

# SHUAI WANG

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## 👤 SHORT BIOGRAPHY

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Shuai Wang is a 6<sup>th</sup>-year Ph.D. Candidate supervised by Prof. Parth H. Pathak (GMU) and Prof. Song Min Kim (KAIST) in the Department of Computer Science at George Mason University. He is interested in wireless sensing, mobile computing, wireless communication (5G, WiFi, LTE, ZigBee, BLE, LoRa, RFID etc.), IoT, and embedded systems for improving wireless connectivity. During his Ph.D. life in GMU, he has published 7 research papers on top conferences including SenSys, MobiCom, ICDCS, and SECON. He won the best paper award at ICDCS 2018. Before joining GMU, he was a Ph.D. student in the Department of Computer Science and Technology at Harbin Institute of Technology, where he received his bachelor and master degrees.

## 🎓 EDUCATION

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<b>George Mason University</b> , Fairfax, Virginia <i>Ph.D. Student</i> in Computer Science	2017.08 – Present
<b>Harbin Institute of Technology</b> , Harbin, China <i>Ph.D. Student</i> in Computer Science and Technology	2013.08 – 2017.07
<b>Harbin Institute of Technology</b> , Harbin, China <i>M.E.</i> in Computer Science and Technology	2011.08 – 2013.07
<b>Harbin Institute of Technology</b> , Harbin, China <i>B.E.</i> in Information Security	2007.08 – 2011.07

## ⚙️ WORKING EXPERIENCE

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<b>Robert Bosch</b> , Sunnyvale, California <i>Research Intern</i> working on wireless AI project using UWB.	2022.06 – Present
<b>Mitsubishi Electric Research Laboratories</b> , Cambridge, Massachusetts <i>Research Intern</i> working on the coexistence of WiFi and ZigBee.	2021.05 – 2021.08

## 🏆 HONORS AND AWARDS

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<b>Best Paper Award</b> at ICDCS 2018.	Austrian Computer Society	2018
<b>Scholarship</b> for Visiting Ph.D. student.	China Scholarship Council	2015
<b>Top 1% (58/7184 teams)</b> Ali Mobile Recommendation Algorithm Competition.	Alibaba Group	2015
<b>Top 3% (10/370)</b> National Graduate Scholarship.	Ministry of Education in China	2012
<b>2nd-class (56/185)</b> Scholarship of Academics.	Harbin Institute of Technology	2011, 2012
<b>2nd-class</b> Chinese Mathematics Competition.	Chinese Mathematical Society	2010

## 📖 SELECTED PUBLICATION

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- [SECON'22] X-Disco: Cross-Technology Neighbor Discovery.  
**Shuai Wang**, Jianlin Guo, Pu Wang, Kieran Parsons, Philip Orlik, Yukimasa Nagai, Takenori Sumi, Parth Pathak.
- [SenSys'20] X-MIMO: Cross-Technology Multi-User MIMO.  
**Shuai Wang**, Woojae Jeong, Jinhwan Jung, Song Min Kim.  
In Proceedings of the 18th Conference on Embedded Networked Sensor Systems, pp.218-231. 2020.
- [MobiCom'20] SDR Receiver Using Commodity WiFi via Physical-Layer Signal Reconstruction.  
Woojae Jeong, Jinhwan Jung, Yuanda Wang, **Shuai Wang**, Seokwon Yang, Qiben Yan, Yung Yi, Song Min Kim.  
In Proceedings of the 26th Annual International Conference on Mobile Computing and Networking, pp.1-14. 2020.

4. [ICNP'20] SCLoRa: Leveraging Multi-Dimensionality in Decoding Collided LoRa Transmissions. *Bin Hu, Zhimeng Yin, Shuai Wang, Shuai Wang, Zhuqing Xu, Tian He.*  
In 2020 IEEE 28th International Conference on Network Protocols (ICNP), pp.1-11. IEEE, 2020.
5. [TMC] Networking Support For Bidirectional Cross-Technology Communication. *Shuai Wang, Zhimeng Yin, Shuai Wang, Yongrui Chen, Zhijun Li, Song Min Kim, Tian He.*  
IEEE Transactions on Mobile Computing, 20(1), pp.204-216.
6. [ICDCS'18] Symbol-level Cross-technology Communication via Payload Encoding. *Shuai Wang, Song Min Kim, Tian He.*  
In IEEE 38th International Conference on Distributed Computing Systems (ICDCS), pp.500-510. IEEE, 2018. **Best Paper Award**
7. [SenSys'18] Exploiting WiFi Guard Band for Safeguarded ZigBee. *Yoon Chae, Shuai Wang, Song Min Kim.*  
In Proceedings of the 16th Conference on Embedded Networked Sensor Systems, pp.172-184. 2018.
8. [DAWAK'17] Electric Vehicle Charging Station Deployment for Minimizing Construction Cost. *Kai Li, Shuai Wang.*  
In International Conference on Big Data Analytics and Knowledge Discovery, pp.471-485. Springer, Cham, 2017.

## Q RESEARCH EXPERIENCES

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- **Cross-technology Neighbor Discovery:** Designed and implemented "X-Disco" to enable a WiFi device to detect ZigBee neighbors, via exploring fine-grained PHY layer information collected at WiFi spectral scan. Validated the intuition of decoding ZigBee message at commodity WiFi. Implemented X-Disco on URSP and TP-link WiFi router. Related publications include [1].
- **Cross-technology MU MIMO:** Designed and implemented "X-MIMO" to support multi-user MIMO and enabled wireless sensing on low-power IoT devices. While the existing wireless sensing technique was mainly supported on the high-power WiFi-based systems, X-MIMO extended the wireless sensing and wireless localization to low-power IoT devices (ZigBee and Bluetooth, etc.). Extracted WiFi channel information on commodity WiFi device. Modified TinyOS on TelosB in NesC and Openwrt in C to support signal emulation. Achieved  $3\times$  performance gain in the throughput. Successfully extended wireless sensing to low-power IoT domain. Related publications include [2].
- **SDR-lite:** Turned a commodity WiFi device into a light-weight SDR and provided opportunity to perform spectrum sensing on smartphone. Modified and controlled WiFi ath9k driver in C to support 40MHz WiFi transmission and arbitrary center frequency change. Related publications include [3].
- **Cross-Technology Communication via Payload Encoding:** Designed "SymBee" system for enabling the direct communication from low-end (ZigBee, e.g., sensor) to high-end (WiFi, e.g., smartphone) wireless technologies at 31.25Kbps. Implemented SymBee on TinyOS in NesC to generate patterned ZigBee signals and controlled GNURadio in Python and C++ to demodulate ZigBee signals. Won the best paper award at ICDCS 2018. Applied "SymBee" in "NetCTC" to provide networking support for cross-technology communication. Related publications include [5, 6].
- **IoT communication via Guard Band Exploration:** Participated in "G-Bee" project, which achieves  $\geq 95\%$  packet reception rate for ZigBee via exploring the guard band provided by ambient 802.11b transmission. Proposed the theoretical analysis and proved "G-Bee" could be implemented on low-power microcontroller. Related publications include [7].
- **Ali Mobile Recommendation Algorithm Competition:** Proposed an effective and efficient data mining model in Ali Mobile Recommendation Algorithm Competition which focused on recommending items to users, given large-scale shopping history data ( $5M \times 0.4M$ ). Implemented the model using scikit-learn in Python. Achieved rank 58th out of 7186 teams from 813 universities in 40 countries.
- **Electric Vehicle Charging Station Deployment:** Utilized trajectories of taxis and housing information in Shenzhen to precisely estimate 99.98% the charging demand and save 24% charging station construction cost. Visualized the housing data on the map and performed the optimization in Python. Related publications include [8].


## TEACHING EXPERIENCE AT GMU

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- Teaching Assistance, CS583, Analysis of Algorithms. Spring 2022
- Teaching Assistance, CS483, Analysis of Algorithms. Fall 2021
- Teaching Assistance, CS630, Advanced Algorithms. Spring 2021
- Teaching Assistance, CS555, Computer Communications and Networking. Fall 2020
- Teaching Assistance, CS222, Computer Programming for Engineers. Fall 2017


## ACADEMIC SERVICES

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**Reviewer:** IEEE Transactions on Mobile Computing, ACM Transactions on Sensor Networks, ACM Transactions on Spatial Algorithms and Systems, IEEE Signal Processing Letters, Computer Communications, Sensors, IEEE Access, Sustainability, Symmetry, Algorithms, Applied Sciences, Designs, International Journal of Molecular Sciences.  
verifies by Publons:  <https://www.webofscience.com/wos/author/record/1384684>

## LEADERSHIP

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- Representative for CS Ph.D. Students at GAPSAs 2021 – Present  
 <https://gapsa.gmu.edu/about-gapsa/general-assembly/general-assembly-roster-for-2021-2022/>

## TECHNICAL SKILLS

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- Wireless Knowledge: Digital signal processing, Physical layer design of WiFi (802.11a/b/g/n/ac/ad/ah), ZigBee, LoRa, BLE and RFID, MAC layer protocols, Wireless Sensing.
- Wireless Systems: WiFi chip 9580/9380/9271, WiFi drivers (ath9k), WiFi firmware (open-ath9k-htc-firmware), OpenWRT, ZigBee Telosb/MicaZ/TI CC2420, BLE CC2650, USRP, GNURadio,
- Programming Languages/Tools: C, Python, Matlab, NesC, Java, SQL.