Zhuang Chen

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EDUCATION

- **Ph.D.**   Sep 2016 – Nov 2022
  Major: Information and communication engineering
  Department of Electronic and Information Engineering, Beihang University
- **Master of Science**   Sep 2015 – Jul 2016
  Major: Communication engineering
  Department of Electronic and Information Engineering, Beihang University
- **Bachelor of Science**   Sep 2011 – Jul 2015
  Department of Electronic and Information Engineering, Beihang University

RESEARCH EXPERIENCE

- Cooperative Positioning System Based on Vehicle-to-Anything (V2X)

  - *Hybrid Cooperative Positioning Techniques Based on GNSS and Radio Ranging*

  The motivation of the research is to develop a hybrid cooperative positioning algorithm suitable for vehicular network applications, which can fuse the measurements from GNSS, infrastructures, other vehicles and inter-node ranging from neighboring vehicles. The work involves the theoretical analysis in terms of performance boundary and verification based on real data.

  - *Constrains of Vehicular Communication for Cooperative Purposes*

  The research focuses on the constrains of vehicular communication on cooperative positioning system. These constrains include the amount of data to be communicated, latency, packet loss rate, the number of participating vehicles, limited link life time, and transmit power.

- Reliable Real-Time Kinematic (RTK) Positioning in Constrained Environments

  - *RTK Positioning Based on a Cluster of Vehicles*

  The research is about developing techniques to handle the frequent signal blockages and limited satellite visibility. One vehicle may not observe sufficient common satellites for GNSS RTK positioning especially in urban environments but a cluster of vehicles may obtain the required observations. The work involves the design of ambiguity resolving algorithm and decentralized state estimation method by using carrier phase observations from a cluster of agents.

  - *Reliability Assessment of RTK Positioning in Urban Environments*

  The research argues the need for RTK positioning to have a reliability assessment mechanism in urban environments. The motivation is to provide instantaneous reliability assessment when the solutions can be trusted for intended operation. The work also involves the analysis of fault modes and the design of position-domain fault detection and exclusion algorithms.

- Chinese National Natural Science Foundation Project under Grant No. 91438116
  The project is entitled "GNSS receiver integrity monitoring based on the solution separation algorithm for the cooperative positioning system". The motivation is to provide a theoretical basis and technical

support for the reliability assessment of GNSS-based cooperative positioning applications.

ACADEMIC EXPERIENCE

- Oral presentation entitled "The Signal Quality Monitoring Method based on Multi-correlation Algorithm for GNSS Modernized Signals" at the 2018 International Technical Meeting of The Institute of Navigation, Reston, Virginia, January 2018

PUBLICATIONS

[1] **C. Zhuang**, H. Zhao, S. Hu, X. Meng, and W. Feng, "A Novel GNSS Fault Detection and Exclusion Method for Cooperative Positioning System," in *IEEE Transactions on Vehicular Technology*, 2022. DOI:10.1109/TVT.2022.3224607.

[2] **C. Zhuang**, H. Zhao, S. Hu, W. Feng and R. Liu, "Cooperative Positioning for V2X Applications Using GNSS Carrier Phase and UWB Ranging," in *IEEE Communications Letters*, 2021. DOI:10.1109/LCOMM.2021.3058152.

[3] **C. Zhuang**, H. Zhao, Y. He, S. Hu, W. Feng, B. Hou, "High-precision Positioning using Plane-constraint RTK Method under Urban Environments," in *Navigation of ION*, 2022. DOI: 10.33012/navi.540.

[4] **C. Zhuang**, H. Zhao, C. Sun and W. Feng, "Detection and Classification of GNSS Signal Distortions Based on Quadratic Discriminant Analysis," in *IEEE Access*, 2020. DOI:10.1109/ACCESS.2020.2965617.

[5] **C. Zhuang**, H. Zhao, S. Hu, C. Sun, W. Feng, "Integrity Monitoring Algorithm for GNSS-based Cooperative Positioning Applications," *Proceedings of the 32nd International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2019)*, Miami, Florida, September 2019. DOI: 10.33012/2019.16881.

[6] **C. Zhuang**, C. Sun, H. Zhao, W. Feng, "The Signal Quality Monitoring Method based on Multi-correlation Algorithm for GNSS Modernized Signals," *Proceedings of the 2018 International Technical Meeting of The Institute of Navigation*, Reston, Virginia, January 2018. DOI: 10.33012/2018.15572.

[7] C. Sun, H. Zhao, **C. Zhuang**, W. Feng, "The IFFT-based SQM method against digital distortion in GNSS signals," *GPS Solutions*, 2017, DOI:10.1007/s10291-017-0622-9.

[8] H. Zhao, Y. Chen, W. Feng, **C. Zhuang**, "A Dual-Channel Acquisition Method Based on Extended Replica Folding Algorithm for Long Pseudo-Noise Code in Inter-Satellite Links," *Sensors*, 2018, 18(6):1717. DOI: 10.3390/s18061717

[9] D. Gao, H. Zhao, **C. Zhuang**, "A Method for Estimating the Positioning Accuracy of Vehicles in Urban Environments," *Proceedings of the 35th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2022)*, Denver, Colorado, September 2022, pp. 2706-2717. DOI:10.33012/2022.18516

[10] Y. He, H. Zhao, **C. Zhuang**, S. Hu, W. Feng, "High-precision Positioning using Height-constraint RTK Method under Urban Environments," *Proceedings of the 34th International Technical Meeting of the Satellite Division of The Institute of Navigation (ION GNSS+ 2021)*, St. Louis, Missouri, September 2021, pp. 2328-2340. DOI:10.33012/2021.17916

[11] S. Hu, H. Zhao, **C. Zhuang**, Y. He, "A Whole-Net Positioning Method Based on Baseline Optimization Selection in Multi-vehicle Cooperative System," *China Satellite Navigation Conference (CSNC 2021)* 2021, DOI:10.1007/978-981-16-3138-2_52

[12] C. Sun, H. Zhao, **C. Zhuang**, W. Feng, "A Frequency Domain-based Detection Technique for Digital Distortion on GNSS Signals," *Proceedings of the 29th International Technical Meeting of The Satellite Division of the Institute of Navigation (ION GNSS+ 2016)*, Portland, Oregon, September 2016, pp.1804-1813. DOI: 10.33012/2016.14693.

[13] C. Sun, H. Zhao, W. Feng, **C. Zhuang**, "A Novel Digital Threat Model and Effect Analysis on Modernized BeiDou Signals," *Proceedings of the 2016 International Technical Meeting of The Institute of Navigation*, Monterey, California, January 2016, pp. 401-413. DOI: 10.33012/2016.13426.

HONORS & AWARDS

- 2014 Meritorious Winner of Mathematical Contest In Modeling and Interdisciplinary Contest In Modeling, awarded by the Consortium for Mathematics and Its Application
- 2016 Science and Technology Progress Award, awarded by GNSS and LBS Association of China
- 2018 Science and Technology Award, awarded by Chinese Institute of Electronics