next generation multitarget trackers: random finite set methods vs transformer-based deep learning.
International Conference on Information Fusion, 2021.
14. **Yuxuan Xia**, Pu Wang, Karl Berntorp, Petros T. Boufounos, Philip V. Orlik, Lennart Svensson, Karl Granström.
Extended object tracking with automotive radar using learned structural measurement model.
IEEE Radar Conference, 2020.
15. **Yuxuan Xia**, Lennart Svensson, Ángel F. García-Fernández, Karl Granström, Jason L. Williams.
Backward simulation for sets of trajectories.
International Conference on Information Fusion, 2020.
16. Ángel F. García-Fernández, Lennart Svensson, Jason L. Williams, **Yuxuan Xia**, Karl Granström.
Trajectory multi-Bernoulli filters for multi-target tracking based on sets of trajectories.
International Conference on Information Fusion, 2020.
17. **Yuxuan Xia**, Pu Wang, Karl Berntorp, Hassan Mansour, Petros T. Boufounos, Philip V. Orlik.
Extended object tracking using hierarchical truncation model with partial-view measurements.
IEEE Sensor Array and Multichannel Signal Processing Workshop, 2020.
18. **Yuxuan Xia**, Pu Wang, Karl Berntorp, Toshiaki Koike-Akino, Hassan Mansour, Milutin Pajovic, Petros T. Boufounos, Philip V. Orlik.
Extended object tracking using hierarchical truncation measurement model with automotive radar.
IEEE International Conference on Acoustics, Speech and Signal Processing, 2020.
19. Karl Granström, Lennart Svensson, **Yuxuan Xia**, Ángel F. García-Fernández, Jason L. Williams.
Spatiotemporal constraints for sets of trajectories with applications to PMBM densities.
International Conference on Information Fusion, 2020.
20. **Yuxuan Xia**, Karl Granström, Lennart Svensson, Ángel F. García-Fernández, Jason L. Williams.
Extended target Poisson multi-Bernoulli mixture trackers based on sets of trajectories.
International Conference on Information Fusion, 2019.
21. Ángel F. García-Fernández, **Yuxuan Xia**, Karl Granström, Lennart Svensson, Jason L. Williams.
Gaussian implementation of the multi-Bernoulli mixture filter.
International Conference on Information Fusion, 2019.
22. Karl Granström, Lennart Svensson, **Yuxuan Xia**, Jason L. Williams, Ángel F. García-Fernández.
Poisson multi-Bernoulli mixture trackers: Continuity through random finite sets of trajectories.
International Conference on Information Fusion, 2018.
23. **Yuxuan Xia**, Karl Granström, Lennart Svensson, Ángel F. García-Fernández.
An implementation of the Poisson multi-Bernoulli mixture trajectory filter via dual decomposition.
International Conference on Information Fusion, 2018.
24. **Yuxuan Xia**, Karl Granström, Lennart Svensson, Ángel F. García-Fernández.
Performance evaluation of multi-Bernoulli conjugate priors for multi-target filtering.
International Conference on Information Fusion, 2017.

Patents

1. *System and method for tracking expanded state of an object.*
US Patent 11,619,494.
2. *System and method for tracking expanded state of moving object with model geometry learning.*
US Patent 11,879,964.
3. *Model-based road estimation.*
US Patent App. 18/739,846.