Aimin Li ⓘD *Birth: Jul., 1998*

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Education

Harbin Institute of Technology, Shenzhen (HITSZ) (*985 Project, C9 League*)   Aug. 2016 – Jun. 2020
    Bachelor degree in EE (Highest Honor)   *Advisor: Prof. Shaohua Wu*
      Best Thesis Award (**Only 2 recipients** in EE Department)
      Provincial Merit Student (Rate **top 1%** in Heilongjiang Province, China)
      First Prize of The **Chinese Mathematics Competitions** (**Twice**)

Harbin Institute of Technology, Shenzhen (*985 Project, C9 League*)   Sept. 2020 – Today
    Phd Candidate in EE (Highest Honor)   *Advisor: Prof. Shaohua Wu*
      Special Merit Doctoral Scholarship (**Only 1 recipient** for Phd students in HITSZ)
      National Scholarship of China (**Twice**, Rate **top 0.2%** in China.)
      Provincial Outstanding Graduate Award (Rate **top 0.4%** in Heilongjiang Province, China)

Agency for Science, Technology, and Research (A*STAR), Singapore   Oct. 2023 – Oct. 2024
    Visiting Student in Institute for Infocomm Research (I^{2}R)   *Advisor: Prof. Sumei Sun*

Research Interest

1. Advanced channel coding in the Finite Block-Length (FBL) regime.
    My research work about FBL analysis of Spinal codes has been published in *IEEE Proc. ISIT, IEEE Trans. Commun., IEEE Trans. Wirel. Commun.,* **and** *IEEE Trans. Veh. Technol.*

2. Performance modeling and optimization of URLLC-oriented physical-layer communications, with a specific interest in Age of Information (AoI) analysis and optimizations.
    My research work about AoI has been published in *IEEE Globecom, IEEE Trans. Commun., IEEE Trans. Wirel. Commun.* **and** *IEEE J. Sel. Areas Inf. Theory.*

3. Goal-oriented and semantic communications, with a focus on evaluating the significance and value of sampled data packets to enhance goal completion.
    My research work about goal-oriented and semantic communications has been published in *IEEE Proc. ITW, IEEE Trans. Commun., IEEE Wirel. Commun.,* **and** *IEEE WCNC.*

Refereed Journal Articles[1]

1. [TCOM] **Aimin Li**, Shaohua Wu*, Xiaomeng Chen, and Sumei Sun. "Tight Upper Bounds on the BLER of Spinal codes over the AWGN Channel",
in *IEEE Trans. Commun., vol. 73, no. 1, pp. 332 - 347.* (**IF: 7.2, JCR Q1**)   Jul., 2024

2. [MWC] **Aimin Li**, Shaohua Wu*, Siqi Meng, Rongxing Lu, Sumei Sun, and Qinyu Zhang. "Toward Goal-Oriented Semantic Communications: New Metrics, Framework, and Open Challenges",
in IEEE Wirel. Commun., vol. 31, no. 5, pp. 238 - 245. (**IF: 10.9, JCR Q1**)   Jul., 2024

3. [TCOM] **Aimin Li**, Shaohua Wu*, Sumei Sun, and Jie Cao. "Goal-Oriented Tensor: Beyond Age of Information Towards Semantics-Empowered Goal-Oriented Communications",
in *IEEE Trans. Commun. vol. 72. no. 12. pp. 7689 - 7704.* (**IF: 7.2, JCR Q1**)   Jun., 2024

4. [TCOM] **Aimin Li**, Shaohua Wu*, Jian Jiao, Ning Zhang, and Qinyu Zhang. "Age of Information with Hybrid-ARQ: A Unified Explicit Result",
in *IEEE Trans. Commun. vol. 70, no. 12, pp. 7899-7914.* (**IF: 7.2, JCR Q1**)   October, 2022

5. [TWC] **Aimin Li**, Shaohua Wu*, Jian Jiao, Ning Zhang, and Qinyu Zhang. "Spinal Codes over Fading Channel: Error Probability Analysis and Encoding Structure Improvement",
in *IEEE Trans. Wirel. Commun., vol. 20, no. 12, pp. 8288-8300.* (**IF: 8.9, JCR Q1**)   Jun., 2021

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[1]($\star$ indicates junior students working on projects with me, $\star$ indicates my advisor.)

6. [NET] Siqi Meng[*], Shaohua Wu[*], Hanyu Wu, **Aimin Li**, Qinyu Zhang. "Effectiveness-Oriented SAGSIN: Unveiling a Unified Metric and a Comprehensive Framework",
in *IEEE Netw. vol. 38, no. 6, pp. 39-47.* (**IF: 6.8, JCR Q1**)   Jun., 2024

7. [JSAIT] Siqi Meng[*], Shaohua Wu[*], **Aimin Li**, Qinyu Zhang. "Towards Goal-Oriented Semantic Communications: AoII Analysis of Coded Status Update System Under FBL Regime",
IEEE J. Sel. Areas Inf. Theory, vol. 4, pp. 2641-8770.   Dec., 2023

8. [TWC] Shaohua Wu[*], Zhihong Deng, **Aimin Li**, Jian Jiao, Ning Zhang, and Qinyu Zhang. "Minimizing Age-of-Information in HARQ-CC Aided NOMA Systems",
in *IEEE Trans. Wirel. Commun., vol. 22, no. 2, pp. 1072-1086.* (**IF: 8.9, JCR Q1**)   Sept., 2022

9. [TCOM] Siqi Meng[*], Shaohua Wu[*], **Aimin Li**, Jian Jiao, Ning zhang, and Qinyu Zhang. "Analysis and Optimization of HARQ Based Spinal Coded Timely Status Update System",
in *IEEE Trans. Commun., vol. 70, no. 10, pp. 6425-6440.* (**IF: 7.2, JCR Q1**)   Aug., 2022

10. [LNET] Xiyu Lv, Shaohua Wu[*], **Aimin Li**, Jian Jiao, Ning Zhang and Qinyu Zhang. "A Weighted Graph-based Handover Strategy for Aeronautical Traffic in LEO SatCom Networks",
IEEE Netw. Lett., vol. 4, no. 3, pp. 132-136.   Jun., 2022

11. [TVT] Siqi Meng[*], Shaohua Wu[*], **Aimin Li**, Jian Jiao, Ning Zhang, and Qinyu Zhang. "Partial Self-Concatenation Structure and Performance Analysis of Spinal Codes over Rayleigh Fading Channel",
IEEE Trans. Veh. Technol., vol. 71, no. 6, pp. 6767-6771. (**IF: 6.1, JCR Q1**)   Mar., 2022

Refereed Conference Proceedings

12. [ITW] **Aimin Li**, Shaohua Wu[*], Gary C.F. Lee, Xiaomeng Chen, and Sumei Sun. "Sampling to Achieve the Goal: An Age-aware Remote Markov Decision Process".
IEEE Information Theory Workshop (*IEEE ITW, Session Chair of AoI Session*)   Nov., 2024

13. [ISIT] **Xiaomeng Chen[*], Aimin Li (Co-first)**, and Shaohua Wu[*]. "Tight Upper Bounds on the Error Probability of Spinal Codes over Fading Channels".
IEEE International Symposium on Information Theory (*IEEE ISIT*)   Aug., 2023

14. [WCNC] **Aimin Li**, Shaohua Wu[*], and Sumei Sun. "Goal-oriented tensor: Beyond AoI towards semantics-empowered goal-oriented communications".
IEEE Wireless Communications and Networking Conference (*IEEE WCNC*)   Apr., 2024

15. [GLOBECOM] **Aimin Li**, Shaohua Wu[*], Yajing Deng, Jian Jiao, Ning Zhang, Qinyu Zhang. "Analyzing Age Performance of Hybrid-ARQ: A Unified Explicit Result".
IEEE Global Communications Conference (*IEEE Globecom*)   Dec., 2022

16. [VTC] **Aimin Li**, Shaohua Wu[*], Ying Wang, Jian Jiao, and Qinyu Zhang. "Spinal Codes over BSC: Error Probability Analysis and the Puncturing Design".
IEEE Vehicular Technology Conference (*VTC2020-Spring*)   May, 2020

17. [ICC] Kunpeng Liu[*], Shaohua Wu[*], **Aimin Li**, and Qinyu Zhang. "Joint Transmission and Control in a Goal-oriented NOMA Network", (*IEEE ICC*)   2024

18. [ITW] Xiaomeng Chen[*], **Aimin Li**, and Shaohua Wu[*]. "Optimal Sampling for Uncertainty-of-Information Minimization in a Remote Monitoring System".
IEEE Information Theory Workshop (*IEEE ITW*)   Nov., 2024

19. [ICCT] Mingxiao Sun, Di Zhang, Shaobo Jia, **Aimin Li**. "Packet Management of AoI in The Finite Block-length Regime".
IEEE International Conference on Communication Technology (*IEEE ICCT*)   Oct., 2024

20. [INFOCOM] Kunpeng Liu[★], **Aimin Li**, and Shaohua Wu[★]. "Deep Reinforcement Learning-Assisted Age-optimal Transmission Policy for HARQ-aided NOMA Networks".
IEEE Conference on Computer Communications Workshops (IEEE Infocom Workshops)   Apr., 2023

21. [VTC] Jiaming Zhang[★], Shaohua Wu[★], **Aimin Li**, Jian Jiao, Qinyu Zhang. "Analysis of GEO Satellite Relay Coded Systems".
IEEE Vehicular Technology Conference (VTC2022-Fall)   Sept., 2022

22. [ICC] Siqi Meng[★], Shaohua Wu[★], **Aimin Li**, Jian Jiao, Ning Zhang, Qinyu Zhang. "Analysis and Optimization of Spinal Codes over the BSC: from the AoI Perspective".
IEEE International Conference on Communications Workshops (ICC Workshops)   Jun., 2021

Submitted Articles

23. [TIT] **Aimin Li**, Shaohua Wu[★], Gary Lee, and Sumei Sun. *"From Freshness to Effectiveness: Goal-oriented Sampling for Remote Decision Making",*
submitted to IEEE Trans. Inf. Theory. (***Under Review, an extended paper of IEEE ITW 2024***)   2025

24. [TWC] **Aimin Li**, Xiaomeng Chen[★], Shaohua Wu[★], Gary C.F. Lee, and Sumei Sun. "A Unified Expression for Upper Bounds on the BLER of Spinal Codes over Fading Channels",
submitted to IEEE Trans. Wirel. Commun. (***Major Revision, revised***)   2025

25. [TVT] **Aimin Li**, Shaohua Wu[★], Xiaomeng Chen[★], and Sumei Sun. "Error Floor of Spinal Codes under ML Decoding",
submitted to IEEE Trans. Veh. Technol. (***Major Revision, revised***)   2025

26. [TCOM] Mingxiao Sun, Lulu Song, Di Zhang, Shaobo Jia, **Aimin Li**, Al-Dulaimi, and Shahid Mumtaz. "Information Freshness and Timeliness Analysis in The Finite Blocklength Regime for Mission-Critical Applications",
submitted to IEEE Trans. Commun. (***Major Revision, revised***)   2025

27. [TCOM] Xiaomeng Chen[★], Shaohua Wu[★], **Aimin Li**, Dawei Chen, Pengfei Duan, and Qinyu Zhang. "Beyond Freshness, Towards Uncertainty: Entropy-Driven Sampling for Remote Estimation in Delay-Tolerant Networks",
submitted to IEEE Trans. Commun. (***Under Review***)   2025

28. [Mobihoc] Adem Utku Atasayar[★], **Aimin Li**, Cagri Ari, and Elif Uysal. "Fresh Data Delivery: Joint Sampling and Routing for Minimizing the Age of Information?",
submitted to ACM Mobihoc (***Under Review***)   2025

Papers in Progress

29. Jiahong Ning, **Aimin Li**, Ning Huang, Tingting Yang, and Sumei Sun. "Hybrid Hierarchical Offloading with Maritime Learning",
(Under Preparation)   2025

Awards

Provincial Outstanding Graduate Award   April, 2025
    (**Rate top 0.4% in Heilongjiang Province.**)

Award for HIT Outstanding Graduate Students   April, 2025
    (**Rate top 10% in HIT.**)

3rd Prize of IEEE Globecom 4MT Thesis Competition   Nov., 2024
    (**Ranked 5th out of 15 finalists worldwide.**)
    (**Awarded by the President of IEEE ComSoc.**)

IEEE Globecom 4MT Thesis Competition Travel Grant   Nov., 2024
    (**Top 15 PhD students worldwide.**)

National Scholarship of China   Nov., 2024
  (The Highest-Level Scholarship Funded by Government.) **(Rate top 0.2% in China.)**

Candidate for the National Natural Science Foundation Youth Project of China   Jan., 2024
  (Only 1 recipient for Phd Students in EE Department.)
  (One of Fewer than 600 PhD Students Across All Disciplines in China.)

HITSZ "Dianzi" Research Student Program   Nov., 2023
  (Only 1 recipient for Phd Students in EE Department.)

Chinese Government Scholarship by China Scholarship Council   Jul., 2023

Award for Outstanding Students in Academic and Applied Endeavors   Dec., 2021
  (Rate top 10% in EE Department.)

Special Merit Doctoral Scholarship of HIT   Nov., 2020
  (Only 1 recipient for Phd students across 13 departments in HITSZ.)
  (Awarded by the University President.)

National Scholarship of China   Nov., 2020
  (The Highest-Level Scholarship Funded by Government.) **(Rate top 0.2% in China)**

Best Thesis Award of HIT   Jul., 2020
  (Only 2 recipients for Bachelor Students in EE Department.)

Outstanding Student Award, Harbin Institute of Technology, 2018-2019 Academic Year   Dec., 2019
  (Rate top 10% in EE Department.)

Outstanding Participant, Tsinghua University Graduate Admissions Summer Camp   Jul., 2019
  (Top 40% campers among top-ranked students from elite Chinese universities.)
  (Earned admission qualification from Tsinghua University.)

Gongjin Scholarship for Overall Excellence   Dec., 2018
  (Only 3 recipients for students in EE Department.)
  (Awarded by the University Vice President.)

Award for Heilongjiang Provincial Merit Student   Nov., 2018
  (Rate top 1% in Heilongjiang Province, China.)

First Prize of Chinese College Student Mathematics Competitions   Dec., 2017
  (National-level Mathematics Competitions in China.)

First Class Scholarship for Comprehensive Excellence, HITSZ   Dec., 2017
  (Rate top 5% in HITSZ.)

Outstanding Student Award, Harbin Institute of Technology, 2016-2017 Academic Year   Dec., 2017
  (Rate Top 10% in EE Department.)

First Prize of Chinese College Student Mathematics Competitions   Dec., 2016
  (First Prize of National-level Mathematics Competitions in China.)

Teaching Experience

Communication Theory (Undergraduate Course)   Fall 2020
  Teaching Assistant, with Prof. Shaohua Wu, at Harbin Institute of Technology (Shenzhen)

Foundations of Information Theory (Graduate Course)   Fall 2022
  Teaching Assistant, with Prof. Shaohua Wu, at Harbin Institute of Technology (Shenzhen)

Academic Service

Conference Session Chair
  IEEE Information Theory Workshop 2024, Session Chair of Age of Information Session
  IEEE GLOBOCOM 2024, Session Chair of Distributed Learning Session

Reviewer
  IEEE Transactions on Information Theory (IEEE TIT)
  IEEE Journal on Selected Areas in Communications (IEEE JSAC)
  IEEE Transactions on Wireless Communications (IEEE TWC)
  IEEE Transactions on Neural Networking and Learning System (IEEE TNNLS)
  IEEE Transactions on Vehicular Technology (IEEE TVT)
  IEEE Transactions on Cognitive Communications and Networking (IEEE TCCN)
  IEEE Communications Letters (IEEE CL)

IEEE Wireless Communications Letters (**IEEE WCL**)
Elsevier Computer Networks
IEEE International Symposium on Information Theory (**IEEE ISIT**)
IEEE Conference on Computer Communications (**IEEE Infocom**)
IEEE International Conference on Communications (**IEEE ICC**)
IEEE Global Communications Conference (**IEEE Globecom**)
IEEE Wireless Communications and Networking Conference (**IEEE WCNC**)
IEEE Vehicular Technology Conference (**IEEE VTC**)
IEEE International Wireless Communications and Mobile Computing Conference (**IEEE IWCMC**)

Volunteer
IEEE 6G Summit 2023, Singapore
IEEE Vehicular Technology Conference (**IEEE VTC-Spring 2024**)**, Singapore**
IEEE 6G Summit 2024, Singapore

Reference

Dr. Shaohua Wu   PhD advisor, HITSZ
Full Professor, Electrical Engineering, Harbin Institute of Technology (Shenzhen)
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Dr. Sumei Sun, IEEE Fellow   PhD Co-advisor, A*STAR
Fellow of the Academy of Engineering Singapore
Executive Director, Institute for Infocomm Research (I2R), A*STAR
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Dr. Qinyu Zhang
National Science Fund for Distinguished Young Scholars
Vice President, Harbin Institute of Technology (Shenzhen)
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