

AIMA4Edu: AI-based Multimodal Analytics for Understanding Human Learning in Real-World Educational Contexts

Format: One day workshop. Program includes invited talks, presentations, discussion, final panel discussion, and future plans.

Proposed Schedule:

- 08:30 - 08:40 Welcome remarks
- 08:40 - 09:00 Overview of the shared dataset
- 09:00 - 09:30 Invited talk (1)
- 09:30 - 10:00 Contributed talks (2)
- 10:00 - 10:30 Coffee break
- 10:30 - 11:30 Invited talks (2)
- 11:30 - 12:00 Contributed talks (2)
- 12:00 - 14:00 Lunch break
- 14:00 - 15:00 Invited talks (2)
- 15:00 - 16:00 Contributed talks (2)
- 16:00 - 17:00 Panel Discussion
- 17:00 Closing remarks

Scope and Objectives

Human learning is a complex interactive and iterative process that takes place at a very fine grained level. However, our ability to understand and support this fascinating latent learning process is often limited by what we can perceive and how we can measure. Recent advances of sensing technology and accompanying techniques for processing multimodal data, which manifest the psychological as well physiological processes during the human learning process, give us a new opportunity to look at this classical problem with a new pair of lens. The emerging new type of data includes, but not limited to, student's physiological signals such as EKG or EEG waveforms, students' speech, facial expressions and postures, within the context of particular learning activities. We are particularly interested in those data gathered from the real world educational activities versus those from the controlled lab environment.

In this 3rd annual convening of the AIMA4EDU workshop, we expand topic areas to include nascent methodological areas and work beginning to apply multimodal data and AI to support learners. We will continue to explore cross-field experience from healthcare, HCI, neural science, etc. A multimodal dataset collected by Squirrel AI Learning is published on the workshop's website (<https://www.aima4edu.com/>), and we also encourage attendants to share more data to the community for research purposes only.

Relevant topic areas include (but not limited to):

- Predicting learning and/or affect from multimodal data streams
- Visualizing and representing multimodal data for human inference
- Constructing models of learning interactions

IJCAI 2021 Workshop on AIMA for Education

- Evaluating learning designs and/or learning components
- New analytic tools and techniques for connecting learning with multimodal data, especially on model interpretability and fairness
- Using multimodal data to inform data-driven interventions for better learning and engagement
- Frameworks and models for better applicability and generalizability of multimodal learning analytics
- Challenges associated with multimodal integrated behavioral and affective analyses
- The engineering and modeling around multi-modal sensor synchronization
- Comprehensive user state interpretation and forecast
- Interface and HCI design around data collection and feedback mechanism
- Standardization for data format and processed around MIBA
- Collaboration of students with coaches and collaboration between students in a group within the AI supported classroom environment
- Implication of multimodal data for recommendation
- Multimodal data sharing best practices, incentives and mechanisms, including data protection, ethical use of data, and governance.
- Ethical AI for education data analytics
- Federated Learning for privacy-preserving educational data analytics

This conference format will be:

- Presentations of peer-reviewed papers, including discussions
- Final panel discussion on needs and challenges for the future

Related Workshop at IJCAI: None

This workshop is a follow-up to our IJCAI '20 workshop by the same name. It focuses on exploiting AI-based multimodal data processing methods to understand how to leverage big data, collected from multiple modalities, in an education context and advance new educational applications fuelled by AI.

Paper Submission and Publication

- Authors should submit papers in IJCAI-2021's format as PDF (Springer Format) on easychair (<https://www.easychair.org/>) To be updated, or send to richard@yixue.us (primary contact)

Important Dates

- Paper submission ultimate deadline: **June 20th, 2021**
- Notification of acceptance/rejection: July 4th, 2021
- Camera-ready version deadline: August 3rd, 2021
- Conference 21st-26th August, **2021**, **The workshop date will be communicated after acceptance)**

Organizing Committee

1. Richard Tong (Yixue Squirrel AI and IEEE, richard.tong@ieee.org)

2. Edgar Kalns (SRI International, edgar.kalns@sri.com)
3. Yiqiang Chen (Institute of Computing Technology, yqchen@ict.ac.cn)
4. Feiyue Wang (Institute of Automation, feiyue.wang@ia.ac.cn)

Members of program committee (tentative):

1. Guodong Long (University of Technology Sydney, guodong.long@uts.edu.au)
2. Zachary Pardos (UC Berkeley, pardos@berkeley.edu)
3. Edgar Kalns (SRI International, edgar.kalns@sri.com)
4. Lingfei Teddy Wu (IBM Watson)
5. Tom Mitchell (Carnegie Mellon University)
6. LP Morency (CMU)
7. Kang Lee (U. of Toronto)
8. Jonathan Rowe (North Carolina State University)
9. Jing Jiang (University of Technology Sydney)
10. Shirui Pan (Monash University)
11. Marcelo Worsley (Northwestern University)
12. Dor Abrahamson (University of California, Berkeley)
13. Paulo Blikstein (Columbia Teacher's College)
14. Bertrand Schneider (Harvard University)
15. Shuchi Grover (SRI International)
16. Mike Tissenbaum (University of Wisconsin, Madison)
17. Joseph Grafsgaard (North Carolina State University)
18. Sen Wang (University of Queensland)
19. Lina Yao (University of New South Wales)
20. Lujie Karen Chen (Carnegie Mellon University)
21. Fangli Xu (Squirrel AI Learning)

JARUI “RICHARD” TONG

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Highland Park, NJ 08904

Richard Tong is the Chief Architect and General Manager of US Operations, Squirrel AI Learning by Yixue Education Group and also the Chair of IEEE Learning Technology Standards Committee, serving the two-year term for 2020-2021.

EDUCATION

MA	University of Alabama, Finance	Dec. 1995
MA	University of Alabama, Economics	May. 1994
BA	Renmin University of China, International Finance	Jul. 1991

EXPERIENCE

Chief Architect and General Manager of US Operations, **Squirrel AI Learning by Yixue Education Group**, 2016 - Present

- Established and lead the R&D effort for the international operations and our collaboration with leading research and academic intuitions in North America, Europe and Australia for Yixue Education, the leading AI-powered Adaptive Education Service Provider for K-12 after-school and supplementary learning.
- Lead the AI and data science research as well as the product implementation of advanced adaptive models.
- Lead the advanced technology and data science research efforts and collaborate with U.S. industry and academia; currently running 3 AI projects with SRI (Stanford Research Institute), 4 projects under CMU Squirrel AI Research Lab, as well as projects with NSF Big Learning Center at the University of Florida, with NSF Learning Analytics at the University of Memphis, with UC Berkeley, with Stanford MediaX, with IIIA in Spain, and with UTS in Australia.

Chair, **IEEE Learning Technology Standards Committee**, 2019 – Present (Part-time)

- I was elected to become the chair of IEEE LTSC in fall of 2019 for term 2020-2021

Senior Implementation Architect, **Knewton Inc.**, 2015 - 2016

- Lead the big-data and adaptive API implementation of Knewton personalized learning platform for education partners in China and Singapore.
- Launched the strategic K-12 adaptive pilot ELT and Math products for 17Zuoye.com for 450,000 students in China.
- Launched the Marshall Cavendish Education MCEduWorld adaptive math pilot product in Singapore.

Interim CTO, **Phoenix New Media Ltd. (NYSE:FENG)**, 2014 - 2015

- Lead ifeng's technology departments and provide technology direction and product strategy to drive innovation in mobile and interactive services.

Director of Solution Architecture, **Amplify Education**, 2011 - 2014

- Lead the technology efforts of the consulting business unit.
- Architect the major winning solutions for major education institutional clients.
- Lead the technology design and oversee architecture and technology analysis.

Director of Distribution and Data Solutions, **PR Newswire**, Jersey City, NJ, 2009 - 2011

- Managed the Solution Delivery for Distribution and Data Portfolio that covers the distribution platforms, master data management systems and global media database application.

VP and Co-founder, **Heng Zhun Technology Inc.**, Beijing China, 2005 - 2009

- Heng Zhun is a start-up which operates the online TV guide in China.

CTO and Co-founder, **UITV/China Netwave**, Beijing, China, 2004 - 2005

- Start-up in IPTV and internet video on demand service in China;

Manager of Enterprise Software Engineering, **Wolters Kluwer, Corporate Legal Services**
New York City, 2001 - 2004

- Managed the enterprise application integration department and ERP development department. Successfully led and launched JDE OneWorld in 2003.

CTO

Global Villager Inc./Startec

New York City

1999 - 2001

- GV is a multicultural community web portal and e-commerce start-up. It was acquired by Startec Global Communication in 2000 for USD 13M.

Web Group Lead

BASF, Advanced Technology Group

Mount Olive, NJ

1996 - 1998

- Managed ERP integration, web technologies, extranet, and security

Programmer

IBM, Network Software Division

Research Triangle Park, NC

1995 - 1996

- Internet connection server dev (logging and traffic analysis modules)

PUBLICATIONS

Book Chapters

- **Richard Tong**, Jonathan Rowe, & Benjamin Goldberg, Chapter 3 – Architecture Implications for Building Macro and Micro Level Self-Improving AISs, Design Recommendations for Intelligent Tutoring Systems: Volume 7 - Self-Improving System, ISBN Number: 978-0-9977257-7-3, Edited by Anne M. Sinatra, Arthur C. Graesser, Xiangen Hu, Keith Brawner, Vasile Rus, US Army Research Laboratory, Human Research & Engineering Directorate, Orlando, Florida, 2019
- Xiangen Hu, **Richard Tong**, Zhiqiang Cai, Jody L. Cockroft, & Jong W. Kim, Chapter 2 - Self-Improvable Adaptive Systems (SIAISs) – A proposed model, Design Recommendations for Intelligent Tutoring Systems: Volume 7 - Self-Improving System, ISBN Number: 978-0-9977257-7-3, Edited by Anne M. Sinatra, Arthur C. Graesser, Xiangen Hu, Keith Brawner, Vasile Rus, US Army Research Laboratory, Human Research & Engineering Directorate, Orlando, Florida, 2019

Conference Papers

- KP Thai and **Richard Tong**, "Interoperability Standards for Adaptive Instructional Systems: Vertical and Horizontal Integrations," Proceedings of HCII, 2019
- **Richard Tong** and KP Thai, "Interoperability Standards for Adaptive Instructional Systems: Summary of Use Cases," Proceedings of I/ITSEC, Dec. 4, 2019
- ShimengPeng, Lujie Chen, ChufanGao and **Richard Tong**, "Predicting Students' Attention Level with Interpretable Facial and Head Dynamic Features in an Online Tutoring System", Feb. 2020, AAAI

PRESENTATIONS AND INVITED TALKS

2019:

AAAI-2019, Hawaii, USA

ASU-GSV 2019, California, USA

AIED-2019, Chicago, US

IJCAI-2019, Macao, China

IEEE ICICLE 2019, Virginia, USA

Stanford MediaX Fall 2019, CA, USA

Harvard ITEC 2019, Boston, MA, USA

NSF AI for K12 Workshop 2019, Los Angeles, CA, USA

2018:

CSEDU-2018, Funchal, Portugal

ASU-GSV 2018, San Diego, CA, USA

AIED-2018, London, US

IJCAI-2018, Stockholm, Sweden

IEEE BigData 2018, Seattle, WA, USA

INACOL-2018, Nashville, USA

NeurIPS 2018, Montreal, CA

PROFESSIONAL AFFILIATIONS

IEEE, 2017-Present

- Besides the LTSC Chair duty, I am also a current member of the IEEE AIS (Adaptive Instructional Systems) Standard working group (IEEE 2247.x), IEEE ICICLE (IC Industry Consortium on Learning Engineering) and IEEE FML (Federated Machine Learning) working group.
- As a former chair, I led the AIS interoperability effort for IEEE 2247.2.

AAAI, 2017-Present

ACM, 2018-Present

PROFESSIONAL SERVICE

Conference Committees

- Workshop Co-chair, AIED 2020, Morocco
- Industry Co-chair, IJCAI 2020, Japan

Conference/Workshop Co-Organizer

- AIAED, 1st ~ 5th, International Conference on AI + Adaptive Education, 2018~2020
- IJCAI 2020, AIMA4Edu: AI-based Multimodal Analytics for Understanding Human Learning in Real-World Educational Contexts, Japan, 2020
- AIED 2019, Standardization Opportunities for AI in Education, 6.25-29, 2019, Chicago, USA
- KDD 2019, Deep Learning on Graphs: Methods and Applications (DLG'19), 8.4-8, 2019, Anchorage, Alaska, USA
- HCII/AIS 2019, Conceptual Models and Interoperability & Competency Modeling, 7.26-31, 2019, Orlando, Florida
- ASU-GSV 2019, Workshop on AI in Education, Standards and Practices, Apr. 2019, San Diego, CA, USA

REFERENCES

Dr. Tom Mitchell, CMU
Dr. Xiangen Hu, University of Memphis
Dr. Robby Robson, Eduworks and IEEE

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SUMMARY

Hands-on, innovative software engineering executive specializing in the commercialization and productization of cutting-edge research in the realm of human-to-machine interactions. Specific expertise in speech recognition/analytics, natural language processing, and computer vision technologies that at their core leverage artificial intelligence, machine learning and ontological techniques. Extensive experience managing global product development teams from early prototype through product release. Proven ability to recruit, mentor, and grow organizations, delivering exceptional consumer experiences and business value.

PROFESSIONAL EXPERIENCE

SRI International, Menlo Park, CA

Director of AI Platforms & Studio on Aging

Oct 2015 – present

June 2012 – May 2014

- Lead the SRI cloud services platform team to accelerate the leap from research innovations to licensable software products. Conceived the idea, formulated the business strategy, and recruited the team to launch and sustain the initiative. In less than a year, created a microservices based platform and Developer Portal. The platform provides a self-service capability for developers to experiment with an initial set of four microservices in the realm of speech dictation, speech analytics, natural language intent understanding, and computer vision.
- Lead customer prototype development for human-to-machine multi-modal and conversational interactions. These prototypes have been demonstrated in a variety of environments and verticals including automotive, banking, retail, and education.
- Lead a multi-disciplinary research initiative to help dialog systems to better adapt to end-user confusion or disengagement during a human-machine conversation.
- Contribute extensively to SRI's patent portfolio, SRI venture incubation, and world-wide business development.

[24]7 Customer Inc., Campbell, CA

Head of Products & Engineering

May 2014 – Oct 2015

- [24]7 enables intuitive consumer experiences for Global 100 enterprises, providing the cloud platform and applications to automate customer care interactions across multiple channels and devices.
- Reporting to the CEO, led the overall strategy, roadmap, and development of [24]7's entire portfolio of products that serve millions of consumer interactions daily. Products comprise natural language & automated speech recognition (ASR), virtual assistant, desktop and mobile assisted chat, and big data prediction analytics services hosted in multi-tenant, redundant data centers.
- Led a team of 170 software development engineers, product and program managers that define, build, and maintain the aforementioned product portfolio. Team based in Campbell, CA, Toronto, Canada, and Bangalore, India.

Easilydo, Inc., Menlo Park, CA

Vice President Engineering

May 2011 – May 2012

- Easilydo creates mobile application to help consumers be more productive by automating tasks. Based on the concept of a cloud-based "do engine", Easilydo automates tasks such as delivering birthday greetings and E-gift cards, merging address book duplicates, and connecting the consumer with conference calls at the touch of a button.
- As the company's chief technical resource, recruited an engineering team comprising mobile user experience designers, software engineers, and quality assurance specialists.
- Led the design and implementation through release of the first Easilydo iPhone application and the cloud' based infrastructure to host consumer data and the "do engine". The Easilydo cloud solution utilized Google App Engine, ensuring seamless, synchronized data access from any iPhone or iPad device.

Nuance Communications, Sunnyvale, CA
Senior Director, On-demand Professional Services & Network Operations

April 2007 – May 2011

- Responsible for end-to-end delivery of IVR and mobile care solutions for customer contact centers. These SaaS applications provide Fortune 500 companies' customers with self-service capabilities via IVR or mobile handset-based modalities. These scalable solutions support millions of calls daily adhering to very stringent customer SLA's and contribute millions of dollars of revenue annually.
- Led a team of 60 comprising managers, software developers, user experience designers, speech scientists, quality assurance engineers, program/project managers, and operations support personnel in multiple locations in the U.S., Canada, Morocco, and India.
- Drove performance analysis and continuous improvement of customers' solutions to achieve higher consumer satisfaction, up-sell offers, and increased automation.
- Responsible for network and sustaining operations, including Change Management, Incident Management, Root Cause Analysis, and problem resolution. Managed the Network Operations Center for solutions across multiple data centers, 24x7. Strategized and negotiated customer SLA contracts.

BeVocal, Mountain View, CA
Manager, Solutions Architecture

Aug 2006 – April 2007 (acquired by Nuance)

- Responsible for SaaS solutions architecture providing automated customer service for several Telco and wireless providers. Scalable, high volume solutions comprise IVR application, ASR platform, web services, back-end data and telephony interfaces and connectivity, data warehouse and real-time reporting capabilities.
- Employed novel techniques to individualize caller experiences based on real-time access to customer data and heuristics around the purpose of individual calls.

EDUCATION

Ph.D., M.S. Computer Science, Michigan State University, E. Lansing, MI
Dissertation: *Scalable Data Redistribution Services For Distributed-Memory Machines*

B.S. Honors Computer Science, University of Michigan, Ann Arbor, MI

PATENTS

- Rapid Development of Virtual Personal Assistant Applications (US9081411B2; grant date: 2016-11-08)
- Using Intents to Analyze and Personalize a User's Dialog Experience with a Virtual Personal Assistant (US9875494B2; grant date: 2018-01-23)
- Sharing intents to provide virtual assistance in a multi-person dialog (US10096316B2; grant date: 2018-10-09)
- VPA with integrated object recognition and facial expression recognition (US20170160813A1; application date: 2017-06-08)

Yiqiang Chen

Research Center for Ubiquitous Computing System
Institute of Computing Technology, Chinese Academy of Sciences
yqchen@ict.ac.cn



WORK & EDUCATION EXPERIENCE:

- 2013--Present Director, Research Center for Ubiquitous Computing System, Institute of Computing Technology (ICT), Chinese Academy of Sciences (CAS)
- 2010--2012 Professor of ICT, CAS
Research fellow of Nanyang Technological University (NTU)
- 2007--2010 Associate Professor of ICT, CAS
Vice Director of Pervasive Computing Research Center of ICT, CAS
- 2004--2007 Associate Professor of ICT, CAS
Vice Director-General of ICT Shanghai division
- 2003--2004 Assistant Professor and Associate Professor of ICT, CAS
PostDoc of Hong Kong University of Science and Technology
- 1999--2003 Ph.D., Computer Application Technology, ICT, CAS

RESEARCH INTERESTS:

- Artificial Intelligence Pervasive Computing
- Federated Learning Wearable Computing
- Human Computer Interaction Healthcare Application

HONORS (Since 2015):

- 2019 IJCAI Best Application Paper Award: “*FedHealth: A Federated Transfer Learning Framework for Wearable Healthcare*” (Federated Learning workshop)
- 2019 National Ten Thousand Talent Program
- 2018 Youth Science and technology innovation leader, Ministry of Science and Technology
- 2018 ICCSE Best Paper Award: “*Deep Transfer Learning for Cross-domain Activity Recognition*”
- 2017 IJIT Best Paper Award: “*Multi-culture face attractiveness enhancement based on double knowledge transferring*”
- 2017 National Patent Award: “*A method and system for generating video outline*”
- 2017 CCF Scientific and Technological Award: “*Barrier-free mobile computing techniques and applications*”
- 2016 AAAI Best Demo Award: “*Artificial intelligence for livable cities*”
- 2016 National Scientific and Technological Award for navigation and localization: “*Progressively adaptive indoor localization techniques and applications*”
- 2016 Beijing Scientific and Technological Award: “*Barrier-free mobile computing techniques and applications*”
- 2015 Beijing Scientific and Technological Award: “*Tele-immersive interaction techniques and*

applications”

- 2015 PlatCon Best Application Paper Award: “*New Method for Spatial Scalable Video Quality Evaluation*”

ACADEMIC WORK:

- **Associate Editor** for IEEE TETCI, IEEE ACCESS, IJMLC, CCF TPCI, etc.
- **General chair** for UIC 2019, **Publicity chair** for IJCAI 2019, Program chair for PCC 2017
- **TPC** for ICA 2019, ISWC 2018, ICAA 2018, PerCom 2017/2016, ICCSE 2017, PCC 2017, AAAI 2015
- **Leader of IEEE P2961** work group (Collaborative Edge Computing)
- **Chair for IDIH Preventive Care**
- The **only Chinese member** for Wearable Computing Standard Committee, European Computer Manufacturers Association (ECMA)
- **Co-founder** for Interactive and Wearable Computing and Devices Technical committee, IEEE International Conference on Systems, Man, and Cybernetics (SMC)
- **Keynote/Invited speaker** for:
 - 2019 IEEE Smart World Congress
 - 2019 IEEE ICAA (International Conference on Ageless Aging)
 - 2019 FL-NeurIPS (Conference on Neural Information Processing Systems)
 - 2017 ELM (International Conference on Extreme Learning Machine)
 - 2016 PerCom Ph.D Forum (International Conference on Pervasive Computing and Communications)
 - 2016 ICCSE (International Conference on Crowd Science and Engineering)

REPRESENTATIVE PAPERS:

- Yingwei Zhang, **Yiqiang Chen***, Hanchao Yu, Zeping Lv, Xiaodong Yang, Chunyu Hu, Tengxiang Zhang: What can “drag & drop” tell? Detecting mild cognitive impairment by hand motor function assessment under dual-task paradigm. *Int. J. Hum. Comput. Stud.* 145: 102547 2021. (Top HCI Trans)
- **Yiqiang Chen***, Xin Qin, Jindong Wang, etc. FedHealth: A Federated Transfer Learning Framework for Wearable Healthcare. *IEEE Intelligent Systems*, 2020. (IJCAI-FL Best Application Paper Award)
- Jindong Wang, **Yiqiang Chen***, etc. Transfer Learning with Dynamic Distribution Adaptation. *ACM Trans. on Intelligent Systems and Technology*, 2020, 11(1): 1-25. (ACM MM Top10 Paper)
- Chunyu Hu, **Yiqiang Chen***, etc. A novel feature incremental learning method for sensor-based activity recognition. *IEEE Trans. on Knowledge and Data Engineering* 31, no. 6 (2019): 1038-1050. (CCF A)
- **Yiqiang Chen***, Chunyu Hu, Bin Hu, etc. Inferring cognitive wellness from motor patterns. *IEEE Trans. on Knowledge and Data Engineering* 30, no. 12 (2018): 2340-2353. (CCF A)
- Yang Xiaodong, **Yiqiang Chen***, Hanchao Yu, Yingwei Zhang, Wang Lu, and Ruizhe Sun. Instance-Wise Dynamic Sensor Selection for Human Activity Recognition[C]//Proceedings of the AAAI Conference on Artificial Intelligence. 2020, 34(01): 1104-1111. (CCF A) .

- Jiang, Xinlong, **Yiqiang Chen***, Wuliang Huang, Teng Zhang, Chenlong Gao, Yunbing Xing, and Yi Zheng. "WeDA: Designing and Evaluating A Scale-driven Wearable Diagnostic Assessment System for Children with ADHD." In Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems, pp. 1-12. 2020 (CCF A) .
- Yingwei Zhang, **Yiqiang Chen***, Hanchao Yu, Zeping Lv*, Qing Li, Xiaodong Yang. Bridging Cross-Tasks Gap for Cognitive Assessment via Fine-Grained Domain Adaptation[C]. Proceedings of the 29th International Joint Conference on Artificial Intelligence(IJCAI), 2020: 4330-4337. (CCF A)
- Qin Xin, **Yiqiang Chen***, Jindong Wang, and Chaohui Yu. Cross-Dataset Activity Recognition via Adaptive Spatial-Temporal Transfer Learning. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 3, no. 4 (2019): 1-25 (CCF A) .
- Wang Jindong, Wenjie Feng, **Yiqiang Chen***, Han Yu, Meiyu Huang, and Philip S. Yu. Visual domain adaptation with manifold embedded distribution alignment. In Proceedings of the 26th ACM international conference on Multimedia, pp. 402-410. 2018 (CCF A)

Feiyue WANG
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Fei-Yue Wang (S'87–M'89–SM'94–F'03) received his Ph.D. degree in computer and systems engineering from the Rensselaer Polytechnic Institute, Troy, NY, USA, in 1990. He joined The University of Arizona in 1990 and became a Professor and the Director of the Robotics and Automation Laboratory and the Program in Advanced Research for Complex Systems. In 1999, he founded the Intelligent Control and Systems Engineering Center at the Institute of Automation, Chinese Academy of Sciences (CAS), Beijing, China, under the support of the Outstanding Chinese Talents Program from the State Planning Council, and in 2002, was appointed as the Director of the Key Laboratory of Complex Systems and Intelligence Science, CAS. In 2011, he became the State Specially Appointed Expert and the Director of the State Key Laboratory for Management and Control of Complex Systems.

His current research focuses on methods and applications for parallel intelligence, social computing, and knowledge automation. He is a fellow of INCOSE, IFAC, ASME, and AAAS. In 2007, he received the National Prize in Natural Sciences of China and became an Outstanding Scientist of ACM for his work in intelligent control and social computing. He received the IEEE ITS Outstanding Application and Research Awards in 2009 and 2011, respectively. In 2014, he received the IEEE SMC Society Norbert Wiener Award. Since 1997, he has been serving as the General or Program Chair of over 30 IEEE, INFORMS, IFAC, ACM, and ASME conferences. He was the President of the IEEE ITS Society from 2005 to 2007, the Chinese Association for Science and Technology, USA, in 2005, the American Zhu Kezhen Education Foundation from 2007 to 2008, the Vice President of the ACM China Council from 2010 to 2011, the Vice President and the Secretary General of the Chinese Association of Automation from 2008-2018. He was the Founding Editor-in-Chief (EiC) of the International Journal of Intelligent Control and Systems from 1995 to 2000, the IEEE ITS Magazine from 2006 to 2007, the IEEE/CAA JOURNAL OF AUTOMATICA SINICA from 2014-2017, and the China's Journal of Command and Control from 2015-2020. He was the EiC of the IEEE Intelligent Systems from 2009 to 2012, the IEEE TRANSACTIONS ON Intelligent Transportation Systems from 2009 to 2016, and is the EiC of the IEEE TRANSACTIONS ON COMPUTATIONAL SOCIAL SYSTEMS since 2017, and the Founding EiC of China's Journal of Intelligent Science and Technology since 2019. Currently, he is the President of CAA's Supervision Council, IEEE Council on RFID, and Vice President of IEEE Systems, Man, and Cybernetics Society.

Google Scholar: <https://scholar.google.com/citations?user=3TTXGAoAAAAJ&hl=en>

DBLP: <https://dblp.org/pid/14/374-1.html>