

Sensors and machine learning and AI operation-constrained process control method for sensor-aided industrial internet of things and smart factories

Abstract

The Industrial Internet of Things (IIoT) incorporates intelligent computing and artificial intelligence paradigms in smart factories for ease of production and human-less interventions. The controlling unit is integrated into the smart operations in managing, controlling, and monitoring industrial operations. This article introduces an Operation-Constrained Process Control (OCPC) for preventing time-lag errors between smart machine operation cycles. The proposed method considers the operational cycles, completion time, and output efficiency metrics for identifying time lags and errors in production. Depending on the maximum productivity-based outcomes, further allocations or modifications in the regular operational cycles are identified. The productivity is analyzed based on the previous outcomes using federated learning. This learning implies multi-sensor knowledge update and production efficiency through repeated training. Therefore, the errors in cycle assignment and production completion are synchronized under controlled error. This method is analyzed using time lag, error, production efficiency, and training instances.

Keywords

AI; Federated learning; IIoT; Multi-sensor; Process control