

Large-scale Time Sensitive Networking for Smart Aircraft Assembly and Testing

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Abstract

As a new generation of deterministic networking technology, Time-Sensitive Networking (TSN) enables real-time, reliable, and deterministic transmission of heterogeneous data. How to supporting the ubiquitous sensing, real-time decision-making, and collaborative control of all elements in the smart manufacturing, such as automatic aircraft assembly, has become challenging for the large-scale TSN. In this talk, an industrial field-level flat architecture is discussed based on TSN as the backbone network for smart aircraft assembly and testing. The following techniques are presented: dynamic scalable on-demand adaptive transmission for TSN, deterministic mechanism design for industrial wired/wireless cross-network, and TSN system optimization for sensing-transmission-control collaboration. The correlation feature learning scheme and resource pre-allocation strategy are given for process matching to reduce transmission delay and jitter, and improving communication resource utilization efficiency. TSN gateway devices and the testbed are developed to ensure the performance of heterogeneous data transmission, flexible configuration and dynamic networking of multiple devices.



Cailian Chen received the B. Eng. and M. Eng. degrees in Automatic Control from Yanshan University, P. R. China in 2000 and 2002, respectively, and the Ph.D. degree in Control and Systems from City University of Hong Kong, Hong Kong SAR in 2006. She has been with the Department of Automation, Shanghai Jiao Tong University since 2008. She is now a Distinguished Professor. Prof. Chen's research interests include industrial wireless networks and computational intelligence. She has authored 3 research monographs and over 100 referred international journal papers. She is the inventor of more than 30 patents. She was a recipient of the prestigious IEEE Transactions on Fuzzy Systems Outstanding Paper Award, IEEE TCCPS Industrial Technical Excellence Award, and 5 conference best paper awards. She was awarded N2Women Top Ten Star in Computer Networking and Communications in 2022. She won the Second Prize of National Natural Science Award from the State Council of China in 2018. She was honored "National Outstanding Young Researcher" by NSF of China in 2020, "Changjiang Young Scholar" in 2015 and China Young Women Scientists Award in 2023. She is a Distinguished Lecturer of IEEE VTS. She serves as Deputy Editor of National Science Open, and Associate Editor of IEEE Transactions on Vehicular Technology and IET Cyber-Physical Systems: Theory and Applications.