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Co-design of edge sensing, transmission, and computing for industrial network systems



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摘要:

With the rapid development of industrial Internet of Things technology, numerous sensing, communication, execution terminals, and edge computing units are integrated into industrial sites, forming a high-dimensional dynamic system at the field level. This system is characterized by highly coupled communication and control, limited resources, heterogeneous requirements, and frequent task-related interactions. There is an urgent need to enhance field-level capabilities in "dynamic scheduling, on-demand interconnection, and efficient collaboration." To address this, our report focuses on the industrial production process, examining the intrinsic connection between control performance and network resources. We delve into the co-design problem of edge sensing, communication, and computing, using Age of Task (AoT) as a key indicator. Our goal is to achieve reliable transmission and efficient processing of sensing information for control needs within the constraints of network resources. This research provides important theoretical support for the smooth and reliable operation of industrial edge network systems.

简介:

Xiaojing Wen received the B.E. degree in measurement and control technology and instrumentation (signal processing and instrumentation) from Jilin University Changchun, China, in 2018. She is currently a Ph.D candidate in Shanghai Jiao Tong University supported by Zhiyuan Honors Program. And she has been a visiting Ph.D student at the City University of Hong Kong. Her research interests include sensing-communication-computing co-design, edge-assisted industrial IoT systems, and industrial network slicing.