

Tong Xia



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Affiliation: Computer Science and Technology Department, University of Cambridge

Research Direction: Mobile health, Machine Learning, Mobile Computing

Highlights

- 7 years of research expertise in digital and mobile health, machine learning, mobile big data, and mobile computing
- Research experience in multidisciplinary and international teams for European Research Council, National Natural Science Foundation of China, and industry-university grants
- H-index of 18, with 1500+ citations and over 50 publications in medicine journals and AI conference
- Extensive global connections with universities and industry leaders, including Tencent, Huawei, Nokia, and Meta
- Rich teaching experience in 5 undergraduate courses and 1 postgraduate course
- Co-supervising 1 PhD, 2 Master's, and 3 undergraduate students for their dissertations

Working Experience

May 2024 – Now *Postdoctoral Research Associate, University of Cambridge*

Sept. 2023 – May 2024 *Postdoctoral Research Assistant, University of Cambridge*

- Department of Computer Science and Technology
- Mobile Systems group, mentored by [Prof. Cecilia Mascolo](#)
- Funded by European Research Council (ERC) Grant – Horizon 2020
- Leading the *Generative AI for Mobile Health* project
- Co-supervising PhD and Master students

Education

Oct. 2020 – May 2024 *Ph.D. Computer Science, University of Cambridge*

- Department of Computer Science and Technology & Queens' College
- Mobile Systems group, supervised by [Prof. Cecilia Mascolo](#)
- [Huawei studentship in mHealth](#)
- Member of *Women@CL Cambridge* and *Computer Science Society of Queens'*
- Thesis titled by *Reliable and Decentralised Deep Learning for Physiological Data*

Sept. 2017 – July 2020 *M.Eng. Electronics and Communication Engineering, Tsinghua University*

- Department of Electronic Engineering & Tsinghua Shenzhen International Graduate School, Tsinghua University, supervised by [Prof. Yong Li](#) & [Prof. Qingmin Liao](#)
- Main participant in the National Natural Science Foundation of China (General Program): *Research on Modelling and Predicting Mobile User App Usage Behaviours*, 2019 –2023
- GPA: 3.83/4.0, [graduate with honour](#)
- Thesis titled by *Mobile Users Online and Offline Behaviour Modelling*
- [Distinguished Master Thesis Award](#)

Sept. 2013 – Jun. 2017 *B.Eng. Electronic Information Engineering, Wuhan University*

- School of Electronic Information, Wuhan, China

- GPA: 3.93/4.0, ranked 1st out of ~400 students
- Outstanding undergraduate

Industry Collaboration and Internship

- May. 2022 – Now *Research collaboration, **Nokia Bell Labs**, Cambridge, UK*
- Collaboration project *On-device Uncertainty Quantification for Mobile Health*
 - Co-organising workshop *FairComp* in top-tier ubiquitous computing conference
- May. 2019 – Feb. 2020 *Research Intern, **Tencent Inc.**, Beijing, China*
- Map Service, Map Big Data Lab, Tencent Inc.
 - Tencent-Tsinghua Joint Laboratory, *Trajectory Big Data Mining*, Core Project Team Member
 - Rhino-Bird Elite Training Program, rewarded as the *Best Intern*
 - Owning two innovative patents in trajectory modelling and transportation planning

Honours and Awards

- 2024 Shortlisted for a Research Fellowship at Jesus and St Johns College, University of Cambridge
- 2023 **Chinese Government Award for Outstanding Self-financed Students Abroad** (600 PhDs globally, a prize of 6000 US dollars each PhD)
- 2022 the 2nd poster award at the Precision Health Initiative Launch Symposium
- 2022 Best Postgraduate Poster in Oxbridge Women in Computer Science Conference
- 2022 COVID-19 Sounds project awarded as **Better Future Award in Hall of Fame Awards**, Cambridge
- 2021 ISCA **INTERSPEECH Student Travel Grant**
- 2020 **Huawei Studentship**, Overseas PhD Full Scholarship for 2020-2023
- 2020 **Distinguished Master Thesis Award by the Chinese Institute of Electronics**
- 2020 Outstanding Master's Graduates of Tsinghua University
- 2020 Outstanding Research Intern, Tencent, Beijing
- 2019 National Graduate Student Scholarship of China
- 2017 Outstanding Undergraduate Prize of Wuhan University
- 2016 Intel Cup Embedded System Invitational Contest, National Third Prize
- 2014 National Undergraduate Student Scholarship of China

Publication List

To date, I have published over 50 peer-reviewed papers, including **3 first-author papers in top medical or AI journals** and **7 first-author papers in CCF-A/B conferences**. My Google Scholar citations exceed 1500, and my h-index is 18. A full list of publications can be found on my [Google Scholar](#). Key publications are listed below (*Equal contribution, ^Corresponding author).

First author and corresponding author journal papers:

1. Sounds of COVID-19: Exploring Realistic Performance of Audio-based Digital Testing
J. Han*, **T. Xia**^{*^}, D. Spathis, C. Mascolo, et al.
Nature NPJ Digital Medicine (IF=15.357), 2022 (*Top medicine journal*)
2. Class-balanced Evidential Deep Learning for Health Diagnostics
T. Xia[^], T. Dang, J. Han, L. Qendro, and C. Mascolo
IEEE Journal of Biomedical and Health Informatics, JBHI (IF=7.7), 2024 (*Top medicine journal*)
3. Uncertainty-aware and History-enhanced Trajectory Recovery via Attentional Network
T. Xia, Y. Qi, J. Feng, F. Xu, F. Sun, D. Guo, and Y. Li
ACM Transactions on Knowledge Discovery from Data, TKDD (IF=4.157), 2023

4. Exploring Machine Learning for Audio-based Respiratory Condition Screening: A Concise Review of Databases, Methods, and Open Issues
T. Xia[^], J. Han, L. Qendro, and C. Mascolo
Journal of Experimental Biology and Medicine, JEBM (IF=4.088), 2022
5. Understanding Urban Dynamics via State-sharing Hidden Markov Model
T. Xia, Y. Yue, Y. Li, et al.
IEEE Transactions on Knowledge and Data Engineering, TKDE (IF=9.235), 2021 (CCF A journal)
6. 3DGCN: 3-dimensional Dynamic Graph Convolutional Network for Citywide Crowd Flow Prediction
T. Xia, J. Lin, Y. Li, J. Feng, P. Hui, F. Sun, D. Guo, and D. Jin
ACM Transactions on Knowledge Discovery from Data, TKDD (IF=4.157), 2021
7. DeepApp: Predicting Personalized Smartphone App Usage via Context-aware Multi-task Learning
T. Xia, Y. Li, J. Feng, D. Jin, Q. Zhang, H. Luo, and Q. Liao
ACM Transactions on Intelligent Systems and Technology, TIST (IF=5.0), 2020

First author conference papers:

8. Flea: Addressing Data Scarcity and Label Skew in Federated Learning via Privacy-preserving Feature Augmentation
T. Xia, A. Ghosh, X. Qiu, and C. Mascolo
ACM SIGKDD Conference of Knowledge Discovery and Data Mining, KDD 2024 (CCF A)
9. Cross-device Federated Learning for Mobile Health Diagnostics: A First Study on COVID-19 Detection
T. Xia, J. Han, A. Ghosh, and C. Mascolo
IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2023 (CCF B)
10. COVID-19 Sounds: A Large-Scale Audio Dataset for Digital Respiratory Screening
T. Xia*, D. Spathis*, C. Brown, J. Chauhan, A. Grammenos, J. Han, C. Mascolo, et al.
Conference on Neural Information Processing Systems, NeurIPS Datasets and Benchmarks Track 2021 (CCF A)
11. Hybrid-EDL: Improving Evidential Deep Learning for Uncertainty Quantification on Imbalanced Data
T. Xia, J. Han, L. Qendro, T. Dang, C. Mascolo
Workshop on Trustworthy and Socially Responsible Machine Learning, NeurIPS 2022
12. Benchmarking Uncertainty Quantification on Biosignal Classification Tasks under Dataset Shift
T. Xia, J. Han, C. Mascolo
Workshop on Health Intelligence, AAAI 2022
13. Evidential Deep Learning for Uncertainty-Aware Mobile Health
T. Xia, J. Han, L. Qendro, and C. Mascolo
UK Mobile, Wearable and Ubiquitous Systems Research Symposium, MobiUK 2022
14. Attnmove: History Enhanced Trajectory Recovery via Attentional Network
T. Xia, Y. Qi, J. Feng, F. Xu, F. Sun, D. Guo, and Y. Li
Annual AAAI Conference on Artificial Intelligence, AAAI 2021 (CCF A)
15. Uncertainty-aware COVID-19 Detection from Imbalanced Sound Data
T. Xia, J. Han, L. Qendro, T. Dang, and C. Mascolo
Conference of the International Speech Communication Association, INTERSPEECH 2021 (CCF C)
16. Mobility-based Individual POI Recommendation to Control the COVID-19 Spread
A. Ghosh* and T. Xia*
IEEE International Conference on Big Data, Big Data 2021 (CCF C)
17. Exploring Automatic Diagnosis of COVID-19 from Crowdsourced Respiratory Sound Data
C. Brown*, J. Chauhan*, A. Grammenos*, J. Han*, A. Hasthanasombat*, D. Spathis*, T. Xia*, P. Cicuta, and C. Mascolo

ACM SIGKDD Conference of Knowledge Discovery and Data Mining, KDD 2020 (CCF A)

18. Semantic-aware Spatio-temporal App Usage Representation via Graph Convolutional Network
Y. Yu*, **T. Xia***, H. Wang, J. Feng, Y. Li
ACM international joint conference on pervasive and ubiquitous computing, UbiComp 2020 (CCF A)
19. Revealing Urban Dynamics by Learning Online and Offline Behaviours Together
T. Xia, Y. Li, J. Feng, D. Jin, Q. Zhang, H. Luo, and Q. Liao
ACM international joint conference on pervasive and ubiquitous computing, UbiComp 2019 (CCF A)

Co-author publications:

20. Reinforcement Learning for Solving Multiple Vehicle Routing Problem with Time Window
Z. Zong, **T. Xia**, M. Zheng, Y. Li
ACM Transactions on Intelligent Systems and Technology, TIST (IF=5.0), 2024
21. Smartphone App Usage Analysis: Datasets, Methods, and Applications
T. Li, **T. Xia**, H. Wang, Z. Tu, S. Tarkoma, Z. Han, and P. Hui
IEEE Communications Surveys & Tutorials (IF=35.6), 2022 (Top journal)
22. Healthy Cities, A Comprehensive Dataset for Environmental Determinants of Health in England Cities
Z. Han, **T. Xia**, Y. Xi, and Y. Li
Scientific Data (IF=9.8), 2023
23. Evaluating Listening Performance for COVID-19 Detection by Clinicians and Machine Learning: Comparative Study
J. Han, M. Montagna, A. Grammenos, **T. Xia**, E. Bondareva, et al.
Journal of Medical Internet Research, JMIR (IF=7.076), 2023 (Top medicine journal)
24. Contact tracing and epidemic intervention via deep reinforcement learning
T. Feng, S. Song, **T. Xia**, Y. Li
ACM Transactions on Knowledge Discovery from Data, TKDD (IF=4.157), 2023
25. A Summary of the ComParE COVID-19 Challenges
A. Akman, H. Coppock, C. Bergler, M. Gerczuk, C. Brown, J. Chauhan, A. Grammenos, A. Hasthanasombat, D. Spathis, **T. Xia**, P. Cicuta, J. Han, S. Amiriparian, A. Baird, L. Stappen, S. Ottl, P. Tzirakis, A. Batliner, C. Mascolo, B. W. Schuller
Frontiers in Digital Health, 2023
26. Exploring Longitudinal Cough, Breath, and Voice Data for COVID-19 Disease Progression Prediction via Sequential Deep Learning: Model Development and Validation
T. Dang, J. Han*, **T. Xia***, D. Spathis, and C. Mascolo, et al.
Journal of Medical Internet Research, JMIR (IF=7.076), 2022 (Top medicine journal)
27. Understanding the long-term dynamics of mobile app usage context via graph embedding
Y. Fan, Z. Tu, T. Li, H. Cao, **T. Xia**, Y. Li, X. Chen, L. Zhang
IEEE Transactions on Knowledge and Data Engineering, TKDE (IF=9.235), 2021 (CCF A journal)
28. DeepFlowGen: Intention-aware fine grained crowd flow generation via deep neural networks
E. Shao, H. Wang, J. Feng, **T. Xia**, H. Yang, L. Geng, D. Jin, Y. Li
IEEE Transactions on Knowledge and Data Engineering, TKDE (IF=9.235), 2021 (CCF A journal)
29. Mobile app usage patterns aware smart data pricing
J. Yin, Y. Fan, **T. Xia**, Y. Li, X. Chen, Z. Zhou, X. Chen
IEEE Journal on Selected Areas in Communications, JSAC (IF=16.4) 2020 (Top journal)
30. DeepMM: Deep learning based map matching with data augmentation
J. Feng, Y. Li, K. Zhao, Z. Xu, **T. Xia**, J. Zhang, D. Jin

- IEEE Transactions on Mobile Computing, TMC (IF=7.9) 2020 (Top journal)*
31. To what extent we repeat ourselves? Discovering daily activity patterns across mobile app usage
T. Li, Y. Li, MA Hoque, **T. Xia**, S. Tarkoma, P. Hui
IEEE Transactions on Mobile Computing, TMC (IF=7.9) 2020 (Top journal)
 32. Portfolio Optimization in Traffic Offloading: Concept, Model, and Algorithms
D. Xu, Y. Li, **T. Xia**, J. Li, S. Tarkoma, P. Hui
IEEE Transactions on Mobile Computing, TMC (IF=7.9) 2019 (Top journal)
 33. Finding spatiotemporal patterns of mobile application usage
T. Li, Y. Li, **T. Xia**, P. Hui
IEEE Transactions on Network Science and Engineering, TNSE (IF=6.6), 2021
 34. Predicting socio-economic levels of urban regions via offline and online indicators
Y. Ren, **T. Xia**, Y. Li, X. Chen
PloS one (IF=3.7), 2019
 35. Conditional Neural ODE Processes for Individual Disease Progression Forecasting: A Case Study on COVID-19
T. Dang, J. Han*, **T. Xia***, D. Spathis, C. Mascolo, et al.
ACM SIGKDD Conference of Knowledge Discovery and Data Mining, KDD 2023 (CCF A)
 36. Devil in the Landscapes: Inferring Epidemic Exposure Risks from Street View Imagery
Z. Han, Y. Xi, **T. Xia**, Y. Liu, Y. Li
ACM International Conference on Advances in Geographic Information Systems, SIGSPATIAL 2023
 37. FairComp: Workshop on Fairness and Robustness in Machine Learning for Ubiquitous Computing
S Yfantidou, D Spathis, M Constantinides, **T Xia**, N Van Berkel
Adjunct Proceedings of the ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing, 2023
 38. Uncertainty Quantification in Federated Learning for Heterogeneous Health Data
Y Zhang, **T Xia**, A Ghosh, C Mascolo
International Workshop on Federated Learning for Distributed Data Mining, 2023
 39. Precise Mobility Intervention for Epidemic Control Using Unobservable Information via Deep Reinforcement Learning
T. Feng, **T. Xia**, H. Wang, X. Fan, and Y. Li
ACM SIGKDD Conference of Knowledge Discovery and Data Mining, KDD 2022 (CCF A)
 40. Reviving the economy while saving lives: a deep reinforcement learning approach for smart POI reopening
T. Feng, H. Wang, X. Fan, **T. Xia**, Y Li
ACM International Conference on Advances in Geographic Information Systems, SIGSPATIAL 2022
 41. Towards Uncertainty-Aware Murmur Detection in Heart Sounds via Tandem Learning
E. Bondareva, **T. Xia**, J. Han, C. Mascolo
Computing in Cardiology, CinC 2022
 42. Quantifying the Causal Effect of Individual Mobility on Health Status in Urban Space
Y. Zhang, F. Xu, **T. Xia**, and Y. Li
ACM international joint conference on pervasive and ubiquitous computing, UbiComp 2021 (CCF A)
 43. One-shot Transfer Learning for Population Mapping
E. Shao, J. Feng, Y. Wang, **T. Xia**, Y. Li
ACM International Conference on Information & Knowledge Management, CIKM 2021 (CCF B)
 44. Exploring automatic COVID-19 diagnosis via voice and symptoms from crowdsourced data
J. Han, C. Brown*, J. Chauhan*, A. Grammenos*, A. Hasthanasombat*, D. Spathis*, **T. Xia***, P. Cicuti, C. Mascolo

IEEE International Conference on Acoustics, Speech and Signal Processing, ICASSP 2021 (CCF B)

45. The INTERSPEECH 2021 computational paralinguistics challenge: COVID-19 cough, COVID-19 speech, escalation & primates
B.W. Schuller, A. Batliner, C. Bergler, C. Mascolo, J. Han, I. Lefter, H. Kaya, S. Amiriparian, A. Baird, L. Stappen, S. Ottl, M. Gerczuk, P. Tzirakis, C. Brown, J. Chauhan, A. Grammenos, A. Hasthanasombat, D. Spathis, **T. Xia**, P. Cicuta, L. JM Rothkrantz, J. Zwerts, J. Treep, C. Kaandorp
Conference of the International Speech Communication Association, INTERSPEECH 2021 (CCF C)
46. A Sequential Convolution Network for Population Flow Prediction with Explicitly Correlation Modelling
J. Feng, Z. Lin, **T. Xia**, F. Sun, D. Guo, Y. Li
International Joint Conferences on Artificial Intelligence, IJCAI 2020 (CCF A)
47. Sume: Semantic-enhanced urban mobility network embedding for user demographic inference
F. Xu, Z. Lin, **T. Xia**, D. Guo, Y. Li
ACM international joint conference on pervasive and ubiquitous computing, UbiComp 2020 (CCF A)
48. UrbanRhythm: Revealing Daily Urban Dynamics Hidden in Mobility Data
S. Song, **T. Xia**, J. Feng, P. Hui, Y. Li
Workshop on Urban Computing, SIGKDD 2019
49. Detecting Popular Temporal Modes in Population-scale Unlabelled Trajectory Data
F. Xu, **T. Xia**, Y. Li, F. Sun, F. Meng
ACM international joint conference on pervasive and ubiquitous computing, UbiComp 2018 (CCF A)
50. Detecting Human Interaction Borders in City: The Shanghai Case
T. Xia, F. Xu, J. Yin, X. Chen, Y. Li, Q. Liao
UbiComp/ISWC Adjunct, 2018

PhD Thesis:

51. T. Xia. "Reliable and decentralised deep learning for physiological data." PhD diss., 2024

Patents

1. Y. Li, T. Feng, **T. Xia**, and D. Jing. *An Individual Epidemic Prevention and Control Method and System*. No: CN113658718B. Chinese Patent, 2024
2. Y. Li, **T. Xia**, F. Jie, Lu. Geng, and D. Jing. *A Navigation Method and Navigation System*. No: CN113252054B. Chinese Patent, 2023
3. **T. Xia**, F. Jie, Y. Li, F. Sun and D. Guo. *Road Network Data Processing Method, Device, Equipment, and Storage Medium*. No: CN111275300B. Chinese Patent, 2023
4. Y. Li, **T. Xia**, D. Jing, and F. Sun. *Method for Determining Hidden State Sequences and Method for Determining Functional Types of Blocks*. No: CN111598114B, 2023
5. D. Jing, Y. Li, and **T. Xia**. *A Method and System for Predicting Block Pedestrian Flow Based on Spatiotemporal Graph Convolutional Neural Network*. No: CN111612206B. 2022

Teaching Experience

Guest Lecturer, University of Cambridge:

- *Generative AI and Mobile health* in [Mobile Health](#) course for CS students, 2024

Undergraduate Lab Demonstrating, University of Cambridge:

- Machine Learning & Real-World Data, Part IA (1st year undergraduate), 2023

Face-to-face Undergraduate Group Supervision, University of Cambridge:

- Artificial Intelligence, Part IB (2nd year undergraduate), 2022, 2023
- Machine Learning & Real-World Data, Part IA (1st year undergraduate), 2021, 2022
- Foundation of Data Science, Part IA (1st year undergraduate), 2021

Online AI Research Skill Training, CCISTC Distance Internship Programs:

- Teaching general computer science research skills including Python programming
- Supervising individual AI research proposal writing, 60 students in total, 2020-2021

Lecture Teaching Assistant, Tsinghua University:

- Big Data and Machine Learning, undergraduate course, 50 students, 2019

Research Mentoring

PhD research, University of Cambridge:

- Co-mentoring *Evelyn Zhang* for her PhD research project: Respiratory sound foundation model for data-efficient respiratory health diagnosis, on-going

MPhil Dissertation, University of Cambridge:

- Co-supervising *Evelyn Zhang* for her MPhil dissertation: *Exploring uncertainty quantification in federated learning for healthcare*, 2022. This student was awarded a **commended dissertation award** by the department - one of the 4 prizes awarded for dissertations in computer science

Undergraduate (Part II) Dissertation, University of Cambridge:

- Co-supervising *Alex Wang* for his part II dissertation: *A holistic evaluation of the quality of uncertainty from Bayesian model ensemble in federated learning*, 2022

Master Dissertation, Tsinghua University:

- Co-supervising *Tao Feng* for his Master research: *Exploring deep reinforcement learning for mobility-based precise epidemic controlling*, 2019-2022, with paper accepted by KDD 2022

Undergraduate Student Research Training, Tsinghua University:

- Co-supervising *Yue Yu* for a SRT project of *Smartphone app usage representation via graph convolutional network*, 2018-2019. A paper published in ACM UbiComp 2020
- Co-supervising *Junjie Lin* for a SRT project of *Exploring graph convolutional network for citywide crowd flow prediction*, 2019-2020. A paper published in TKDD 2021

Invited Talks and Presentations

- July 2023 Invited talk Sounds of COVID-19 at Launch of Compendium of Open Technology, Cambridge, UK
- April 2023 Invited talk Sounds of COVID-19: Exploring Realistic Performance of Audio-based Digital Testing, Tsinghua University, Beijing
- July 2022 Evidential Deep Learning for Uncertainty-Aware Mobile Health, [MobiUK](#), London
- Sep. 2021 Uncertainty-Aware COVID-19 Detection from Imbalanced Sound Data, INTERSPEECH conference presentation
- Nov. 2021 Uncertainty-aware Machine Learning for Biosignal-based Healthcare Applications, Women@CL [Talks](#), University of Cambridge
- Dec. 2020 Exploring Automatic Diagnosis of COVID-19 from Crowdsourced Respiratory Sound Data, Cambridge University Students' Clinical Research Society - [Research During COVID](#)

Academic Services

Seminar Organizer:

- Mobile and Wearable Health Seminar [Series](#), University of Cambridge, 2023-2024

Conference Organizer:

- Poster&Demo Chair of the ACM UbiComp 2022
- Organizer of ACM UbiComp FairComp workshop, 2023

Journal Reviewer:

- Lancet Regional Health-Europe (IF=20.9, **Top medicine journal**)
- EPJ Data Science (IF=3.63)
- Nature Scientific Data (IF=8.051)
- Nature Scientific Reports (IF=4.996)
- IEEE Transactions on Neural Networks and Learning Systems (IF=14.255, **Top AI journal**)
- IEEE Transactions on Network and Service Management (IF=4.758)
- IEEE Transactions on Affective Computing (IF=11.2, **Top AI journal**)
- ACM Transactions on Knowledge Discovery from Data (IF=3.6)

Conference Programme Committee Member:

- AAAI (AAAI Conference on Artificial Intelligence) 2021-2024 (**CCF A**)
- IJCAI (International Joint Conference on Artificial Intelligence) 2021-2024 (**CCF A**)
- KDD (SIGKDD Conference on Knowledge Discovery and Data Mining) 2022-2024 (**CCF A**)
- ICASSP (IEEE International Conference on Acoustics, Speech and Signal Processing) 2022-2024 (**CCF B**)
- CHIL (Conference on Health, Inference, and Learning) 2024

Non-Academic Services

Since 2021, I have been a committee member of the **UK Tsinghua Alumni Association** (UKAT). Since 2022, I have been the leader of the publicity team and managed the official UKTA WeChat public account. In late 2023, I officially became the Vice Secretary-General of UKTA.