Cheng Xu

Address	No. 30, Xueyuan Rd. Haidian Dist., Beijing (China)	**Website**	http://xucheng.org.cn
		Telephone	+86 134-0116-9207
Birth	2 Feburary 1988 Liaoning (Chinese)	**E-mail**	xucheng@ustb.edu.cn
		Citizenship	Chinese

Education

Sept 2016 — Jan 2019 **Doctor of Philosophy (PhD)** • University of Science & Technology Beijing
Human Motion Tracking using Wearables
Thesis: Towards Human Motion Tracking: Study on Performance Evaluation and Algorithms for IMU/TOA Fusion.

Aug 2012 — Jan 2015 **Master of Science (MSc)** • University of Science & Technology Beijing
TOA Channel Modeling
Thesis: Height Dependent TOA Ranging Error Model For Near Ground Localization Applications.

Sept 2008 — Jun 2012 **Bachelor of Science (BSc)** • University of Science & Technology Beijing
Wireless Localization using TOA
Thesis: Design and Development of Android-based Conputing Engine for Indoor Geolocation system.

Employment & Social Activities

May 2019 — Now **Associate Professor** • University of Science & Technology Beijing
My research focuses on the use of statistical inference and cooperative computing methods that allow swarm robots to perform complex tasks collaborativly and intelligently in uncertainty environments.

May 2019 — Now **Associate Editor** • International Journal of Wireless Information Networks
Helping the Editor in Chief with submitted articles processing and organize special issues for wireless sensor networks.

Awards & Honours

2019 **China National Postdoctoral Program for Innovative Talents** • Ministry of Human Resources and Social Security
I obtained a talent funding program focusing on the research of *Collaborative Localization and Navigation for Emergency Rescue in Bilnd Environments*.

2019 **Excellent Doctoral Dissertation** • University of Science & Technology Beijing
I was honored by the University of Science & Technology Beijing for the Excellent Doctoral Dissertation. My work aims to solve the drift problem of traditional inertial measurement units (IMUs) based human motion tracking systems, by integrating Time of Arrival (TOA) sensors (a kind of wireless ranging sensor). With the introduction of distance parameters, it can significantly reduce the cost and the complexity of the system.

2018 **Science and Technology Innovation Award** • China Fire Protection Association

I devote myself to the research of navigation and positioning for emergency rescue applications. Using TOA technology, my research group developed a searching and rescue device and a supporting command system for first responders.

Research Topics

Intelligent Computing **Swarm Robotics & Statistical Inference** • May 2019 — Now

- The use of statistical inference and cooperative computing methods that allow swarm robots to perform complex tasks collaborativly and intelligently in uncertainty environments.
- Theoretical algorithms for cooperative computing with use of Bayesian statistical inference, belief propagation and probability graph model.

Internet of Things **Wireless Localization & Human Motiong Tracking** • Sept 2015 — Now

- Multi-source fusion navigation using statistical inference and deep learning methods. RFID (CSS/UWB) based wireless localization techniques, including error modeling, protocol and algorithm investigation.
- Human motion tracking and activity recognition techniques based on wearable sensors (such as inertial sensors and TOA sensors), including the design of recognition and tracking algorithms and the construction of software and hardware platforms.

Research Fundings

July 2020 — June 2021 **Research on TOA Signal Model and Key Algorithms for Emergency Rrescue Localization**
- China Postdoctoral Science Foundation

Jan 2020 — Dec 2021 **Research on Key Technologies of Wearable Human Movement Tracking**
- Guangdong Basic and Applied Basic Research Foundation

Aug 2020 — July 2021 **Wearable Human Movement Tracking**
- Special Project of Postdoctoral Research, Shunde Graduate School, USTB

July 2019 — June 2021 **Collaborative Localization and Navigation for Emergency Rescue in Blind Environments**
- China National Postdoctoral Program for Innovative Talents

May 2019 — April 2022 **Research on Key Technologies of Cooperative Target Tracking**
- Fundamental Research Funds for the Central Universities

Jan 2020 — June 2020 **Research on Collaborative Architecture of Cluster Tasks in Unstable Environment**
- Institute of Automation, Chinese Academy of Sciences

List of Publications

J14 **Xu C***, Wang X, Duan S, et al. Spatial-Temporal Constrained Particle Filter for Cooperative Target Tracking[J]. **Journal of Network and Computer Applications**, 2021, 176:102913.

J13 Duan S, Su R, **Xu C***, et al. Ultra-Wideband Radio Channel Characteristics for Near-ground Swarm Robots Communication[J]. **IEEE Transactions on Wireless Communications**. 2020, 19(7): 4715-4726.

J12 Wang X# , **Xu C#*** , Duan S , et al. Error-Ellipse-Resampling-Based Particle Filtering Algorithm for Target Tracking[J]. **IEEE Sensors Journal**, 2020, 20(99):5389-5397.

J11 Ma F#, **Xu C#***, Zhang X*, et al. Iterative Reweighted DOA Estimation for Impulsive Noise Processing Based on Off-Grid Variational Bayesian Learning[J]. **IEEE Access**, 2019, 7: 104642-104654.

J10 **Xu C**, Ji M, Qi Y, et al. MCC-CKF: A Distance Constrained Kalman Filter Method for Indoor TOA Localization Applications[J]. **Electronics**, 2019, 8(4): 478.

J9 **Xu C**, He J, Zhang X, et al. 3D Localization Performance Evaluation using IMU/TOA Fusion Methods[J]. **International Journal of Wireless Information Networks**, 2019, 26(2): 67-79.

J8 **Xu C**, He J, Zhang X, et al. Human Motion Tracking Performance Evaluation Method Based on IMU/TOA Fusion. **Acta Electronica Sinica**, 2019, 47(8): 1748-1754.

J7 **Xu C**, He J, Zhang X, et al. Recurrent Transformation of Prior Knowledge Based Model for Human Motion Recognition[J]. **Computational Intelligence & Neuroscience**, 2018, 2018:1-12.

J6 **Xu C**, He J, Zhang X, et al. Detection of Freezing of Gait Using Template-Matching-Based Approaches[J]. **Journal of Sensors**, 2017, 2017(2):1-8.

J5 **Xu C**, He J, Zhang X, et al. Towards Human Motion Tracking: Multi-Sensory IMU/TOA Fusion Method and Fundamental Limits[J]. **Electronics**, 2019, 8(2): 142.

J4 **Xu C**, He J, Li Y, et al. Optimal Estimation and Fundamental Limits for Target Localization using IMU/TOA Fusion Method[J]. **IEEE Access**, 2019, 7: 28124-28136.

J3 **Xu C**, Chai D, He J, et al. InnoHAR: A Deep Neural Network for Complex Human Activity Recognition[J]. **IEEE Access**, 2019, 7: 9893-9902.

J2 **Xu C**, He J, Zhang X, et al. Toward Near-Ground Localization: Modeling and Applications for TOA Ranging Error[J]. **IEEE Transactions on Antennas & Propagation**, 2017, 65(10):5658-5662.

J1 **Xu C**, He J, Zhang X, et al. Geometrical kinematic modeling on human motion using method of multi-sensor fusion[J]. **Information Fusion**, 2018, 41: 243-254.

C10 **Xu C**, Chen Y, Duan S, et al. Towards Human Motion Tracking: An Open-source Platform based on Multi-sensory Fusion Methods, **IEEE INTERNATIONAL CONFERENCE ON SYSTEMS, MAN, AND CYBERNETICS (IEEE SMC 2020)**, October 11-14, 2020, Toronto, Canada.

C9 **Xu C**, Chen Y, Duan S, et al. Cooperative Source Seeking in Scalar Field: A Virtual Structure-based Spatial-Temporal Method, **International Conference on Collaborative Computing: Networking, Applications and Worksharing (CollaborateCom 2020)**, October 16-18, 2020, Cyberspace.

C8 Zhou X, **Xu C***, He J, et al. A Cross-region Wireless-synchronization-based TDOA Method for Indoor Positioning Applications, **28th Wireless and Optical Communications Conference (WOCC 2019)**, Beijing, China.

C7 Duan S, Li Y, **Xu C***, et al. TOA based Target Tracking using Optimal Estimation Methods[C]//**2019 28th Wireless and Optical Communications Conference (WOCC 2019)**. IEEE, 2019: 1-5.

C6 **Xu C**, He J, Zhang X, et al. Toward Human Motion Sensing: Design and Performance Evaluation of a Minimized Wearable Platform Using Inertial and TOA Sensors[C]//**International Conference on Intelligent and Interactive Systems and Applications (IISA 2018)**. Springer, Cham, 2018: 95-102.

C5 **Xu C**, He J, Zhang X, et al. Template-matching-based detection of freezing of gait using wearable sensors[J]. **Procedia Computer Science (IIKI 2017)**, 2018, 129: 21-27.

C4 **Xu C**, He J, Zhang X. Hierarchical Decision Tree Model for Human Activity Recognition Using Wearable Sensors[C]//**International Conference on Intelligent and Interactive Systems and Applications (IISA 2017)**. Springer, Cham, 2017: 367-372.

C3 **Xu C**, He J, Zhang X, et al. DFSA: A Classification Capability Quantification Method for Human Action Recognition, **IEEE Ubiquitous Intelligence and Computing (UIC 2017)**, Aug.4-8, 2017, San Francisco, USA.

C2 **Xu C**, He J, Liu F, et al. MLOC: A Multiple Service Fusion Self-Organizing Geolocation System[M]//**Advanced Technologies in Ad Hoc and Sensor Networks (CWSN 2014)**. Springer, Berlin, Heidelberg, 2014: 247-261.

C1 **Xu C**, He J, Liu F, et al. ZTDMA: A Multi-zones and Multi-objectives Channel Allocation Protocol Based on TOA Real-Time Geolocation System[M]//**Advanced Technologies in Ad Hoc and Sensor Networks (CWSN 2014)**. Springer, Berlin, Heidelberg, 2014: 233-245.