

## EXTENDED CURRICULAM VITAE

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### ACADEMIC POSITIONS

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- 04/2020-Present    **Research Assistant Professor**, Department of Aeronautical and Aviation Engineering, The Hong Kong Polytechnic University, Hong Kong
- 08/2018-04/2020    **Postdoctoral Fellow**, Department of Aeronautical and Aviation Engineering, The Hong Kong Polytechnic University, Hong Kong (work with **Dr. Li-Ta Hsu**)

### EDUCATION

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- 09/2012-06/2018    **PhD in Navigation, Guidance and Control** (Nanjing University of Science and Technology, Nanjing, China. Advisor: **Prof. Lei Dou**)
- 09/2008-06/2012    **BSc in Network Engineering** (Nanjing University of Science and Technology, Nanjing, China)

### RESEARCH INTERESTS

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- Signal processing with application to localization and wireless communications
- Global navigation satellite system receiver design
- Mitigation of radio frequency interference including jamming and spoofing

### TEACHING EXPERIENCE

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- **Flight Mechanics and Control Systems (AAE4006)**, The Hong Kong Polytechnic University, 2020-2021 Semester II
- **Dynamical Systems and Control (AAE3004)**, The Hong Kong Polytechnic University, 2020-2021 Semester I, 2021-2022 Semester I
- **Advanced Avionics Systems (ME583)**, The Hong Kong Polytechnic University (Teaching Assistant), 2018-2019 Semester I and 2019-2020 Semester I

### PROFESSIONAL MEMBERSHIPS

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- IEEE (US), **Professional Member**
- ION (Institute of Navigation, US), **Professional Member**

### ACADEMIC ACTIVITIES

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- **Guest editor** of special issue “All-Source Position and Navigation: An Alternative Solution for Resilient PNT” in *Applied Sciences*
- **Guest editor** of special issue “Advanced Technologies for Position and Navigation under GNSS Signal Challenging or Denied Environments” in *Remote Sensing*
- **Reviewer** for *IEEE Transactions on Aerospace and Electronic Systems*, *IEEE Communications Letters*, *International Journal of Communication Systems*, etc.

## HONORS/AWARDS

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- 2016 Outstanding Student Award, Nanjing University of Science and Technology, China
- 2012 Second Prize of 2012 National Post-Graduate Mathematical Contest in Modeling, China
- 2012 Star of Excellence Award, Nanjing University of Science and Technology, China
- 2011 National Encouragement Scholarship, Nanjing University of Science and Technology, China

## RESEARCH PROJECTS INVOLVED

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As the role of **PI**:

1. Research on direct position estimation based GNSS and 5G positioning and GNSS/5G deep integration mechanism, 1 Jan 2022~31 Dec 2024.
  - Funding body: National Natural Science Foundation of China (NSFC) 國家自然科學基金委員會
  - Funding scheme: NSFC for Young Scholar 國家自然科學基金委員會青年科學基金項目
2. Research on GNSS Vector Tracking based Anti-multipath Mechanism in Urban Environment, 1 Jan 2022~31 Dec 2024.
  - Funding body: 廣東省基礎與應用基礎研究項目 廣東省科學技術廳
  - Funding scheme: 廣東省基礎與應用基礎研究項目
3. Security reinforcement for high-precision fusion positioning, 1 Dec 2021 ~ 30 Nov 2022
  - Funding body: Huawei Technologies Co. Ltd.
  - Funding scheme: Huawei Technologies Co. Ltd. (Collaborative)
4. A-GNSS Based Direct Position Estimation: Modelling, Implementation and Performance Assessment, 15 Mar 2021~14 Mar 2023
  - Funding body: The Hong Kong Polytechnic University (UGC)
  - Funding scheme: Start-up Fund for RAPs under the Strategic Hiring Scheme
5. Detection and Localization of Radio Frequency Interference Source for GBAS Reference Stations in Terminal Area, 15 Jul 2020~13 Jul 2023.
  - Funding body: The Hong Kong Polytechnic University (UGC)
  - Funding scheme: Departmental Start-up Fund
6. Radio Frequency Interference Monitoring in Terminal Area, 1 Aug 2021 ~ 1 Oct 2022
  - Funding body: The Hong Kong Polytechnic University (UGC)
  - Funding scheme: Undergraduate Research and Innovation Scheme (URIS)

As the role of **Co-PI**:

1. Reliable Multiagent Collaborative Global Navigation Satellite System Positioning for Intelligent Transportation Systems, 2022~2024,
  - Funding body: RGC
  - Funding scheme: Research Impact Fund (RIF)

As the role of **Co-I**:

1. Unlocking the potential of AI edge intelligence and cloud-edge computing for flexible robotic and facility control system, 2 Jul 2021 ~ 1 Jul 2023
  - Funding body: Innovation and Technology Commission
  - Funding scheme: Innovation and Technology Fund - Partnership Research Programme (ITF-PRP)
2. Factor Graph Optimization for GNSS Positioning, 30 Jun 2021 ~ 29 Apr 2022
  - Funding body: Huawei Technologies Co. Ltd.
  - Funding scheme: Huawei Technologies Co. Ltd. (Collaborative)
3. Ultra-Tightly Coupled GNSS/INS Integration for Smartphone, 25 Dec 2018 ~ 24 Jan 2020
  - Funding body: Huawei Technologies Co. Ltd.
  - Funding scheme: Huawei Technologies Co. Ltd. (Collaborative)

As the role of **Member**:

1. Map Aided GNSS Urban Positioning Phase II, 12 Aug 2019 - 31 Dec 2020
  - Funding body: Huawei Technologies Co. Ltd.
  - Funding scheme: Huawei Technologies Co. Ltd. (Collaborative)

## **JOURNAL PUBLICATIONS (\*: Corresponding author)**

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1. C. Jiang, Y. Chen, **B. Xu**, J. Jia, H. Sun, T. Wang, Z. Duan, J. Hyppä (2022) Carrier-Aided Dual Frequency Vectorized Tracking Architecture for NavIC Signals, *IEEE Internet of Things Journal*, published online, DOI: 10.1109/JIOT.2022.3150764
  2. A. Dey, K. Iyer, **B. Xu**\*, N. Sharma, and Hsu, L.-T. (2022) Carrier-Aided Dual Frequency Vectorized Tracking Architecture for NavIC Signals, *IEEE Transactions on Instrumentation and Measurement*, 71:1-13
  3. C. Jiang, **B. Xu**\*, L.-T. Hsu (2021) Probabilistic Approach to Detect and Correct GNSS NLOS Signals Using an Augmented State Vector in the Extended Kalman Filter, *GPS Solutions* 25(72):1-14.
  4. Q. Jia, L.-T. Hsu, **B. Xu**, R. Wu (2021) A cost-effective beam forming structure for global navigation satellite system multipath mitigation and its assessment, *The Journal of Navigation* 74(2):425-445.
  5. J. Dou, **B. Xu**, L. Dou (2021) Impact Assessment of the Asynchronous Clocks Between Reference and User Receivers in Differential Pseudolite Navigation System, *IEEE Sensors Journal* 21(1): 403 – 411.
  6. G. Zhang, **B. Xu**, H.-F. Ng, L.-T. Hsu (2021) GNSS RUMS: GNSS Realistic Urban Multiagent Simulator for Collaborative Positioning Research, *Remote Sensing* 13(4): 544.

7. **B. Xu**, Q. Jia, L.-T. Hsu (2020) Vector Tracking Loop-Based GNSS NLOS Detection and Correction: Algorithm Design and Performance Analysis, *IEEE Transactions on Instrumentation and Measurement* 69(7):4604-4619.
8. A. El-Mowafy, **B. Xu**, L.-T. Hsu (2020) Integrity monitoring using multi-GNSS pseudorange observations in the urban environment combining ARAIM and 3D city models, *Journal of Spatial Science*, DOI: 10.1080/14498596.2020.1734109.
9. G. Zhang, W. Wen, **B. Xu**, L.-T. Hsu (2020) Extending Shadow Matching to Tightly-Coupled GNSS/INS Integration System, *IEEE Transactions on Vehicular Technology* 69(5):4979-4991.
10. **B. Xu**, L.-T. Hsu (2019) Open-source MATLAB code for GPS vector tracking on a software-defined receiver, *GPS Solutions* 23:46.
11. **B. Xu**, Q. Jia, Y. Luo, L.-T. Hsu (2019) Intelligent GPS L1 LOS/Multipath/NLOS Classifiers Based on Correlator-, RINEX- and NMEA-Level Measurements. *Remote Sensing* 11:1851.
12. J. Dou, **B. Xu**, L. Dou (2020) An intelligent joint filter for vector tracking loop considering noise interference, *Optik* 22:164984.
13. Q. Meng, L.-T. Hsu, **B. Xu**, X. Luo, A. El-Mowafy (2019) A GPS Spoofing Generator Using an Open Sourced Vector Tracking-Based Receiver, *Sensors* 19:3993.
14. Y. Luo, J. Li, C. Yu, **B. Xu**, Y. Li, L.-T. Hsu, N. El-Sheimy (2019) Research on Time-Correlated Errors Using Allan Variance in a Kalman Filter Applicable to Vector-Tracking-Based GNSS Software-Defined Receiver for Autonomous Ground Vehicle Navigation, *Remote Sensing* 11:1026.
15. J. Dou, **B. Xu**, L. Dou (2019) Performance assessment of GNSS scalar and vector frequency tracking loops, *Optik* 202:163552.
16. **B. Xu**, L. Dou (2018) GNSS IF Signal Simulation Considering Oscillator Phase Noise, *Journal of Navigation* 71(4): 805-820.
17. **B. Xu**, L. Dou (2018) Benefits of long coherent integration for CZT-based GPS signal acquisition, *Electronics Letters* 54(16):995-997.
18. **B. Xu**, L. Dou (2017) Novel acquisition of global positioning system signals based on parameter prediction and the chirp z-transform, *Proceedings of the Institution of Mechanical Engineers, Part G: Journal of Aerospace Engineering* 231(8):1391-1401.

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#### PAPERS UNDERGOING PEER-REVIEW (\*: Corresponding author)

1. A. Dey, **B. Xu\***, X. Lu, N. Sharma (2022) GNSS Code Multipath Time-frequency Analysis Using Wavelet-based Synchrosqueezing Transform in Urban Environments, *IEEE Geoscience and Remote Sensing Letters*, Minor Revision, under review
2. N. Sharma, A. Dey, P. Sing, D. Alapatt, S. Mishra, **B. Xu\***, L.-T. Hsu (2022) LabVIEW-based Real-Time Multi-Constellation NavIC/IRNSS (L5/S) and GPS (L1) Software Receiver: Development, Optimization and Benchmarking, *IEEE Transactions on Instrumentation and Measurement*, under review

3. J. Yue, **B. Xu\***, L.-T. Hsu (2022) Data Denoising Based on Hadamard Matrix Transformation and Rayleigh Quotient Maximization: Application to GNSS Signal Classification, *IEEE Transactions on Instrumentation and Measurement*, under review

## CONFERENCE PUBLICATIONS

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1. H. Xu, **B. Xu**, L.-T. Hsu (2022), 3DMA Sky Visibility Matching: An Example using a Simulated LEO Constellation, *ION ITM 2022, Long Beach, California, January 25-27, 2022*.
2. J. Fang, S. Vincenzo, J. Marcelino and **B. Xu** (2022), Adaptive GNSS Positioning Strategy Switching: Metric Modelling, Algorithm Design and Performance Analysis, *The International Conference on Smart Living, Hong Kong, March 31-April 1, 2022*.
3. S. Vincenzo, J. Marcelino and **B. Xu** (2022), Ultra-tight GNSS/UWB integration for seamless indoor/outdoor pedestrian navigation, *The International Conference on Smart Living, Hong Kong, March 31-April 1, 2022*.
4. Z. Li, J. Fang and **B. Xu** (2022), Vector Tracking Loop Based Mixed-Level Satellite Signal Type Classification in Urban Areas, *The International Conference on Smart Living, Hong Kong, March 31-April 1, 2022*.
5. **B. Xu** (Presenter), L.-T. Hsu, T. Suzuki (2020), Intermediate Frequency Level GPS Multipath Simulator based on Vector Tracking and Ray-tracing, *ION ITM 2020, San Diego, California, January 21-24, 2020*.
6. **B. Xu** (Presenter), L.-T. Hsu (2019), NLOS Detection and Compensation using a Vector Tracking-based GPS Software Receiver, *Proceedings of the 2019 Pacific PNT Meeting, ION Pacific PNT 2019, Honolulu, Hawaii, April 8-11, 2019*.
7. Y. Luo, C. Yu, **B. Xu**, G.-J. Tsai, J. Li, Y. Li, N. El-Sheimy (2019), Assessment of Ultra-Tightly Coupled GNSS/INS Integration System towards Autonomous Ground Vehicle Navigation Using Mobile-Phone IMU, *IEEE International Conference on Signal, Information and Data Processing 2019, Chongqing, China, December 11-13, 2019*.
8. **B. Xu** (Poster), L.-T. Hsu (2019), NLOS signal detection and correction based on vector tracking in urban environments, *Proceedings of the CSNC 2019, Beijing, China, May 2019*.
9. H. Xu, G. Zhang, **B. Xu**, L.-T. Hsu (2018), GNSS Shadow Matching based on Intelligent LOS/NLOS Classifier, *IAIN 2018, Japan*.
10. **B. Xu** (Presenter), L. Dou (2016), Performance of the Vector Tracking Loop Assisted by Desired Trajectory during Short Signal Outages, *Proceedings of 2016 IEEE Chinese Guidance, Navigation and Control Conference, August 12-14, 2016, Nanjing, China*.